



Kemin-Balykchy OHTL and Balykchy Substation

Environmental & Social Impact Assessment (ESIA): Volume III – Technical Appendices

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Appendices

Technical appendix 1: Kemin-Balykchy scoping report and ESIA TOR	4
Technical appendix 2: Critical Habitat Assessment	364
Technical appendix 3: Noise and Air Quality baseline survey report	409
Technical appendix 4: Soil and water assessment report	505
Technical appendix 5: Traffic count report	532
Technical appendix 6: VP Bird Monitoring report (Spring 2025)	558
Technical appendix 7: Raptor nesting survey report (Spring 2025)	579
Technical appendix 8: Mammal survey report (Spring 2025)	593
Technical appendix 9: Reptile survey report (Spring 2025)	608
Technical appendix 10: Bat roost survey report (Spring 2025)	627
Technical appendix 11: Fish survey (Spring 2025)	648
Technical appendix 12: VP Bird Monitoring report (Autumn 2024)	690
Technical appendix 13: VP Bird Monitoring report (Spring 2024)	756
Technical appendix 14: Raptor nesting survey report	846
Technical appendix 15: Botanical report	860
Technical appendix 16: Breeding bird survey near Issyk Kul report Spring 2024	1041
Technical appendix 17: Waterbird winter survey report	1060
Technical appendix 18: Canyon visual survey report	1081
Technical appendix 19: Archaeological Field Studies	1112

Technical appendix 1: Kemin-Balykchy scoping report and ESIA TOR



Kemin-Balykchy OHTL

Environmental & Social Impact Assessment (ESIA): Scoping Report

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Table of Contents

1	Introduction	12
1.1	Background.....	12
1.2	Purpose of the scoping report.....	12
1.3	Project proponent	13
1.4	ESIA team and Project contact information.....	13
1.5	Structure of the scoping report	14
2	Policy, Legislative and Institutional Framework	16
2.1	Main entities	16
2.2	Kyrgyz Republic environmental regulatory context.....	16
2.3	Green Energy Policy	18
2.4	Environmental Law	22
2.5	Applicable E&S Legislation and Standards	27
2.6	Applicable National Environmental Standards	28
2.7	Labour and Employment.....	42
2.8	Lender requirements	44
2.9	International conventions and agreements	49
3	Project Description.....	51
3.1	Summary of needs case and analysis of alternatives.....	51
3.2	Analysis of Alternatives.....	52
3.3	Project location.....	57
3.4	Project setting.....	57
3.5	Project components	70
3.6	Stages of the project cycle.....	79
3.7	Other activities.....	83
3.8	Neighbouring and future planned projects.....	86
4	Baseline Conditions.....	89
4.1	Introduction	89
4.2	Defining the AOI	89
4.3	Geographic overview	93
4.4	Physical baseline	94
4.5	Land Use.....	136

4.6	Socio-economic overview	139
4.7	Biodiversity overview	150
5	Identification of potential E&S impacts	178
6	Scoping Stakeholder Engagement	199
6.1	Stakeholder engagement approach	199
6.2	SEP objectives	199
6.3	Stakeholder identification	199
6.4	Scoping engagement	209
6.5	Grievance mechanism	215
7	ESIA Terms of Reference	217
7.1	Objectives	217
7.2	Structure of the ESIA	217
7.3	Baseline Surveys	217
7.4	Non-technical Summary	220
7.5	ESIA Report	220
7.6	Critical Habitat Assessment / Appropriate Assessment	227
7.7	Volume III: Technical Appendices	227
7.8	Volume IV: ESMP	227
7.9	Volume V: Livelihood Acquisition and Livelihood Restoration Framework	228
7.10	Volume VI: SEP	229
7.11	Work Plan	230
	Annex A: Scoping Notification Leaflet	231
	Annex B: Project Grievance Form	233
	Annex C: Biodiversity Survey Work Plan	235
a.	Introduction	235
b.	Biodiversity baseline surveys	235
	Annex D Protected areas and Key Biodiversity areas within the 50 km buffer zone	246
	Annex E: Preliminary Priority Biodiversity Features and Critical Habitat assessment	251
	Annex F: Baseline noise, air quality and soil surveys (interim reports for surveys conducted in 2024).	268

Table of Figures

Figure 1: Project location	15
Figure 2: Project alternatives	53
Figure 3: Spare bay for the 500 kV Kemin-Balykchy OHTL in the Kemin substation (source: Kemin Balykchy inception report, December 2024)	54
Figure 4: Connection from the Existing 500/220/35kV Kemin Substation	54
Figure 5: Overview of the location of the Project considering existing and planned infrastructure	56
Figure 6: Project setting for K-B OHTL	59
Figure 7: Receptor clusters along the OHTL options.....	60
Figure 8: Location of the planned substation	61
Figure 9: Kemin district villages.....	64
Figure 10: Ton district villages	64
Figure 11: Road shops and cafes along EM11	65
Figure 12: Example of stand-alone farmstead and households (mountain area)	65
Figure 13: Existing OHTL and railway along EM11	65
Figure 14: Brick factory (C4).....	67
Figure 15: Factories (C1).....	67
Figure 16: Landscapes along the OHTL route (mountain areas)	68
Figure 17: Site overview at new Balykchy substation	69
Figure 18: Route option 2 existing line and unpaved gravel road.	69
Figure 19: Concept of electric energy transmission	70
Figure 20: Components of an OHTL (source: Juru).....	73
Figure 21: Self-supporting 500 kV Steel Lattice Suspension Tower (single circuit) (source: Juru) ..	74
Figure 22: Example 500 kV H-Guyed suspension (intermediate) tower (single circuit) (source: Juru)	74
Figure 23: Example of 500 kV angle tower	74
Figure 24: Self-supporting 500 kV Steel Lattice Suspension Tower (single circuit) (source: Juru) ..	74
Figure 25: Typical OHL tower foundation (source: industrial electronics.com)	75
Figure 26: Vertical insulator (source: Juru)	77
Figure 27: V-arrangement insulator (source: Juru).....	77
Figure 28: Horizontal insulator (dead-end tower) (source: Juru)	77
Figure 29: Examples of access road conditions near Balykchy.....	79
Figure 30: Stages in the project cycle	80
Figure 31: Example of tower foundation construction (source: NJDA, 2022)	81
Figure 32: Example of tower foundation construction (source: NJDA, 2022)	81
Figure 33: Example of tower assembly process (source: NJDA 2022)	81
Figure 34: Example of tower assembly process (source: http://cscon.co.za/ and EDM)	81
Figure 35: Stringing the conductor (source: Electrical World Magazine, 2021)	82
Figure 36: Construction material factory	87
Figure 37: Storage of materials of cement factory.....	87
Figure 38: Brick factory	88
Figure 39: AOI map (scoping phase)	91
Figure 40: Observation points of the Scoping site visit.....	92
Figure 41: Climatic Regions of Kyrgyz Republic	97
Figure 42: Kyrgyz Republic Climate Map by Köppen-Geiger	98

Figure 43: Topography map of the project route (Source: https://www.maps-of-the-world.org/maps/asia/Kyrgyz_Republic/large-scale-physical-map-of-Kyrgyz_Republic-with-other-marks.jpg).....	101
Figure 44: Elevation profile of project route (Source: Google earth).....	102
Figure 45: Map of earthquake force probability in the Kyrgyz Republic (Source: Measuring Risk in Kyrgyz Republic, Seismic Hazard Assessment Report, World Bank, 2017)	105
Figure 46: Map of Earthquake Epicenters in the Kyrgyz Republic (Source: A.G. Frolova et al. Seismicity of the Kyrgyz Republic Territory. *Izvestiya of the National Academy of Sciences of the Kyrgyz Republic*, 2012, No. 3)	106
Figure 47: The location of the OHTL route relative to the country's seismic intensity zones.....	107
Figure 48: Location of the OHTL route relative to soil cover.....	113
Figure 49: Brown desert-steppe soils	113
Figure 50: Mountain dark chestnut soil under snow cover, excavation	115
Figure 51: The OHTL area in relation to the FAO-UNESCO Soil Map	116
Figure 52: Air quality in Kyrgyz Republic (Source: AQair).....	118
Figure 53: The Project area in relation to the Geological Map of the Kyrgyz Republic (Source: State Agency for Geology and Mineral Resources under the Government of the Kyrgyz Republic, 2008)	122
Figure 54: Map of hydrogeological zoning	123
Figure 55: Locations of springs and wells in the Kyrgyz Republic (Source: Geological Map of the Kyrgyz Republic. State Agency for Geology and Mineral Resources of the Kyrgyz Republic, 2017)	124
Figure 56: Water basins of Kyrgyz Republic	127
Figure 57: Water objects of the Project area.....	128
Figure 58: Zones of shallow groundwater in Kyrgyz Republic (Source: Flooding Zones Map, Ministry of Emergency Situations of the Kyrgyz Republic)	129
Figure 59: Transport infrastructure of the Project area	132
Figure 60: Internet Coverage in the Territory of Kyrgyz Republic (Source: Official websites of the Providers)	134
Figure 61: Location of the DWDM system in the Kyrgyz Republic (Source https://www.kt.kg/dcasa/)	135
Figure 62: Land of Forestry Committee.....	137
Figure 63: Water ditch	137
Figure 64: Land Use Map of Kyrgyz Republic (Source: Land Use Map of the Kyrgyz Republic. National Water Resource Management Project, 2017.).....	138
Figure 65: Commercial centres	143
Figure 66: Cement manufacturing factory	143
Figure 67: Poultry farm	143
Figure 68: Cement manufacturing factory	143
Figure 69: Herder's house with stable	143
Figure 70: Fish farm.....	143
Figure 71: Example of household Garden.....	144
Figure 72: Herder's house with stable	144
Figure 73: Herder's house with stable	144
Figure 74: Herder's house with stable	144
Figure 75: Herder's house with stable	144
Figure 76: Herder's house with stable	144
Figure 77: Unidentified fenced area	145
Figure 78: Unidentified fenced area	145

Figure 79: Railway	147
Figure 80: Chu river	147
Figure 81: Cultural heritage objects.....	149
Figure 82: Cemeteries of Cholok ayil (1300 meters away from the OHTL)	149
Figure 83: Cemeteries of Balykchy city (350 meters away from the OHTL).....	149
Figure 84: Sculpture (500 meters away from the OHTL)	149
Figure 85: Grave (1000 meters away from the OHTL).....	149
Figure 86: Sculpture (500 meters away from the OHTL)	150
Figure 87: Sculpture (330 meters away from the OHTL)	150
Figure 88: Protected areas of national and international importance within 50 km buffer around the proposed OHTL Route option 1.....	152
Figure 89: Protected areas of national and international importance within 50 km buffer around the proposed OHTL Route option 2.....	153
Figure 90: Habitat map in 2 km buffer (Option 1)	156
Figure 91: Habitat types of scoping study area.	157
Figure 92: View of Alpine meadows.....	158
Figure 93: View of Alpine shrub.....	159
Figure 94: View of Loamy slope.....	159
Figure 95: View of Loamy steppe	160
Figure 96: View of Meadow with grass.	161
Figure 97: View of Red stony slope.	161
Figure 98: View of Riverside forests.....	162
Figure 99: View of Sandy Semi-Desert	162
Figure 100: View of Steppe with Sedges (Livestock).....	163
Figure 101: View of Stony and Loamy Steppe.....	163
Figure 102: View of Stony Foothill Arid Steppe.....	164
Figure 103: View of Stony Semi-Desert.....	164
Figure 104: View of Stony Steppe.....	165
Figure 105: View of Sub-Alpine Meadow.....	165
Figure 106: View of Takyr with Gypsiferous Soil.....	166
Figure 107: Location of vantage points surveyed in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchy.....	168
Figure 108: Some of the species were observed during VP surveys along the proposed OHTL route between Kemin and Balykchi in spring 2024. a) golden eagle; b) black stork; c) bearded vulture; d) Himalayan vulture	170
Figure 109: Tracks used during raptor nesting surveys along the proposed OHTL route between Kemin and Balykchy in spring 2024.....	172
Figure 110: Territory covered by breeding bird surveys along the proposed OHTL route between Kemin and Balykchy in spring 2024.....	173
Figure 111: Methods of stakeholder engagement during the ESIA process	209
Figure 112: Location of Stakeholder Engagement Completed to Date (November 2024)	214
Figure 113: Grievance mechanism flow chart	215
Figure 114: Baseline Survey locations	220
Figure 115: Supplementary VP surveys Spring 2025.....	244

Table of Tables

Table 1: Project contact information shared in leaflets.....	13
Table 2: ESIA Team	14
Table 3: National Air Quality MPCs	29
Table 4: WHO Ambient Air Quality Guidelines.....	30
Table 5: National noise limits (Source: GOST 23337-78, SanPiN 2.1.2.1002-00)	31
Table 6: National noise level limits for working spaces (Source: SN 2.1.8.562-96)	32
Table 7: WBG Noise Level Guidelines	32
Table 8: National requirements on water quality	33
Table 9: National requirements on soil quality	34
Table 10: List of conventions ratified by Kyrgyz Republic.....	49
Table 11: Summary of OHTL characteristics	72
Table 12: Foundation characteristics (source: Juru and NEGK).....	75
Table 13: Current anticipated development schedule.....	86
Table 14: Geographic overview	93
Table 15: Population of Study area communities (ayils).....	139
Table 16: Gender distribution of the Study area ayil okmutus	140
Table 17: Protected areas within a 50 km buffer around the proposed OHTL routes.....	154
Table 18: Habitat Classification	155
Table 19: Potential globally threatened bird species within 50 km buffer around the 500 kV OHTL Kemin-Balykchy (source: IBAT report)	167
Table 20: Coordinates and description of vantage points surveyed in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchi.	168
Table 21: Species observed within the project site during VP surveys in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchy	169
Table 22: A preliminary list of reptile and amphibian species that may potentially inhabit the OHTL route ROW's (to be confirmed during the ESIA stage)	175
Table 23: Species of mammals.....	177
Table 24: ESIA Scoping outcomes and requirements	179
Table 25: Stakeholder engagement matrix (also provided in the SEP - and will be copied over once comments received).....	201
Table 26: Stakeholder engagement for scoping phase (up to 30 November 2024)	210
Table 27: Proposed structure of ESIA report	221
Table 28: Topics scoped into the ESIA	222
Table 29: Generic criteria for the allocation of Receptor sensitivity – criteria for allocation	223
Table 30: Determination of magnitude – example criteria for allocation.....	225
Table 31: Significance evaluation	226

Abbreviations

AC	Alternating Current
AoA	Analysis of Alternatives
Study area	Area of Influence
AP	Action Plan
CBD	Convention on Biological Diversity
CBO	Community Based Organisations
CHA	Critical Habitat Assessment
CHS	Community Health and Safety
CSR	Corporate Social Responsibility
DC	Direct Current
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
GHG	Greenhouse Gas
GIP	Good Industry Practice
GIS	Geographical Information System
HR	Human resources
IFC	International Finance Corporation
ILO	International Labour Organisation
IP	Indigenous peoples
IUCN	International Union for Conservation of Nature
LRF	Livelihood Restoration Framework

NCR	Non-compliance report
NGO	Non-Governmental Organisation
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OHL	Overhead lines
OHS	Occupational Health and Safety
OPEX	Operating Expenditures
PM	Particulate Matter
POPs	Persistent organic Pollutants
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PRs	Performance Requirements
PS	Performance Standards
PV	Photovoltaic
RAP	Resettlement Action Plan
RoW	Rights of Way
RPF	Resettlement Policy Framework
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SWMP	Site Waste Management Plan
TMP	Traffic Management Plan
ToR	Terms of Reference
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USTDA	United States Trade and Development Agency
WBG	World Bank Group
WHO	World Health Organisation
WMP	Waste Management Plan

Introduction

1.1 Background

The European Bank for Reconstruction and Development ("EBRD") is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic ("JSC NEGK") to finance the construction of a 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the Kemin substation in Chui region and the Balykchy substation (or an alternative new substation) in Issyk-Kul region (see Figure 1). Currently there are three route variations under consideration, and which are covered in this report.

The Project's primary purpose is to facilitate the evacuation of electricity generated by renewable energy power plants under development to the national power grid. Implementing the Project will also significantly improve the transmission networks' reliability, efficiency, stability, quality and security of the electricity supply.

EBRD Environmental and Social Policy (ESP) (2019), Annex2 "Category A Projects" (paragraph 24) makes specific reference to the "construction of high voltage overhead electrical power lines" as a project with the potential to generate significant adverse E&S impacts. Considering Annex2, the Project is categorised as Category "A". Category A projects require a comprehensive Environmental and Social Impact Assessment (ESIA) and review of associated documents, followed by public disclosure of key documents for a minimum of 120 days. This requirement aligns with the EU EIA Directive requirements for Annex I projects.

The EBRD has appointed Juru Ltd. ("Juru" or the "ESIA Consultant") to perform the ESIA for the Project following EBRD Environmental and Social Policy 2019 (ESP 2019) and supporting Performance Requirements (PRs). Juru is supported by "Evidence CA", a local social consulting and research organisation. This report is the Scoping Report and sets the terms of reference for the ESIA for the preferred route option.

According to the Law of the Kyrgyz Republic "On Environmental Protection" dated June 16, 1999, No. 53, for projects of this type, it is required to conduct an environmental impact assessment (EIA) when designing economic activity facilities. The categorization of facilities is carried out following Annex2 of the Law of the Kyrgyz Republic dated May 8, 2009, No. 151 "General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic," based on the calculation of expected impacts using the provided formula, which is performed during the development of the EIA. The Project will deliver a national EIA using a separate third-party consultant as part of the feasibility study.

1.2 Purpose of the scoping report

The purpose of this scoping report is to identify the potential positive and negative environmental and social (E&S) risks and impacts related to the pre-construction, construction, operation and

decommissioning of the Project for further assessment during the ESIA process as defined in the ESIA terms of reference (Chapter 7). This scoping process has been informed by:

- A scoping site visit to the area from 12 to 15 November 2024.
- Face-to-face discussions with NEGK.
- Face-to-face and letter consultation with representatives of the affected public government agencies, local authorities and other organisations.
- Review of existing documentation and earlier studies for other related projects in the region.
- Route options site visit with the feasibility consultant (02 to 05 December).
- Review of relevant regional and strategic environmental and social assessments or studies of relevance to the Project.

1.3 Project proponent

JSC NEGK was established following the Program for Denationalization and Privatization of State Property in the Kyrgyz Republic for 1998–2000 due to the restructuring of the former operator of the country's energy infrastructure, JSC "Kyrgyzenergo." JSC NEGK operates as an independent joint-stock company; however, the state currently participates in its ownership structure through the Ministry of Energy (MoE) of the Kyrgyz Republic and the Ministry of Finance of the Kyrgyz Republic. The company's main activities are the operation and development of the primary electric networks of the Kyrgyz Republic, the supply of electricity through the main electric, the implementation of interstate transit, and cooperation with the electric power systems in neighbouring countries.

1.4 ESIA team and Project contact information

Table 1: Project contact information shared in leaflets

Juru (via Evidence CA)	NEGK
Name: Bermet Alieva Address: 61, Kulatova Str., Bishkek, Kyrgyz Republic, 720017 Email: Bermet.alieva@gmail.com Phone: +996 551 99 99 84	Name: Department of External Relations and Project Implementation Email: 1piunegk@gmail.com Phone: +996 312 67 03 19

Table 2: ESIA Team

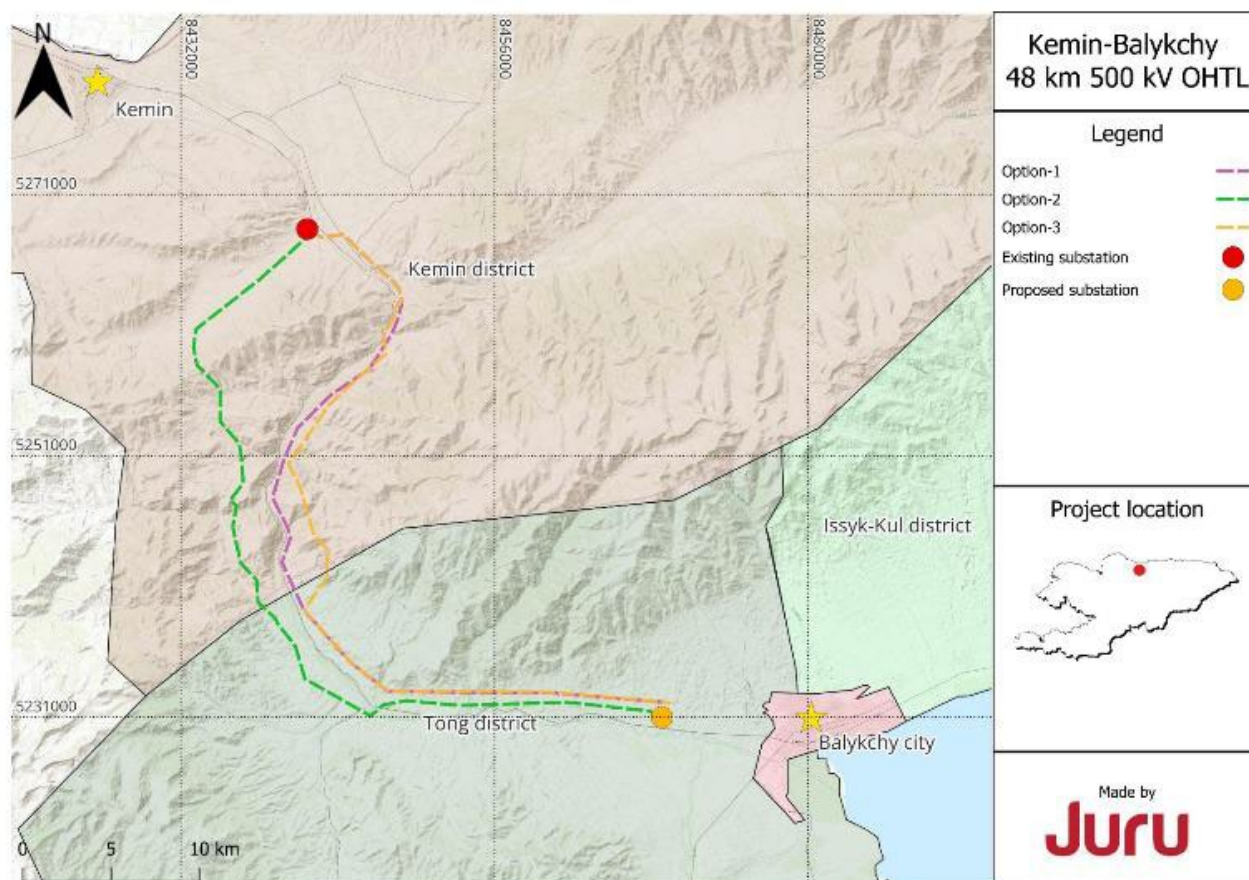
Name	Position
Nicola Davies	Project Manager & Environmental Specialist
Caleb Gordon	International Biodiversity Lead
Marianne Lupton	International Social Lead
Oleg Khegay	Local Environmental Specialist
Danila Avdulov	Local Environmental/ Baseline Specialist
Gulchekhra Nematullaeva	Social Expert
Murod Berdimurodov	Social specialist
Mokhinur Zokirova	Social specialist
Maxim Koshkin	Local Biodiversity Expert / Zoologist
Azamat Sultamuratov	Botanist

1.5 Structure of the scoping report

The scoping report is structured as follows:

- Chapter 2: Applicable national legislation and international standards.
- Chapter 3: Description of the Project, scope, alternatives, and justification.
- Chapter 4: Overview of the environmental and social baseline conditions.
- Chapter 5: Assessment of the potential environmental and social impacts to be studied and a justification for those impacts scoped out during the scoping process.
- Chapter 6: Stakeholder engagement (scoping phase).
- Chapter 7: ESIA terms of reference (TOR) and work programme.
- Annex A: Scoping notification leaflet (English and Kyrgyz)
- Annex B: Project grievance form
- Annex C: Biodiversity survey work plan
- Annex D: Information about protected areas in the scoping AOI
- Annex E: Preliminary Priority Biodiversity Features and Critical Habitat assessment
- Annex f: Baseline noise, air quality and soil surveys (interim reports, October 2024)

Figure 1: Project location



2 Policy, Legislative and Institutional Framework

2.1 Main entities

The main entities in the power sector that are relevant to the development of the Project are:

- Ministry of Energy of the Kyrgyz Republic - responsible for developing and implementing policy in the electricity sector.
- “Electric Power Stations” OJSC – responsible for electricity generation on large HPPs.
- “National Electric Grid of Kyrgyzstan” (NEGK) OJSC– responsible for the central transmission system operator (TSO) and distribution company, managing from high to low voltage power transmission and distribution and ensuring grid stability.
- Thermal Power Plants recently been transferred to local authorities – responsible for electricity generation.
- “Chakan GES” OJSC – responsible for electricity generation at small HPPs.
- Private power sector companies – responsible for electricity generation (mainly small HPPs) and distribution in the selected areas.
- Energy Supervision Service under the Ministry of Energy of the Kyrgyz Republic -performs state control and oversight functions to ensure compliance with energy sector legislation, including conducting acceptance tests for newly commissioned, reconstructed, and modernized electrical installations.
- Green Energy Fund under the Cabinet of Ministers of the Kyrgyz Republic - responsible for the design, maintenance, subsidizing, repair, reconstruction, construction, and development of renewable energy sources (RES).

Further information on the stakeholders listed above and other stakeholders relevant to the ESIA phase are mapped in the Project Stakeholder Engagement Plan (SEP) that accompanies this scoping report.

2.2 Kyrgyz Republic environmental regulatory context

2.2.1 Relevant government ministries

Activities associated with adverse environmental and social impacts are regulated by a specially authorized environmental protection body, represented by the **Ministry of Natural Resources, Ecology, and Technical Supervision (MNRETS)**, which oversees:

- The Department of State Environmental Expertise (EE) (conducting state environmental reviews of project documentation).
- The Environmental Monitoring Department (conducting laboratory research on environmental conditions).
- Environmental and Technical Supervision Services (state environmental control and monitoring of compliance with the norms and requirements of the legislation of the Kyrgyz Republic).

- Regional Departments of MNRETS (conducting state environmental reviews of project documentation, regulatory and technical documentation, including environmental passports for enterprises, projects of maximum permissible air emissions, wastewater discharges, waste generation, and issuing permits for emissions, discharges, and waste disposal into the environment).

Other relevant stakeholders include:

- **The Ministry of Energy of the Kyrgyz Republic:** the state executive authority responsible for developing and implementing state policies in the fuel and energy sector, as well as exercising state control and monitoring compliance with energy legislation.
- **The Ministry of Emergency Situations of the Kyrgyz Republic:** the state executive authority responsible for developing and implementing state policies and regulatory framework, as well as supervision and control in civil defence, protection of the population and territories from natural and man-made emergencies, fire safety, and ensuring the safety of people on water bodies.
- **The Ministry of Health of the Kyrgyz Republic:** the central executive authority conducting state policy and managing health protection and medical insurance for citizens in the Kyrgyz Republic. It also serves as the National Coordinator for the International Health Regulations of the World Health Organization.
- **The Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic:** the authorized state executive body responsible for state policies in water resources, including water funds, drinking water supply, land reclamation, irrigation, and meliorative infrastructure; the agro-industrial complex, including livestock, veterinary services, aquaculture, crop production, plant quarantine; agricultural lands (state agricultural land fund and pastures); food and processing industries (excluding unified state policies for production, import, storage, and circulation of ethyl alcohol and alcohol-containing products). It ensures uniformity in the application and enforcement of land and water legislation and oversees veterinary and phytosanitary safety, as well as green and organic farming, climate change adaptation, and mitigation measures in agriculture.
- **The Ministry of Health of the Kyrgyz Republic**, represented by the Department of Disease Prevention and State Sanitary-Epidemiological Supervision: the authorized body for control and supervision of facilities, regardless of ownership and departmental affiliation, ensuring compliance with technical regulations and other legal norms in public health. It identifies and forecasts potential impacts of biological, chemical, radiation, and other physical factors on the health of the population and workers and takes measures following the legislation of the Kyrgyz Republic.

2.3 Green Energy Policy

2.3.1 Kyrgyz Republic's Green Economy Strategy

The Kyrgyz Republic ratified the Paris Agreement on 17 November 2019¹. Under the Agreement, the Kyrgyz Republic committed to the following obligations:

- Develop national plans for emission reductions, technological upgrades, and adaptation to climate change.
- Systematically reduce CO₂ emissions into the atmosphere.
- Establish international exchanges of “green” technologies in energy efficiency, industry, construction, agriculture, and other sectors.

For a long time, the development of the Kyrgyz Republic, like most countries, was focused on achieving economic growth, primarily through the intensive use of natural resources. In recent years, it has become evident that continuing along a path of economic growth without properly considering environmental and social factors poses risks to current and future generations.

The concept of a “green” economy does not replace sustainable development but serves as a foundation for achieving it. Sustainable development, the key long-term goal, requires transitioning to a green economy. The United Nations Environment Programme (UNEP) defines a green economy as one that enhances human well-being, ensures social justice, and significantly reduces environmental risks and degradation.

In the Kyrgyz Republic, a green economy is understood to increase human well-being and strengthen social justice while significantly reducing environmental risks, preserving and enhancing natural capital, efficiently using resources, and stimulating the conservation of the country's natural ecosystems. In a green economy, income and employment growth are driven by public and private investments aimed at reducing carbon emissions and pollution, creating green jobs accessible to both women and men, improving living and health conditions, and increasing the efficiency of energy, resources, and ecosystem service use.

At the 2012 UN Conference on Sustainable Development, the Kyrgyz Republic expressed its commitment to sustainable development by promoting the priorities of a green economy. This transition is necessary for the Kyrgyz Republic, as the country's socio-economic development heavily relies on natural resource consumption. Recognizing the importance of transitioning to a green economy, Kyrgyz Republic adopted the “Concept of Kyrgyz Republic as a Green Economy Country”, which was developed and approved by the resolution of the state parliament named Jogorku Kenesh on 28 June 2018².

1 <https://cbd.minjust.gov.kg/111972/edition/979958/ru>

2 <https://cbd.minjust.gov.kg/453438/edition/1189681/ru>

The Kyrgyz Republic is actively pursuing policies to develop and strengthen its economic potential in line with the main strategic directions and tasks in the National Sustainable Development Strategy - a national document outlining the country's development agenda.

In 2019, the Kyrgyz Republic adopted the Green Economy Development Program for 2019-2023. The program has identified seven priority areas: green energy, green agriculture, green industry, low-carbon and clean transport, sustainable tourism, waste management, and green cities. Green energy initiative aims to reduce the energy intensity of GDP while increasing access to reliable and modern energy supply for citizens and economic entities.

The key objectives include:

- Improving the evaluation and monitoring systems of the energy sector.
- Enhancing energy policies.
- Increasing the transparency and profitability of the fuel and energy sector.
- Boosting energy consumption efficiency.
- Improving the energy efficiency of buildings.
- Increasing the share of renewable energy sources in total final energy consumption.
- Raising public awareness about energy saving and renewable energy.

Enhancing energy supply quality and reliability amidst limited natural gas and oil resources and a deficit of hydropower-generated electricity, especially in winter, necessitates the rapid implementation of energy-saving measures, improved energy sector management, and accelerated deployment of additional generating capacities, including large hydropower plants and renewable energy sources.

To develop renewable energy in the Kyrgyz Republic, feasibility assessments will determine their implementation potential at the district level based on energy supply costs through the national grid, the potential and costs of renewable energy sources, and projected energy demand growth until 2040.

Expected outcomes include:

- Reducing GDP energy intensity by 4.5%
- Lowering energy consumption in residential, public, administrative, and non-industrial buildings by 10%
- Decreasing distribution losses to 13%
- Eliminating 100% of commercial losses
- Commissioning renewable energy facilities with at least 50 MW capacity
- Ensuring transparency, effective management, and financial sustainability of energy companies
- Attracting over \$300 million in private investments to the energy sector
- Providing reliable energy and fuel supplies to the population

- A sustainable and efficient system for training and professional development is operational in the country
- The business sector and the population are actively utilizing and implementing energy-efficient technologies.

One of the strategic measures for green energy is the implementation of renewable energy sources (RES). The Law of the Kyrgyz Republic “On Renewable Energy Sources” dated June 30, 2022, No. 49 (hereinafter referred to as the “RES Law”) was adopted, identifying RES as sources of continuously renewable types of energy, including solar energy, geothermal energy, vacuum energy, wind energy, and hydropower.

According to the National Energy Program of the Kyrgyz Republic for 2008-2010 and the Strategy for the Development of the Fuel and Energy Complex until 2025, approved by Resolution No. 346-IV of the Jogorku Kenesh on April 24, 2008 (hereinafter referred to as the “National Energy Program”), the practical use of RES currently remains minimal, accounting for less than 1% of the country's energy balance. According to the National Energy Program, the total hydropower potential of 172 rivers and streams in the country, with water flow rates of 0.5 to 50 cubic meters per second, exceeds 80 billion kWh per year, of which 5-8 billion kWh per year are technically feasible for development. Given the growing annual electricity deficit during winter, which exceeded 2 billion kWh in 2023, developing small hydropower plants and other RES could fully cover the increasing electricity deficit.³

By Presidential Decree No. 178 of July 24, 2023, a state of emergency in the energy sector of the Kyrgyz Republic was declared, effective from August 1, 2023, until December 31, 2026 (hereinafter referred to as the “Energy Emergency Decree”)⁴ The decree cites the need for urgent measures to address the energy crisis caused by climate challenges, low water inflow in the Naryn River basin, a lack of generating capacities, and the rapid growth of energy demand. The declaration of the state of emergency further underscores the importance and urgency of the issues discussed in this document.

To promote the adoption and development of RES, amendments to the RES Law came into force on August 31, 2023, including:

- Extending the preferential period for solar and wind power plants from the current 15 years to 25 years while retaining the 15 years for small hydropower plants.
- During the preferential period, the electricity tariff for RES installations will be calculated by multiplying the tariff determined by the government's tariff policy by 1.3 (the same as the previous factor).
- A key innovation for potential investors is the introduction of annual tariff indexation based on changes in the exchange rate of the Kyrgyz som to foreign currencies. The

³ https://unece.org/fileadmin/DAM/project-monitoring/unda/16_17X/E2_A2.3/NSEAP_Kyrgyzstan_ENG.pdf

⁴ <https://www.gov.kg/ru/programs/16>.

Cabinet of Ministers will determine the specific procedure for indexation. Meanwhile, the existing annual tariff indexation based on inflation rates will be abolished.

- Additional costs incurred by the National Electric Grid of Kyrgyz Republic (NEGK) for purchasing electricity generated using RES will be compensated through the Green Energy Fund under the Cabinet of Ministers.
- The Ministry of Energy will be able to implement auction mechanisms with downward adjustments to purchasing tariffs for RES installations. This provision is new to Kyrgyz legislation, so tariff auction mechanisms did not exist. However, the procedure for conducting auctions is yet to be adopted and must be developed by the Cabinet of Ministers.

As a result of this program, the country's energy sector has undergone significant changes. The Law of the Kyrgyz Republic, "On Renewable Energy Sources", dated June 30, 2022, No. 49 was adopted. According to this law, renewable energy sources include continuously replenishable energy types such as solar, geothermal, wind, and hydropower. The law also established compensation from the Green Energy Fund under the Cabinet of Ministers to cover the additional costs incurred by OJSC "NESK" for purchasing electricity generated using renewable energy sources.

In the Kyrgyz Republic, several energy projects have been implemented or are in progress, financed by international donors, including:

- The Master Plan for the Comprehensive Development of the Energy Sector of the Kyrgyz Republic for 2020–2024 includes objectives such as Renewable Energy and Energy Efficiency.
- The reconstruction and modernization of existing facilities within the Toktogul Hydropower Cascade.
- The high-voltage transmission line "CASA-1000" was constructed in the Batken, Osh, and Jalal-Abad regions. The project involves the construction of a 484 km high-voltage alternating current transmission line from the Datka substation in Kyrgyzstan to the Sughd substation in Tajikistan for exporting Kyrgyz electricity. Construction began in 2021 and was completed in November 2024. The line consists of 1,243 towers, a 456 km transmission line, and a cell at the Datka substation⁵.
- Reconstruction and construction of small and medium hydropower plants (e.g., new Karakul and Tarsk HPPs with substations and reconstruction of the existing Bystrovsk HPP).
- Strengthening the capacity of JSC "Chakan HPP".
- Preparing and integrating renewable energy projects into the grid by expanding and enhancing electrical networks, facilitating the integration of hydro and solar power, and providing technical assistance to the Ministry of Energy, JSC "National Electrical Grid of

⁵ <https://casa-1000.kg/tpost/ugy0dij1a1-novaya-epoha-v-energetike-kirgizstan-zav>

Kyrgyzstan (NEGK)," and other key stakeholders. Activities include developing and implementing grid standards, such as connection rules for renewable energy generation, reviewing policies and regulations for renewable energy development, and implementing short-term forecasting measures. This also includes plans to construct the Isanova 220 kV substation and 220-110 kV power lines.

- Projects under various agencies that introduce energy efficiency principles in building construction.

Other initiatives include:

- Implementing tariff policies by adjusting electricity rates and subsidies (both commercial and social).
- Construction of small hydropower plants by investors and private entities.
- Transitioning the state vehicle fleet to electric vehicles.
- Developing policies to promote renewable energy sources and improve building energy efficiency through the adoption of laws.

2.4 Environmental Law

2.4.1 Constitution of Kyrgyz Republic

The constitution of Kyrgyz Republic (dated 2021) has the following provisions relating to environmental and social aspects:

Article 16

- Land, subsoil, airspace, waters, forests, pastures, flora and fauna, and other natural resources are the exclusive property of the Kyrgyz Republic.
- Land and natural resources are utilized as the basis for the life and activities of the people of the Kyrgyz Republic; to preserve the unified ecological system and ensure sustainable development, they are under state control and special protection.
- Land, except for pastures and forests, may be in private and municipal ownership.
- Guarantees for the protection of landowners' rights are defined by law.

Article 49

- Everyone has the right to an environment favourable for life and health.
- Everyone has the right to compensation for harm caused to their health or property by activities related to using natural resources.
- Everyone must carefully protect and treat the natural environment, flora, and fauna.

2.4.2 Law on Nature Protection, 1999, as Amended in 2024

The fundamental law of the Kyrgyz Republic is the Law On "Environmental Protection" dated June 16, 1999, No. 53 (as amended and supplemented on June 13, 2024, No. 95), which defines the

policy and regulates legal relations in the field of environmental protection and natural resource use in the Kyrgyz Republic.

Every citizen has the right to an environment favourable for life and health and compensation for damage caused to their health or property by adverse environmental impacts from economic or other activities.

The following are subject to protection from pollution, damage, depletion, destruction, degradation, and other negative impacts: land and its subsoil, soil cover, waters, forests, flora and fauna and their genetic resources, atmospheric air, other natural objects, complexes and ecosystems, as well as the climate, ozone layer, and the Earth as a planet as a whole.

The main principles of environmental protection are:

- Principle of priority: Ensuring fundamental guarantees for protecting human rights to an environment favourable for life, work, and recreation, which supports human life and health.
- Principle of balance: Maintaining the stability of ecological systems, observing environmental protection rules in economic and other activities, replenishing natural resources, and preventing irreversible consequences for the environment and human health.
- Principle of comprehensiveness: A harmonious, scientifically grounded combination of ecological, economic, and social interests of society, a comprehensive approach to addressing resource conservation and environmental protection issues.
- Principle of restraint: Regulation, mandatory environmental impact assessments, justification and limitation of the effects of economic activities and other influences on the environment.
- Principle of responsibility: Strict adherence to environmental protection laws, the inevitability of accountability for violations, and compensation for damage caused to the environment by enterprises, institutions, organizations, farms, and citizens.
- Principle of openness: Transparency in addressing environmental issues in economic and other activities with ecological consequences, close collaboration with public organizations and the population, encouragement, and promotion of measures aimed at protecting and rationally using natural resources, and balancing national, regional, and international interests in the field of environmental protection.

2.4.3 Law on Environmental Control, 2009, as Amended in 2019

The Law of the Kyrgyz Republic establishes technical regulation in the field of environmental safety, "General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic" dated May 8, 2009, No. 151 (as amended and supplemented on July 8, 2019, No. 83). This law includes general requirements for ensuring environmental safety during the design and implementation of activities at facilities involved in economic and other activities, as well as for the processes of production, storage, transportation, and disposal of products.

The requirements of this technical regulation apply to the production, storage, transportation, and disposal of products and are mandatory for all legal entities and individuals engaged in such processes.

The objects regulated by this technical regulation include production processes used or intended to be used at facilities involved in economic or other activities, which are classified as hazardous or require an EIA for planned activities, as well as processes for storing, transporting, and disposing of products.

According to **Article 6**, technical regulation in the field of environmental safety is carried out based on the following principles:

- Mandatory State Environmental Expertise and environmental impact assessments before making decisions on economic and other activities
- Acceptable Levels of Environmental Impact: Ensuring compliance with environmental safety requirements for the level of impact from economic and other activities on the environment
- Reduction of Negative Impact: Minimizing the adverse environmental effects of production processes from economic and other activities by using the best available technologies, considering economic and social factors, and the rational use of natural resources
- Prohibition of Activities with Unpredictable Consequences: Banning production processes and other activities with unpredictable environmental consequences, as well as projects that may lead to negative environmental impacts
- Priority of Preserving Natural Ecological Systems: Giving precedence to the protection of natural ecological systems
- Principle of Openness: Transparency in the planning and implementation of production processes with environmental consequences, close collaboration with public organizations and the population, and encouragement of measures aimed at protecting and rationally using natural resources

In the Kyrgyz Republic, an environmental expertise (EE) process is conducted during the design and implementation of economic and other activities to prevent potential adverse environmental impacts from such activities and are regulated by the Law of the Kyrgyz Republic "On Environmental Expertise" dated June 16, 1999, No. 54 (as amended and supplemented as of May 4, 2015).

The objectives of the EE are:

- Prevention of the potential negative impacts of planned administrative, economic, and other activities on public health and the environment.
- Assessment of the compliance of planned administrative, economic, investment, and other activities with environmental protection legislation at stages preceding decisions on their implementation and during their construction and execution.

National Environmental Impact Assessment (EIA)

The specially authorized state body for environmental expertise is the republican state environmental protection authority of the Kyrgyz Republic. The procedure for conducting state EE is regulated by the “Regulations on the Procedure for Conducting State Environmental Expertise”, approved by the Government of the Kyrgyz Republic on May 7, 2014, No. 248.

A positive conclusion from the state EE is one of the mandatory conditions for financing, crediting, investing in, or implementing the object under review. The legal consequence of a negative conclusion from the state EE prohibits the object under review.

Energy facilities, such as high-voltage overhead transmission lines, fall under the types of economic activities subject to Environmental Impact Assessment (EIA) and mandatory state EE. The procedure for conducting an EIA for proposed activities is established by the “Regulations on Environmental Impact Assessment in the Kyrgyz Republic” approved by the Government of the Kyrgyz Republic on February 13, 2015, No. 60. The goal of the EIA is to prevent and/or mitigate the impact of proposed activities on the environment and associated social, economic, and other consequences.

Participants in the EIA process include:

1. The project initiator
2. The entity performing the EIA work
3. Local state administrations and local self-governing bodies
4. The authorized state body in the field of environmental protection and/or its territorial bodies
5. The public (public organizations, population)

The EIA process consists of four stages:

1. Decision on the need for an EIA (screening to determine whether EIA is required)
2. Preliminary EIA (Pre-EIA) for the feasibility study stage
3. EIA (Detailed EIA) for the working project stage
4. Post-project analysis (conducted one year after the start of activities)

The **first stage** of the EIA process is deciding whether an EIA is necessary. At this stage, it is determined whether the planned activity needs to be assessed for its environmental impact, including potential transboundary effects. The project initiator makes the decision based on a list of activities subject to EIA.

- Full-scale EIA is mandatory for activities classified as Category I hazards and projects with potentially significant transboundary impacts.
- A reduced EIA is conducted for activities classified under Categories II and III hazards.

- For projects with minimal environmental impact, a completed Environmental Impact Statement (EIS) form for the working project is sufficient.

The **second stage** of the EIA is the preliminary EIA phase, which accompanies the project's feasibility study. It involves a comprehensive analysis of potential project impacts, alternative options assessment, and an Environmental Management Plan development. This report includes:

1. A brief description of the proposed activity.
2. An assessment of the current state of the environment within the potential impact zone.
3. An evaluation of potential environmental impacts from the proposed activity.
4. An assessment of the environmental impact of alternative options for the proposed activity.
5. Forecasting and assessment of environmental changes during construction, operation, and decommissioning.
6. Development of measures to prevent, minimize, and/or compensate for significant environmental harm during all project phases.
7. Conclusions based on the EIA results.
8. An Environmental Impact Statement (EIS).

The **third stage** is the detailed EIA, conducted alongside project design documentation (e.g., design and working project stages). It includes:

1. A refined comprehensive assessment of the impact of the chosen implementation plan.
2. Refined technical solutions and measures to prevent, mitigate, and minimize the environmental and public health impacts during project operation and decommissioning.
3. A resource-backed program for monitoring and controlling environmental components during all project phases.
4. Project norms for emissions, discharges of pollutants, and waste management.
5. An Environmental Consequences Statement (ECS).

The results of the detailed EIA are included in the project feasibility documentation as a section titled "Environmental Protection".

The **fourth stage** is the post-project analysis, conducted one year after project commencement to confirm the project's environmental safety and adjust environmental protection measures. It includes:

1. Comprehensive studies to evaluate the effectiveness of planned environmental measures and to ensure environmental and public safety.
2. A post-project analysis plan developed based on EIA materials and approved by regional environmental protection authorities.
3. The project initiator organizes and oversees the analysis.
4. The analysis is conducted by a specialized organization (research, design, or another firm).

5. The results are documented in a report containing specific proposals for minimizing adverse environmental impacts and amending existing norms and permits. The report includes supporting data such as measurements, lab analyses, photos, and interviews.
6. The report is submitted to the project initiator for necessary actions to reduce environmental impacts. It must also be accessible to the design organization, EIA implementers, environmental authorities, and the public.
7. Upon request, the project initiator informs the public about the analysis results.

EIA documentation must include:

1. Details of the project initiator and the EIA implementer.
2. A description of the proposed activity and its justification.
3. An environmental impact assessment conducted during one of the EIA stages.
4. Materials on public information and input, documented with protocols and conclusions from public discussions.
5. Main conclusions of the EIA process.
6. Environmental Impact Statement (EIS).
7. Environmental Consequences Statement (ECS).
8. Appendices (maps, diagrams, research data, lists of involved organizations, etc.).
9. A list of legal, technical, and methodological documents governing natural resource use and environmental protection, used during the EIA process.

The project initiator submits the EIA documentation as part of the project documentation for state EE and formal approval. For this project, a third party will perform the national EIA as part of the ongoing feasibility study.

2.5 Applicable E&S Legislation and Standards

2.5.1 Environment

The following Laws are relevant to the Project:

- The Law of the Kyrgyz Republic On “Environmental Protection” dated June 16, 1999, No. 53 (as amended and supplemented on June 13, 2024, No. 95)
- The Law of the Kyrgyz Republic No. 151 “General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic”, dated May 8, 2009 (as amended of July 8, 2019)
- The Law of the Kyrgyz Republic dated June 20, 2001, No. 53 “On the Protection and Use of Plant Resources” (as amended and supplemented as of March 23, 2020)
- The Law of the Kyrgyz Republic dated June 17, 1999, No. 59 “On Wildlife” (as amended and supplemented as of March 23, 2020)
- The Law of the Kyrgyz Republic No. 181 “On Production and Consumption Waste”, dated August 15, 2023

- The Land Code of the Kyrgyz Republic dated June 2, 1999, No. 45 (as amended and supplemented as of August 5, 2022)
- The Forest Code of the Kyrgyz Republic dated July 8, 1999, No. 66 (as amended and supplemented as of February 7, 2024)
- The Law of the Kyrgyz Republic “On the Conversion (Transformation) of Land Plots” dated July 15, 2013, No. 145 (with the latest amendments as of October 21, 2024)
- The Law of the Kyrgyz Republic dated January 11, 2001, No. 4 “On the Management of Agricultural Lands” (as amended and supplemented as of August 4, 2020)
- The Law of the Kyrgyz Republic “On Water” dated January 14, 1994, No. 1422-XII (with the latest amendments and supplements as of April 5, 2019)
- Sanitary and Epidemiological Rules and Standards (SanPiN), approved by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201.

2.6 Applicable National Environmental Standards

Environmental compliance regulation is a system of standards and norms developed based on international conventions and agreements, considering the latest scientific advancements.

Environmental quality standards and norms are indicators that define the qualitative criteria for the state of the environment. These include:

- Maximum permissible concentrations (MPCs) of harmful substances in emissions and discharges.
- Maximum permissible levels (MPLs) of radiation exposure, noise, vibration, and magnetic fields.
- Maximum permissible levels of chemical substances (MPLCS) used in agriculture and forestry.
- Maximum permissible residual amounts of chemicals in food products.
- Maximum permissible levels of anthropogenic activity impact on the environment.
- Norms for maximum permissible concentrations of harmful substances in atmospheric air, water, soil, and subsoil;
- Norms for maximum permissible emissions and discharges of harmful substances;
- Norms for maximum permissible levels of radiation exposure;
- Norms for maximum permissible environmental load levels;
- Norms for sanitary and protective zones;
- Standards for the use of natural resources;
- Norms for maximum permissible levels of noise, vibration, electromagnetic fields, and other harmful physical impacts;
- Maximum permissible norms for the use of chemicals in agriculture;
- Norms for maximum permissible concentrations of chemical, toxic, carcinogenic substances, and biological additives in food products.

Environmental quality norms, maximum permissible standards, and the methods for determining them are approved by the national state environmental and health protection authorities of the Kyrgyz Republic in coordination with other specially authorized state bodies within their competence.

Sanitary and Epidemiological Rules and Standards (SanPiN) are in effect in the Kyrgyz Republic, approved by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201. These include:

- Sanitary protection zones and sanitary classification of enterprises, facilities, and other objects
- Noise levels in workplaces, residential areas, public buildings, and residential zones
- Approximate safe exposure levels of pollutants in the atmospheric air of populated areas
- Maximum permissible concentrations of chemical substances in water bodies used for domestic and cultural purposes
- Maximum permissible concentrations of pollutants in the atmospheric air of populated areas
- Maximum permissible concentrations of harmful substances in workplace air
- Approximate safe exposure levels of harmful substances in workplace air
- Approximate permissible levels of chemical substances in water bodies used for domestic and cultural purposes
- Maximum permissible concentrations and approximate permissible quantities of chemicals in soil, etc

Sanitary and epidemiological rules and norms apply to the placement, design, construction, and operation of newly built, reconstructed, and existing industrial facilities, transportation, communications, agriculture, energy, experimental production, utilities, sports, trade, catering, and other facilities that impact the environment and human health.

The standards, norms and SanPIN regulations applicable to this Project are summarised in the sub-sections below.

2.6.1 Air Quality

Ambient Air Quality Standards, or MPCs, are established by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Approximate Safe Levels of Pollutant Exposure in the Atmospheric Air of Populated Areas" according to Annex15). The law provides lists of substances and permissible concentrations. Table 3 presents the MPC for primary pollutants relevant to the Project.

Table 3: National Air Quality MPCs

Pollutant	MPC (mg/m ³)			Hazard class
	One-time	24 hours	Working zone	
Nitrogen Dioxide (NO ₂)	0.085	0.04	5	2

Pollutant	MPC (mg/m ³)			Hazard class
	One-time	24 hours	Working zone	
Fluorides	0,03	0,02	1,0	2
Sulphur Dioxide (SO ₂)	0,5	0,05	10,0	3
Inorganic Dust (SiO ₂ 20-70%)	0,3	0,1	2,0	3
Carbon Monoxide (CO)	5,0	3,0	20	4
Hydrogen fluoride	0,02	0,002	0,5	2
Saturated hydrocarbons	1,0	-	-	4
Soot	0,15	0,05	4,0	3
Welding fumes	0,01	0,001	0,2	2
Manganese compounds	0,01	0,001	0,05	2

To meet the Lender standards for air quality, reference is made to the World Bank Group (WBG) General Environmental, Health, and Safety Guidelines (EHS Guidelines - General). These ambient air quality standards are based on World Health Organization (WHO) guidelines. Table 4 sets out these standards. As part of the ESIA, the most stringent standards between national and international guidelines will be applied as “project standards” and defined in the ESIA.

Table 4: WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Concentration
PM _{2.5}	24 hours	15 µg/m ³
PM _{2.5}	Annual	5 µg/m ³
PM ₁₀	24 Hour	45 µg/m ³
PM ₁₀	Annual	15 µg/m ³
NO ₂	Hourly	200 µg/m ³
NO ₂	Annual	10 µg/m ³
NO ₂	24 hours	25
SO ₂	24 hours	40 µg/m ³
CO	Maximum daily 8-hour mean	10 mg/m ³

2.6.2 Noise

National noise standards are set out by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Sanitary Rules and Standards “Noise in Workplaces, Residential and Public Buildings, and Residential Areas” according to Annex14) and by other standard documents. The admissible noise level in the living area, inside and outside the buildings, is used to ensure the rules of acceptable noise levels for residential and other areas in the Kyrgyz Republic. These rules

and regulations establish permissible noise parameters for residential and public buildings and general requirements for measurements and measurement methods. Evaluation of the sound level at the calculation point is performed for the day and night period of the day (from 7:00 to 23:00 hours and from 23:00 to 7:00 hours) and considers the maximum intensity of the sound source level during the half-hour period Table 5 presents the permissible noise levels for the premises most relevant for the project.

Table 5: National noise limits (Source: GOST 23337-78, SanPiN 2.1.2.1002-00)

Receptor	L _{aeq} (dBA)			
	Daytime		Night-time	
	07.00-22.00		22.00 – 07.00	
	Average	Max	Average	Max
Areas directly adjacent to residential buildings, polyclinics, dispensaries, rest homes, boarding houses, libraries, schools, etc.	55	70	45	60
Areas directly adjacent to hospitals and sanatoriums	45	60	35	50
Areas directly adjacent to hotels and dormitories	60	75	50	65
Recreational zones near hospitals and sanatoriums	35	50	35	50
Recreational zones in residential micro-districts, construction of cottages, rest homes, sanatoriums, schools, retirement homes, etc.	45	60	45	60
Industrial; commercial	70		70	

The standard SN 2.1.8.562-96 “Noise in Workplaces, Residential and Public Buildings, and Residential Areas” encompasses a broad range of requirements related to environmental safety and comfort for the population and workers. The Table 6 represents the standard requirements:

Table 6: National noise level limits for working spaces (Source: SN 2.1.8.562-96)

Category of Work Intensity	Category of Physical Workload				
	Light Physical Work	Moderate Physical Work	Heavy Work 1st Degree	Heavy Work 2nd Degree	Heavy Work 3rd Degree
Light Intensity	80	80	75	75	75
Moderate Intensity	70	70	65	65	65
High-Intensity Work 1st Degree	60	60	-	-	-
High-Intensity Work 2nd Degree	50	50	-	-	-

To meet the Lender standards for noise, reference is made to the WBG EHS Guidelines. These state that noise impacts should not exceed the levels presented in Table 7 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 7: WBG Noise Level Guidelines

Receptor	One-hour L_{aeq} (dBA)	
	Daytime 07.00-22.00	Night-time 22.00 – 07.00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The national standards are almost identical to WBG noise level guidelines, except for a slight variation in the definition of the start of “night-time”. The WBG defined night-time as 22:00 instead of 23:00 under national standards. The WBG noise guideline limits will be used for the Project.

2.6.3 Water Quality

The Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic is the authorized state executive body responsible for state policies in water resources. Relations in the field of use and protection of water resources (waters), prevention of environmentally harmful impacts of economic and other activities on water bodies and water management structures, improvement of their condition, and strengthening legality in water relations are regulated by the Law of the Kyrgyz Republic "On Water" dated January 14, 1994, No. 1422-XII (as amended and supplemented as of April 5, 2019).

The protection of water resources and the regime of economic activities and land use within water protection zones (WPZs) and strips are regulated by the Regulations on Water Protection Zones

and Strips of Water Bodies in the Kyrgyz Republic, approved by the Resolution of the Government of the Kyrgyz Republic dated July 7, 1995, No. 271.

- The width of the WPZ for rivers is established on both banks and is 50 meters.
- The width of the coastal water protection strip is 30 meters.

The following are prohibited within WPZs and coastal strips:

- Installation of containers with fuel and lubricants.
- Parking and washing of vehicles and machinery.
- Storage of industrial waste and other garbage.
- Discharge of untreated wastewater and other activities that negatively affect the condition of water bodies.

Specific WPZs along the surface water courses of the rivers that interface with the Project route will be defined and elaborated in the ESIA, and prohibited activities will be defined in the management plans.

National water standards are set out by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards “Maximum Permissible Concentrations of Chemical Substances in Water Bodies for Domestic and Cultural Use” according to Annex16). The requirements are presented in Table 8.

Table 8: National requirements on water quality

No	Substance	MPC, mg/l
1	Al	0,2
2	Benzo(a)pyrene	0,5
3	V	0,1
4	Cd	0,001
5	Technical kerosene	0,01
6	Mg	50
7	Mn	0,1
8	Cu	1
9	As	0,01
10	Na	200
11	Pb	0,01
12	Sulfates	500
13	Sulfides and H ₂ S	0,05
14	Chlorides	350

No	Substance	MPC, mg/l
15	Zn	1

2.6.4 Soil Quality

Article 13 of the Law of the Kyrgyz Republic, dated May 8, 2009, No. 151, "General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic", establishes environmental safety requirements for protecting soils and natural landscapes. Relevant requirements include:

- During activities involving disturbance of the soil cover, the fertile soil layer must be removed, stored, and subsequently used for land reclamation.
- Routes for temporary access roads must be planned with maximum use of the existing road network, considering local natural conditions.
- The movement of vehicles and specialized machinery is allowed only on specially constructed roads that ensure safe movement without causing damage to vegetation and soil cover.

Article 19 of the Law of the Kyrgyz Republic, dated June 20, 2001, No. 53, "On the Protection and Use of Plant Resources", establishes requirements for combating soil erosion.

National standards for soil quality are set out by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Annex21). The requirements for the relevant contaminants are presented in Table 9.

Table 9: National requirements on soil quality

No	Substance	MPC (mg/kg) considering baseline conditions
1	Cd	0,5
2	Cu	33
3	As	2
4	Ni	20
5	Pb	32
6	Zn	55
7	Benzo(a)pyrene	0,02

2.6.5 Biodiversity legislation

The Law of the Kyrgyz Republic, dated June 20, 2001, No. 53, "On the Protection and Use of Plant Resources" (as amended and supplemented as of March 23, 2020) is the key legislation related to biodiversity protection. The law obliges individuals and legal entities to:

- Comply with the requirements for the protection and use of plant resources established by legislation and other regulatory legal acts.
- Prevent the deterioration of habitats for plant resources and adhere to environmentally friendly practices while collecting and harvesting wild plant materials.
- Avoid disrupting the integrity of natural plant communities, contribute to preserving their species diversity, and enhance the productivity of herbaceous and forest vegetation, seeds, fruits, and other products.
- Provide comprehensive assistance to state authorities responsible for maintaining the state cadastre, monitoring plant resources, and controlling the protection and use of plant resources.
- Prevent the degradation of other natural resources;
- Respect the rights of lessees, other temporary users, and neighbouring users of plant resources.
- Fulfil other requirements for the protection and rational use of plant resources as stipulated by the legislation of the Kyrgyz Republic.

The Law of the Kyrgyz Republic dated June 17, 1999, No. 59, "On Wildlife" (as amended and supplemented as of March 23, 2020).

When conducting state EE for projects involving the construction and reconstruction (expansion, technical re-equipment) of enterprises, facilities, and other structures, as well as the implementation of new equipment, technologies, materials, and substances, the impact on the condition of wildlife, migration routes, and reproduction conditions of animals must be considered.

The locations of enterprises, facilities, and other structures, as well as the introduction of new equipment, technologies, materials, and substances affecting the condition of wildlife, must be coordinated with the republican state environmental protection authority of the Kyrgyz Republic.

Forest Code of the Kyrgyz Republic dated July 8, 1999, No. 66 (as amended and supplemented as of February 7, 2024).

The forest legislation of the Kyrgyz Republic is aimed at protecting, preserving, and reproducing forests, ensuring their rational and sustainable use. This aligns with the national objectives of effective forest management, conserving the biodiversity of forest ecosystems, enhancing the ecological and economic potential of forests, and meeting societal needs for forest resources based on scientifically grounded, multifunctional forestry practices.

All forests and lands in state, communal, and private ownership designated for forestry form a unified Kyrgyz Republic forest fund. All forests and lands designated for forestry, except those in communal and private ownership, constitute the state forest fund.

Lands of the Forest Fund

Forest fund lands include:

- Forest lands: Lands covered with forest vegetation and those not covered but intended for forestry needs, such as sparse forest plantations, plantations, nurseries, clear-cut areas, burned lands, and open glades.
- Non-forest lands: Lands forming a single natural complex with forests, such as agricultural and other lands where forests were cleared for construction related to economic activities, roads, firebreaks, power line routes, and pipelines.

The boundaries of forest fund lands, separating them from other land categories, are determined according to the legislation of the Kyrgyz Republic.

The ESIA will define any Forest fund land relevant to the Project.

Not Included in the Forest Fund

The following are not part of the forest fund:

- Individual trees and groups of trees, shrub vegetation, and agroforestry plantations on agricultural lands.
- Protective plantations along railway and road rights-of-way, canals, and other linear structures.
- Individual trees, groups of trees, and shrubs in urban greening areas and other settlements (excluding urban forests), as well as on household, dacha, and garden plots.

The creation, maintenance, use, and protection of plantations not included in the forest fund are carried out following procedures established by local self-governance bodies and local state administrations unless otherwise specified by the legislation of the Kyrgyz Republic.

During the exploration, design, construction, and commissioning of new or reconstructed enterprises, facilities, and other objects, as well as the implementation of new technological processes affecting the condition and reproduction of forests, measures must be taken to protect forests from negative impacts such as wastewater, chemicals, industrial and municipal emissions, waste, and other harmful influences.

The locations of enterprises, facilities, and other objects affecting forests must comply with current legislation and require positive conclusions from the state environmental expertise and the republican state forestry management authority, as well as other specially authorized state bodies.

According to Article 12 of the **Law of the Kyrgyz Republic, “General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic”**, for preserving wildlife and plant resources during the design, construction, and operation of high-voltage power transmission lines. Measures noted as relevant to the project are as follows:

1. Clearing of tree and shrub vegetation corridors for construction is prohibited during animal breeding periods.

2. Measures must be implemented to protect wildlife, including restricting work during periods of mass migration, in breeding and moulting areas, during the rearing of young, spawning, foraging, and migration of fish fry.
3. Measures must be taken to prevent and reduce the risk of bird fatalities due to contact with live wires at points of attachment to support structures. Transmission lines, poles, and insulators must be equipped with special bird protection devices, including those that prevent birds from nesting in areas where they could encounter live wires. The use of uninsulated metal structures as bird protection devices is prohibited.
4. Sanitary protection zones must be established along power transmission lines to prevent the death of wildlife due to the impact of electromagnetic fields (EMFs).

2.6.6 Waste Management

Environmental safety requirements for the management of production and consumption waste during the design, construction, operation, reconstruction, conservation, and decommissioning of facilities for economic and other activities must include designated areas for the collection and/or accumulation of waste, equipped following the requirements established by special technical regulations.

The **Law of the Kyrgyz Republic “On Production and Consumption Waste”**, dated November 13, 2001, No. 89, defines state policy in production and consumption waste management. It aims to prevent the negative impact of such waste on the environment and human health during handling and maximize its integration into the economic cycle as an additional source of raw materials.

Waste is classified into hazard classes as follows:

- First (I) hazard class – extremely hazardous
- Second (II) hazard class – highly hazardous
- Third (III) hazard class – moderately hazardous
- Fourth (IV) hazard class – low hazardous
- Fifth (V) hazard class – practically non-hazardous

The hazard classes of waste are specified in the Waste Classifier, approved by the Resolution of the Government of the Kyrgyz Republic dated January 15, 2010, No. 9 (with the latest amendments and additions dated April 25, 2024, No. 201).

Ownership rights to waste are acquired by:

- State authorities, local state administrations, and local self-government bodies: from the moment waste is deposited in specially designated collection areas (trash bins, containers, and landfills) unless otherwise stipulated by the legislation of the Kyrgyz Republic and/or an agreement regarding the use of property that served as the source of the waste generation.

- A legal or natural person, including an individual entrepreneur, based on a transaction transferring ownership of the waste or through other actions that indicate the transfer of waste ownership in another manner.

When collecting waste, it is necessary to separate waste by types (metal, glass, textiles, paper, plastic, rubber, food waste, etc.).

Waste processing must be carried out in an environmentally safe manner. Facilities for waste processing that have been commissioned must be registered in the registry of waste processing facilities following the procedure established by the Cabinet of Ministers of the Kyrgyz Republic. The EPR (Extended Producer Responsibility) operator maintains the waste processing facility registry. The operation of waste processing facilities not included in this registry is prohibited.

Waste neutralization must be carried out only at waste neutralization facilities operated in compliance with the requirements established by this Law and other regulatory legal acts in the field of waste management and environmental protection.

Biological waste must be obligatorily destroyed by incinerator incineration (cremation) starting from January 1, 2025. Disinfection in biothermal pits (Beccari pits) followed by burial of the remains in the ground is allowed in cases determined by the Cabinet of Ministers of the Kyrgyz Republic. In the event of mass animal deaths due to natural disasters and the impossibility of transportation for utilization, incineration, or disinfection in biothermal pits (Beccari pits), burial of carcasses in the ground is permitted.

Activities by legal and natural persons, as well as individual entrepreneurs, involving the transportation (including transboundary), handling, processing, neutralization, and disposal of waste of hazard classes I-V are subject to licensing following the Law of the Kyrgyz Republic "On the Licensing and Permitting System in the Kyrgyz Republic" dated October 19, 2013, No. 195 (with the latest amendments and additions as of July 29, 2024, No. 151).

Unauthorized disposal of waste that may be a source of environmental pollution and its burning on the premises of enterprises, institutions, organizations, and populated areas is prohibited.

2.6.7 Land rights, acquisition and resettlement

The following land Laws are relevant to the Project:

- Civil Code of the Kyrgyz Republic - establishes the fundamental concepts of property rights.
- Land Code of the Kyrgyz Republic, dated June 2, 1999, No. 45 - defines the regulations for land withdrawal for civil needs.
- Forest Code of the Kyrgyz Republic, dated July 8, 1999, No. 66 - governs specific legal relations concerning forest fund lands.
- Law of the Kyrgyz Republic "On the Conversion (Transformation) of Land Plots" dated July 15, 2013, No. 145 - establishes rules for transitions between land categories.

- Law of the Kyrgyz Republic dated January 11, 2001, No. 4, “On the Management of Agricultural Lands” - governs specific legal relations concerning agricultural land.

2.6.8 Land acquisition process in Kyrgyz Republic

Land plots can be acquired for state and public needs following the Land Code of the Kyrgyz Republic. Acquisition of a land plot for state and public needs may be carried out based on an agreement between the authorized body and the owner of the land plot or land user. In the event of disagreement between the land plot owner or the land user regarding the acquisition or its terms, the authorized body has the right to apply to the court within two months with a claim for expropriation of the land plot from the moment of receipt of the refusal. Until the court decides on the land plot's expropriation, the owner of the land plot or land user has the right to exercise their rights to the plot and make the necessary expenses to ensure the use of the land plot following its intended purpose.

The owner of the land plot or the land user bears the risk of the costs and losses associated with new construction, expansion or reconstruction of buildings and structures during the specified period. When determining the compensation price of the land plot, it includes the market value of the right to the land plot and the buildings and structures located on it, as well as the losses caused to the owner or land user in connection with the termination of the right to the land plot, including losses associated with the early termination of obligations to third parties.

When a land plot is allocated for state or public needs, with the consent of the owner of the land plot or land user, he may be provided with another land plot with the value of the right to it being offset against the compensation cost.

2.6.8.1 Servitude / Right of Way

According to the provisions of the Code, a compulsory servitude may be established to ensure:

- 1) Access to the land plot if other access is impossible, extremely difficult or requires disproportionate expenses.
- 2) The laying and operation of power lines, communications, water supply, heat supply, land reclamation and other needs cannot be ensured without the establishment of a compulsory servitude.

A servitude may be established by agreement of the parties (voluntary servitude) or, if necessary, based on a decision of an authorized body (compulsory servitude). Encumbrance of a land plot with a servitude does not deprive the owner of the land plot or the land user of the right to the land plot.

Compensation for damages caused to the owner of a land plot or land user by establishing a compulsory servitude shall be subject to compensation by the entity whose interests the servitude is established. The authorized body shall determine the amount of damages and, in case of land plot owner or land user disagreement, by the court. The owner of a land plot or land user whose

land plot is acquired by a compulsory servitude has the right, instead of compensation for damages, to demand a proportionate fee from the entity in whose interests the servitude is established.

2.6.8.2 Forestry land

Forest legislation, as outlined in the Forest Code of the Kyrgyz Republic dated July 8, 1999, No. 66 (as amended and supplemented as of February 7, 2024), is aimed at protecting, conserving, reproducing, and sustainable use of forests.

All forests and lands in state, communal, and private ownership allocated for forestry purposes form the unified forest fund of the Kyrgyz Republic. All forests and lands provided for forestry needs, except for forests in municipal and private ownership, form the state forest fund. Following the constitutional provision on the right of private ownership of land in the Kyrgyz Republic, private forest lands are allowed on the condition of providing land plots in private ownership for artificial forest cultivation.

When forested land plots are expropriated for state or public needs, the issue of preserving or felling forest plantations and the procedure for utilizing the resulting timber is simultaneously resolved based on recommendations from the Republican State Forestry Management Authority.

2.6.8.3 Land categorisation

The Law of the Kyrgyz Republic, “On the Conversion of Land Plots”, dated July 15, 2013, No. 145 (as amended on October 21, 2024), regulates the conversion of land categorisation. This process is carried out following the provisions of the Land Code of the Kyrgyz Republic and other regulatory legal acts adopted in alignment with it. The conversion of land from one category to another is a state function and is implemented when the primary designated purpose of the land changes.

When agricultural land is converted from agricultural, forestry, water fund, or reserve land categories to other categories or types of land use unrelated to agricultural or forestry production, compensation for losses and lost profits is paid by the new land users or owners, except in cases specified by the law.

According to the Law of the Kyrgyz Republic dated January 11, 2001, No. 4, “On the Management of Agricultural Lands” (as amended and supplemented as of August 4, 2020), agricultural land in state ownership and leased out is expropriated for state purposes after payment of calculated costs and lost profits at the time of expropriation.

2.6.9 Archaeology and cultural heritage

According to the Law of the Kyrgyz Republic dated July 26, 1999, No. 91, “On the Protection and Use of Historical and Cultural Heritage”, during the engineering and survey stages and when converting land to a different land category, organizations engaged in construction, roadworks, or significant landscape modifications are required to conduct an archaeological survey to determine

the presence or absence of historical and cultural heritage objects on the affected territory (Article 32 of the Law "On the Protection and Use of Historical and Cultural Heritage").

Organizations may collaborate with private or state entities licensed by the Ministry of Culture, Information, and Tourism of the Kyrgyz Republic to conduct archaeological surveys to provide their archaeological expertise. Requirements for conducting survey work for this Project are defined in the ESIA terms of reference below.

2.6.10 National norms and standards for transmission lines

According to **Article 7** of the **Law of the Kyrgyz Republic "General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic"**, environmental safety during the design, construction, and operation of projects, including high-voltage power transmission lines, is ensured through the following measures:

1. Using machinery and equipment with design characteristics and technological processes to reduce negative environmental impact, ensure personnel safety, and prevent accidents.
2. The application of effective methods and technologies for treating pollutant emissions and discharges, as well as waste disposal technologies, to minimize environmental impact levels.
3. Conducting an environmental impact assessment (EIA) for planned economic and other activities before deciding on their implementation following the environmental safety requirements established by this technical regulation.

Sanitary and Epidemiological Rules and Standards (SanPiN), approved by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201, also establish guidelines for the placement, design, construction, and operation of newly constructed, reconstructed, and existing industrial and energy facilities.

To ensure the safety of the population around facilities and operations that impact the environment and human health, a **sanitary protection zone (SPZ)** is established. This is a defined area with a restricted usage regime, whose size is designed to reduce pollution impacts on atmospheric air. For OHTLs, a SPZ is defined to ensure people and equipment maintain a safe distance from live electrical wires, as defined in regulation and based on the voltage level of the line. The ESIA will define the SPZ for a 500 kV OHTL.

To protect the population from the electric fields generated by OHTLs, a **sanitary gap (SG)** is established along the high-voltage OHTLs routes, ensuring that the electric field intensity does not exceed **1 kV/m** outside these zones. This is below the maximum allowable electric field strength and magnetic flux density as defined by ICNIRP are defined below.

Exposure classification	Electric Field (kV/m)	Magnetic Field (μT)
Occupational	10	500
Public	5	100

For newly designed OHTLs, as well as buildings and structures, the boundaries of the SGs along the OHTL routes, with horizontally arranged conductors and without electric field intensity reduction measures, are as follows (measured from the projection of the outer phase conductors onto the ground, perpendicular to the OHTL):

- 20 meters for OHTL with a voltage of 330 kV;
- 30 meters for OHTL with a voltage of 500 kV;
- 40 meters for OHTL with a voltage of 750 kV;
- 55 meters for OHTL with a voltage of 1150 kV.

Thus, for the 500 kV power transmission line "PS Kemin" - "PS Balykchy", an SG of 30 m on either side of the outermost conductor will be established. At the commissioning and operation stages, the SG can be adjusted based on the results of instrumental measurements. When commissioning a facility and during its operation, the sanitary gap must be adjusted based on the results of instrumental measurements. The SG prohibits permanent residential properties within this area and the routing will be designed to maintain at least 30 m at all times.

2.7 Labour and Employment

Labour policy in the Kyrgyz Republic is implemented at the national government level and is reflected in the following relevant laws, regulations, and national social programs:

- **Constitution of the Kyrgyz Republic** (May 5, 2021)
- **Labour Code of the Kyrgyz Republic** (August 4, 2004, No. 106)
- **Law on Occupational Safety** (August 1, 2003, No. 167)
- **Law on Trade Unions** (October 16, 1998, No. 130)
- **Law on the Rights and Guarantees of Persons with Disabilities** (April 3, 2008, No. 38)
- **Resolution of the Government of the Kyrgyz Republic** (June 25, 1997, No. 374): "On the free provision of milk and other equivalent food products, soap, detergents, and disinfectants for workers in harmful working conditions."
- **Resolution of the Government of the Kyrgyz Republic** (October 11, 2011, No. 727): "On the approval of regulations for the appointment, payment, and size of temporary disability benefits, maternity benefits, and funeral benefits," with amendments from 2012, 2014, and 2016.
- **Resolution of the Government of the Kyrgyz Republic** (April 27, 2015, No. 258): "On the approval of regulations for establishing additional payments for heavy work and work in harmful or dangerous conditions, and a standard list of such jobs."
- **Resolution of the Government of the Kyrgyz Republic** (March 24, 2000, No. 158): "On the list of industries, jobs, professions, and positions with harmful and/or dangerous working conditions where women's labour is prohibited."
- **Resolution of the Government of the Kyrgyz Republic** (July 2, 2001, No. 314): "On the list of industries, professions, and jobs with heavy and harmful conditions where the labour of persons under 18 is prohibited," with amendments from 2005 and 2012.

- **Resolution of the Government of the Kyrgyz Republic** (July 1, 1996, No. 298): "On the approval of the list of industries, jobs, professions, positions, and indicators entitling workers to preferential pension benefits," with amendments up to 2021.
- **Regulations on the Organization of Occupational Safety Services and Work** (approved by Government Resolution No. 225 of April 5, 2004, with amendments from 2005).
- **Regulations on the Investigation and Reporting of Workplace Accidents** (approved by Government Resolution No. 64 of February 27, 2001, amended in 2020).
- **Regulations on Occupational Safety Training and Knowledge Assessment** (approved by Government Resolution No. 225 of April 5, 2004, with additions in 2013).

The Kyrgyz Republic became a member of the **International Labour Organization (ILO)** on March 31, 1992. Upon joining, the Kyrgyz Republic confirmed that the ILO conventions ratified by the USSR would remain in effect for Kyrgyz Republic following its independence from the USSR. The Kyrgyz Republic has ratified the following conventions:

Table 10: Labour Conventions ratified by Kyrgyz Republic

Convention	Date
Universal Declaration of Human Rights (1948)	1991
International Covenant on Civil and Political Rights (1966)	07-10-1994
Partnership and Cooperation Agreement with the EU (1996)	1999
ILO Convention 10 (Minimum Age in Agriculture, 1973)	06-07-1956 (USSR)
ILO Convention 11 (Right of Association and Organization in Agriculture, 1921)	06-07-1956 (USSR)
ILO Convention 17 (Workmen's Compensation for Accidents, 1925)	17-08-2004
ILO Convention 29 (Forced Labour, 1930)	23-06-1956 (USSR)
ILO Convention 45 (Underground Work for Women, 1935)	31-01-1961 (USSR)
ILO Convention 47 (40-Hour Workweek, 1935)	04-06-1956 (USSR)
ILO Convention 52 (Annual Paid Leave, 1936)	06-07-1956 (USSR)
ILO Convention 59 (Minimum Age in Industry, 1938)	06-07-1956 (USSR)
ILO Convention 60 (Revised Minimum Age for Non-Industrial Employment, 1937)	06-07-1956 (USSR)
ILO Convention 73 (Medical Examination of Seafarers, 1946)	18-06-1969 (USSR)
ILO Convention 77 (Medical Examination of Children for Industry Work, 1946)	06-07-1956 (USSR)
ILO Convention 78 (Medical Examination of Children for Non-Industrial Work, 1946)	06-07-1956 (USSR)
ILO Convention 79 (Night Work of Children in Non-Industrial Work, 1946)	06-07-1956 (USSR)

Convention	Date
ILO Convention 81 (Labour Inspection in Industry and Commerce, 1947)	15-01-2000
ILO Convention 87 (Freedom of Association and Protection of the Right to Organize, 1948)	06-07-1956 (USSR)
ILO Convention 90 (Revised Night Work for Young Persons in Industry, 1948)	06-07-1956 (USSR)
ILO Convention 95 (Protection of Wages, 1949)	31-01-1961 (USSR)
ILO Convention 97 (Migration for Employment, 1949)	15-04-2003
ILO Convention 98 (Right to Organize and Collective Bargaining, 1949))	06-07-1956 (USSR)
ILO Convention 103 (Maternity Protection, 1952)	06-07-1956 (USSR)
ILO Convention 105 (Abolition of Forced Labour, 1957)	19-03-1998
ILO Convention 111 (Discrimination in Employment and Occupation, 1958)	31-01-1961 (USSR)
ILO Convention 115 (Radiation Protection, 1960)	05-08-1967 (USSR)
ILO Convention 118 (Equality of Treatment in Social Security, 1962)	12-01-1994
ILO Convention 150 (Labour Administration, 1978)	15-07-2003
ILO Convention 182 (Worst Forms of Child Labour, 1999)	11-05-2004
ILO Convention 184 (Safety and Health in Agriculture, 2001)	30-12-2003
ILO Convention 190 (Violence and Harassment, 2019)	29-02-2024
CEDAW (Convention on the Elimination of All Forms of Discrimination Against Women)	10-02-1997

A legal and institutional framework has been established in national legislation following international conventions to prevent forced labour. The legislation of the Kyrgyz Republic (Constitution and Labour Code) prohibits child and forced labour use. Article 10 of the Labour Code explicitly bans forced labour under the threat of any form of coercion or violence, with exceptions made only for emergencies, military service obligations, or duties arising from the enforcement of a court sentence.

2.8 Lender requirements

The following Lender requirements will be considered to provide maximum flexibility to the Project financing.

2.8.1 EBRD Policy

The ESIA will principally consider the E&S requirements of EBRD as described in the following text:

- The European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy 2019 (ESP 2019);

- EBRD Performance Requirements (PRs):
- PR1 – Assessment and Management of Environmental and Social Risks and Impacts;
- PR2 – Labour and Working Conditions;
- PR3 – Resource Efficiency and Pollution Prevention and Control;
- PR4 – Health, Safety and Security;
- PR5 – Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- PR6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PR7 – Indigenous Peoples;
- PR8 – Cultural Heritage;
- PR10 – Information Disclosure and Stakeholder Engagement.

A summary of the overall objectives of each of the PRs is summarised below⁶:

PR1 - Assessment and Management of Environmental and Social Impacts and Issues

- Identify and evaluate environmental and social impacts and issues of the project;
- Adopt a mitigation hierarchy to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities;
- Promote improved environmental and social performance of clients through the effective use of management systems; and
- Develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant prs.

PR2 - Labour and Working condition

- Respect and protect the fundamental principles and rights of workers;
- Ensure fair treatment, non-discrimination and equal opportunities of workers;
- Establish, maintain and improve a sound worker-management relationship;
- Promote compliance with any collective agreements to which the client is a party, national labour and employment laws;
- Protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions; and
- Prevent the use of forced labour and child labour (as defined by the ILO) as it relates to project activities.

PR3 - Resource Efficiency and Pollution Prevention and Control

⁶ [EBRD ESP 2019](#)

- Adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project;
- Avoid, minimise and manage the reduction of project-related greenhouse gas emission;
- Associated with hazardous substances and materials, including pesticides;
- Identify, where feasible, project-related opportunities for resource efficiency improvements associated with hazardous substances and materials;
- Including pesticides; and
- Identify, where feasible, project-related opportunities for resource efficiency improvements.

PR4 – Health, Safety and Security

- Protect and promote the health, safety and security of workers, by ensuring safe, healthy and secure working conditions and implementing a management system, appropriate to risks associated with the project; and
- Identify, assess, and manage health, safety and security risks to project affected communities and consumers during the project life cycle from both routine and non-routine activities.

PR5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

- Avoid involuntary resettlement or, when unavoidable, minimise involuntary resettlement by exploring feasible alternative project designs and sites;
- Avoid forced eviction;
- Mitigate unavoidable adverse social and economic impacts from involuntary resettlement on affected persons use of and access to assets and land by:
 - (i) providing timely compensation for loss of assets at full replacement cost
 - (ii) ensuring that land acquisition, restrictions on land use, other assets and natural resources and involuntary resettlement activities are implemented with meaningful consultation, participation, and disclosure of information, in accordance with the requirements of PR 10;
- Restore or, where possible, improve the livelihoods and standards of living of affected persons compared to pre-displacement levels; and
- Improve living conditions among physically displaced persons through the provision of adequate housing, including security of tenure at resettlement sites.

With relevance to this Project, this PR applies to restrictions that result in people experiencing loss of access to land, assets, natural resources or livelihoods, irrespective of whether such rights or restrictions are acquired through negotiation, expropriation, compulsory purchase, or employing government regulation (EBRD PR5, para 6).

PR6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources

- Protect and conserve biodiversity using a precautionary approach;
- Adopt the mitigation hierarchy (avoid, minimise, offset) approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity;
- Maintain ecosystem services; and
- Promote Good International Practice (GIP) in the sustainable management and use of living natural resources.

PR7 – Indigenous Peoples (IPs)

- Ensure that projects fully respect the dignity, rights, aspirations, cultures, customary laws and livelihoods of indigenous peoples;
- Both anticipate and avoid adverse risks and impacts of projects on the lives and livelihoods of indigenous peoples' communities or, when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts;
- Promote sustainable development benefits and opportunities for indigenous peoples and establish and maintain an ongoing relationship with IPs affected by the project, ensure the effective participation of indigenous peoples in the design of project activities or mitigation measures that could potentially affect them either positively or negatively; and
- Ensure good-faith negotiation with IPs and obtain their free prior informed consent (FPIC).

PR8 - Cultural Heritage

- support the protection and conservation of cultural heritage;
- adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project;
- promote the equitable sharing of benefits from the use of cultural heritage in business activities; and
- where significant elements of cultural heritage are identified, promote the awareness, appreciation and enhancement of cultural heritage as well as potential socioeconomic benefits for local communities.

PR10 - Information Disclosure and Stakeholder Engagement

- outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular, the directly affected communities;
- provide means for effective engagement with the project's stakeholders throughout the project lifecycle;
- ensure that appropriate environmental and social information is disclosed, and meaningful consultation is held with the project's stakeholders, and where appropriate, feedback provided through the consultation is taken into consideration; and
- ensure that grievances from affected communities and other stakeholders are handled appropriately.

2.8.2 EHS Guidelines

The EBRD PRs refer to the World Bank Group (WBG) Environment, Health and Safety (EHS) Guidelines as general guidance for implementing GIIP. The EHS Guidelines applicable to the Project include the following:

- WBG General EHS Guidelines (April 2007) - cover the four areas of the environment; occupational health & safety (OHS); community health & safety (CHS); construction and decommissioning.
- WBG EHS Guidelines Electric Power Transmission and Distribution (April 2007).

2.8.3 Good Industry Practice (GIP)

The Project will also follow the relevant requirements of the following GIP. Including, but not limited to:

- Voluntary Principles on Security and Human Rights (est. 2000); (<http://www.voluntaryprinciples.org/>);
- United Nations Guiding Principles for “Protect, Respect and Remedy” Human Rights Framework (2011); (<https://www.business-humanrights.org/en/un-secretary-generals-special-representative-on-business-human-rights/un-protect-respect-and-remedy-framework-and-guiding-principles>);
- United Nations Code of Conduct for Law Enforcement Officials; and (<https://www.un.org/ruleoflaw/blog/document/code-of-conduct-for-law-enforcement-officials/>);
- United Nations Basic Principles on the Use of Force and Firearms by Law;
- Use of Security Forces: Assessing and Managing Risks and Impacts (February 2017);
- Worker's Accommodation: Processes and Standards (Guidance Note by IFC and EBRD, 2009), and
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, World Bank, 2007.

EBRD is committed to promoting the adoption of European Union (EU) environmental principles, practices and substantive standards by EBRD-financed projects, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects will be expected to meet whichever is more stringent. Relevant EU Directives include:

- EIA Directive (2011/92/EU as amended 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment;
- Council Directive 2009/147/EC on the conservation of wild birds^[1]
- Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna (Habitats Directive); and
- Directive on Environmental Quality Standards in the Water Policy 2008/105/EC.

With reference to the EIA Directive, an EIA is mandatory for all projects which are considered as having significant effects on the environment and as listed in Annex I of the EIA Directive. This includes "20. Construction of overhead electrical power lines with a voltage of 220 kV or more and a length of more than 15 km"⁷⁸.

2.9 International conventions and agreements

The following fundamental conventions (in addition to ILO conventions which are included in section 2.7) have been ratified by the Kyrgyz Republic (*Table 10*).

Table 10: List of conventions ratified by Kyrgyz Republic

Convention name
Environment / Climate Change
United Nations Framework Convention on Climate Change (UNFCCC), including the Paris Agreement (Ratified January 14, 2000, and November 11, 2019)
Convention on Biological Diversity, including the Nagoya and Cartagena Protocols (July 26, 1996, March 2, 2015, August 6, 2003)
United Nations Convention to Combat Desertification (UNCCD) (January 15, 2000)
Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (January 12, 2015)
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (January 18, 1996)
Convention Concerning the Protection of the World Cultural and Natural Heritage (June 2, 1995)
Convention for the Safeguarding of the Intangible Cultural Heritage (July 19, 2006)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (November 30, 2006)
Convention on the Conservation of Migratory Species of Wild Animals (November 22, 2013)
Ramsar Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (April 10, 2002)
Vienna Convention for the Protection of the Ozone Layer (January 15, 2000)
Montreal Protocol on Substances that Deplete the Ozone Layer (January 15, 2000)
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) (January 14, 2001)

⁷ <https://ec.europa.eu/environment/nature/legislation/birdsdirective/>

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0092>

Convention name
Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (Aarhus Convention) (January 12, 2000)
Convention on Long-Range Transboundary Air Pollution (January 14, 2000)
Stockholm Convention on Persistent Organic Pollutants (POPs) (March 5, 2002)
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (January 15, 2000)
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (December 5, 2006)
United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (January 12, 2001)
Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (August 17, 2004)

3 Project Description

3.1 Summary of needs case and analysis of alternatives

The Kemin–Balykchy OHTL (K-B OHTL) will be built to support the development of large renewable power plants in the Issyk-Kul region. Currently, hydropower is the primary source of electricity in the Kyrgyz Republic, accounting for approximately 90% of annual production. However, about 80% of the energy system infrastructure is deteriorated and requires modernization.

According to UN statistics, the population of the Kyrgyz Republic is expected to grow significantly. At the same time, the country is experiencing a sharp increase in electricity consumption. Between 2010 and 2020, total consumption rose 72%, driven primarily by a dramatic 170% increase in residential sector consumption⁹.

In 2019, the Kyrgyz Republic adopted the Green Economy Development Program of the Kyrgyz Republic for 2019-2023, prioritising green energy. As part of this program, funding was secured for the development of wind and solar energy. According to the Kyrgyz Republic Investment Portal, work is already underway in the Issyk-Kul region on the design and/or construction of a solar power plant and a wind farm within a 50-kilometre radius of the city of Balykchy, with a budget exceeding USD 200 million¹⁰.

The region's power grid is currently served by 220 kV transmission lines, which are insufficient for energy transportation and have significant challenges, including:

- Ageing infrastructure: many substations and transmission lines have exceeded their operational life, leading to inefficiencies and frequent outages.
- Load growth and grid overloads: increasing electricity demand, particularly in winter, has caused up to 45-53% of overloads during peak periods.
- Cross-border power exchanges: while NEGK plays a key role in regional trade through CAPS, the system's reliability is affected by neighbouring networks.

Since the Chui region and Bishkek are the most densely populated areas in the Kyrgyz Republic, they are the priority for connection to new capacity. Previously, the Kemin substation in the Kemin district of the Chui region was constructed to receive 500 kV lines. However, the Issyk-Kul region currently lacks such a substation.

Constructing a transmission line between the existing Kemin substation and Balykchy in the Issyk-Kul region would deliver electricity from planned green energy facilities to densely populated

⁹https://iea.blob.core.windows.net/assets/e3dc71d9-a1f8-40bf-a6d6-b7b4ed9fa37a/StrengtheningPowerSystemSecurityinKyrgyzstan_ARoadmap.pdf

¹⁰<https://invest.gov.kg/investmap/map.xhtml?lang=ru#>

areas, provide redundancy for existing lines in emergencies, and significantly increase the overall grid transmission capacity. The OHTL is an integral part of a broader program supporting the integration of renewable energy sources into the national grid and, specifically, the integration of renewables in the northwestern region. This needs case will be elaborated in the ESIA to show the current and planned development projects for which this OHTL plays a strategic role in the overall upgrades.

3.2 Analysis of Alternatives

3.2.1 No project alternative ("do-nothing option")

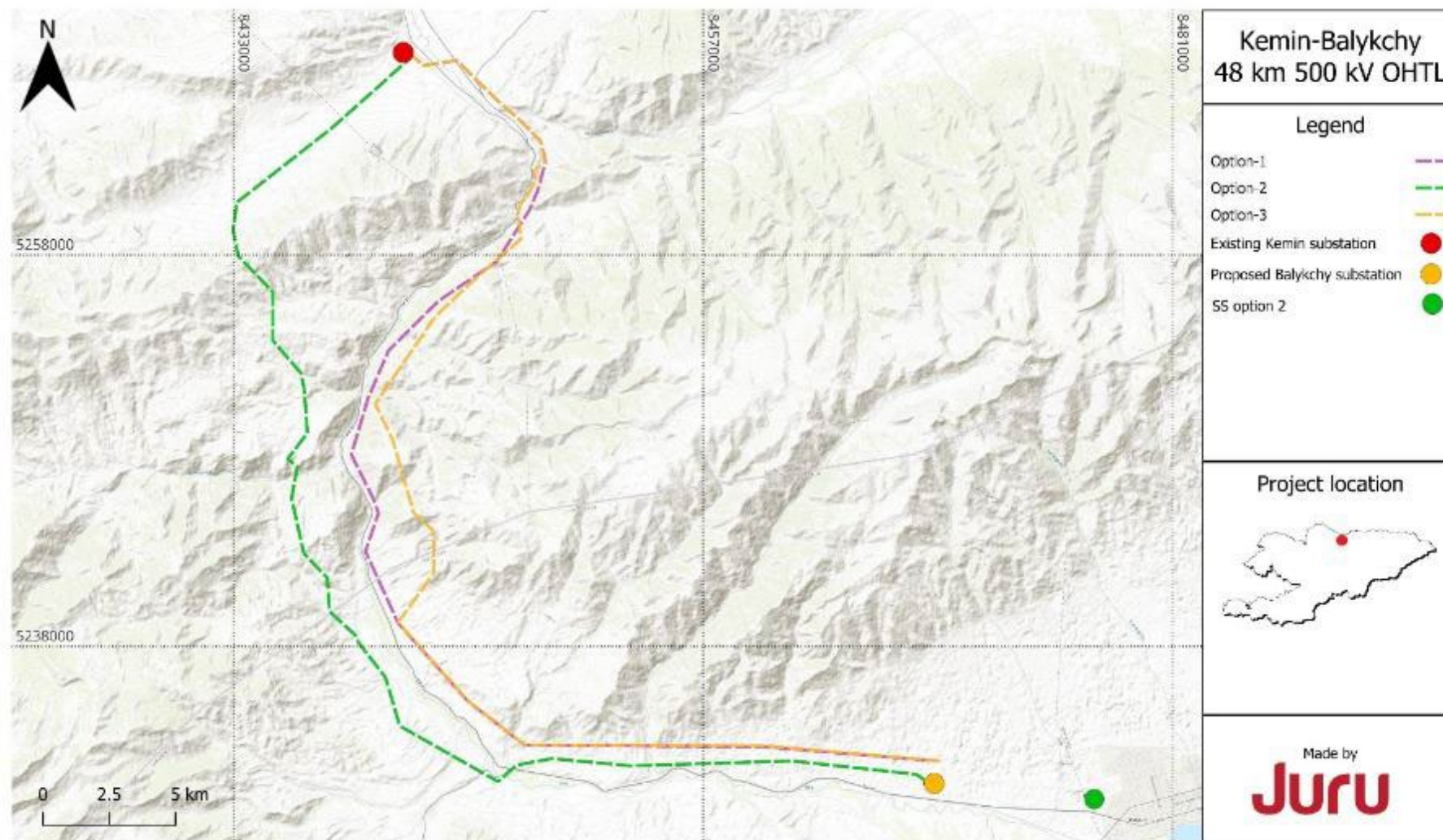
Not constructing the K-B OHTL will avoid any potential E&S impacts connected with the OHTL construction, operation and decommissioning. However, the "do-nothing" option could hinder the upgrade of the national transmission system, which is required to improve grid security and support the transition to a lower-carbon economy. The installation will also support improvements in the transmission losses experienced when transmitting energy over long distances. Positive socio-economic impacts related to direct employment of personnel on the OHTL construction work, and wider employment connected to the expansion of RE projects in the region may also be lost in this case.

3.2.2 Alternative concepts

The K-B OHTL options analysis considers alternatives for both the transmission line route and the location of the Balykchy 500 kV substation. The feasibility study has considered three alternative routes and three location options for the Balykchy 500 kV substation. This scoping report considers the two most likely routes and substation options (see below).

The final selection of the OHTL route will be carried out during the feasibility study (FS) stage of the Project, based on the technical, economic, and E&S (Environmental and Social) characteristics of each option (as identified during this scoping phase). The route and substation options are shown in *Figure 2*. It is important to note that the routes may be subject to minor changes depending on the selection of the substation location. The ESIA will be performed for the preferred route option.

Figure 2: Project alternatives



3.2.3 Project description

The primary components of the K-B OHTL Project are:

- Approximately 48 km (route option 1) or 54 km (route option 2) of 500kV OHTL between the settlements of Kemin (Chui region) and Balykchy (Issuk-Kul Region)

Related activities in support of the OHTL works will include:

- End-user works at the Kemin SS (Figure 3 and Figure 4) – the connection is expected to be within an existing reserve bay within the current substation footprint (route option 1 and route option 2).
- End-user works at 25 ha site for a new standalone substation
- ~65m servitude under the OHTL (including the area for tower footprint, and the sanitary gap (30 m on either side of the outermost conductor).
- Provision of any related livelihood compensation).
- Upgrade the existing track or a new access track suitable to provide access to the OHTL ROW from existing road (s) that run parallel to the OHTL servitude.

Figure 3: Spare bay for the 500 kV Kemin-Balykchy OHTL in the Kemin substation (source: Kemin Balykchy inception report, December 2024)



Figure 4: Connection from the Existing 500/220/35kV Kemin Substation



The proposed route options are expected to require one or more of the following crossings with natural features or existing infrastructure:

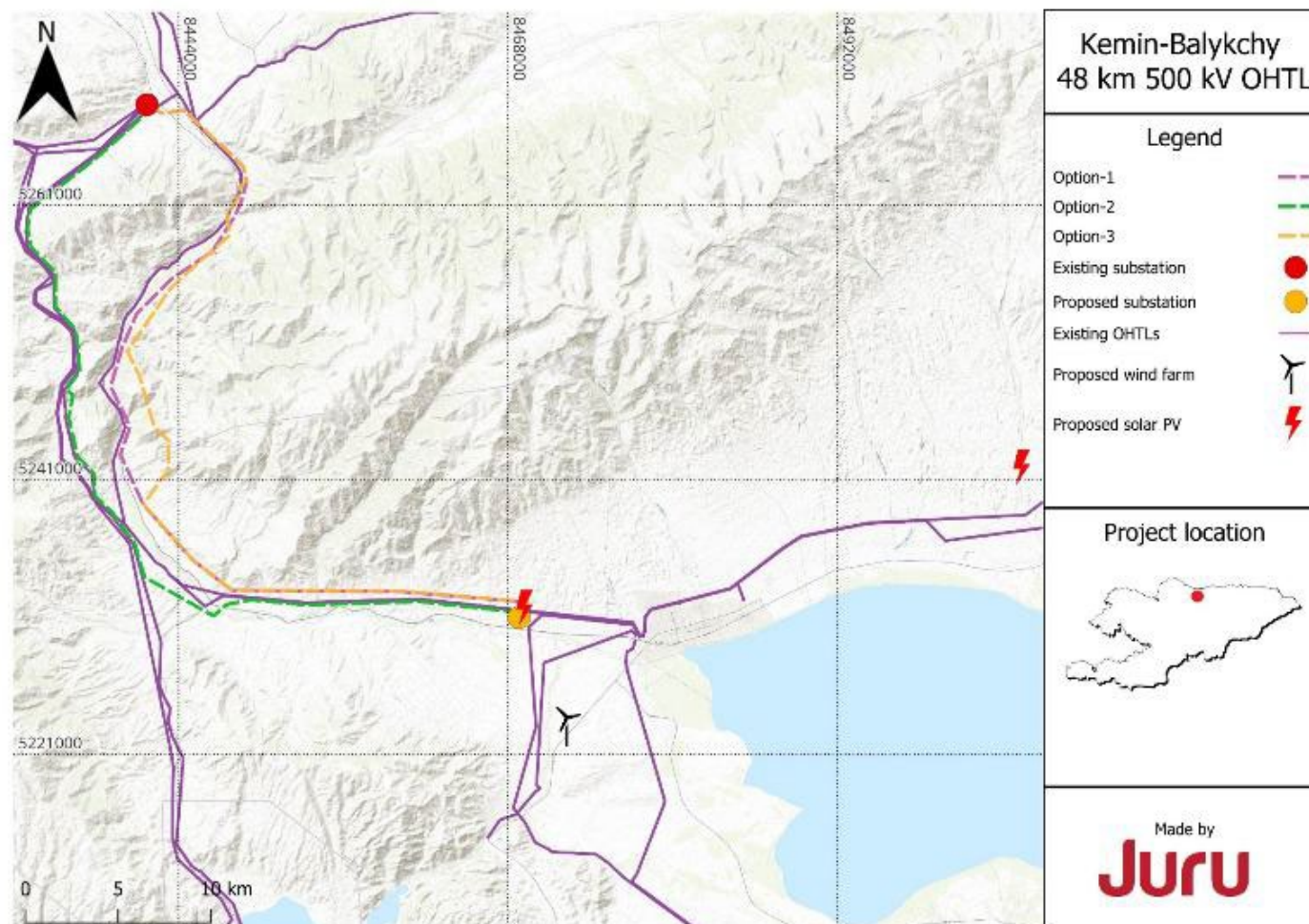
- Railway crossings.
- Crossing of the Chu River.
- Multiple crossings of existing 220 kV overhead line (IssikKul-1, IssikKul-2 and Zapadnaya OHTL).
- Road crossings (EM11 and more minor local roads).

All works will be carried out by a construction contractor selected by NEGK through an open tender process. Further description of these works is provided in section 3.5.7 and section 3.5.8 below. Once operational, the OHTL and substation will be transferred to the local subsidiary company of OJSC NEGK, which will assume responsibility for operation and maintenance (O&M) activities.

3.2.4 Associated facilities

The work at the Kemin SS and possible works at the Balykchy SS are not considered associated facilities as defined by EBRD PR1. The construction/expansion work is being undertaken exclusively for this Project. No other associated facilities are identified at this time. This will be confirmed during the ESIA process.

Figure 5: Overview of the location of the Project considering existing and planned infrastructure



3.3 Project location

The planned OHTL starts from the existing Kemin SS, located close to Cholok village (200 m), to the planned Balykchy SS (location to be finalised). The OHTL is expected to route through two regions, up to three districts (depending on the preferred option), and two municipalities (ayil okmutus), as shown in

Figure 1: Project location

Figure 1Figure 5.

- Chui region (Kemin district, Kyzyl-Oktyabr municipality).
- Issyk-Kul region (Ton district, Kok-Moynok municipality and Balykchy city (depending on substation option)).

Within the two-kilometre buffer of the OHTL routes, the scoping site visit has identified the villages of Kok-Moynok-1 and Kok-Moynok-2 (Ton District), Cholok village (Kemin district), and alternative routes pass along the village of Kyz-Kiya (Kemin district). Further information on other receptors is provided below.

3.4 Project setting

Receptors identified with the 2 km of the proposed OHTL routes are shown in Figure 6 and described below.

Route option 1 starts at the existing 500/220/35 kV Kemin substation and routes southeast through the Boom Gorge, which closely follows the Bishkek-Torugart (EM11) highway, the main transport artery connecting the Chui and Issyk-Kul regions. Along the entire route of the OHTL, there are four main settlements/villages - Cholok (S1) and Kyz-Kiya (S2) in the Kemin district (Figure

9), Kok-Moynok-1 (S6) and Kok-Moynok-2 (S3) in the Ton district (**Error! Reference source not found.**). There are also smaller farmsteads and households within 500m of both proposed OHTL routes, as shown in Figure 7 (marked F1, F4, F7-F10, F15). The route necessitates several infrastructure crossings and has access challenges when routing along the right bank of the Chu River. Further along, the route option approaches residential areas on the outskirts of Balykchy (150 m).

Route option 2 (approximately 52km) heads west into the mountains from the Kemin substation and follows an unpaved gravel road and existing 500kV OHTL ("Datka-Kemin"). The route also crosses the existing 220 kV lines "Kemin-Issyk-Kulskaya-1" and "Kemin-Issyk-Kulskaya-2", as it passes through the mountains to the village of Kok-Moynok-2 where the route crosses the Bailamtal River and the follows a similar alignment as to "Bishkek-Torugart" highway (and route option 1) for approximately 18 km towards Issyk-Kulskaya existing substation (or the new Balykchy substation approximately 6 km outside Balykchy). There are no villages or commercial facilities along the mountain portion of the OHTL. The main receptors are small clusters of farms (F4, F6, F13, F15) and rural households (S1, S3, S6, S7). Within Farm Cluster 2 the Nature And Biodiversity Conservation Union (NABU) animal rehabilitation centre has been observed. The terrain along route option 2 is hilly, with sharp elevation changes ranging from 1,283 to 2,394 meters above sea level. No demolition of buildings or clearing of vegetation along the route is likely to be required.

Figure 6: Project setting for K-B OHTL

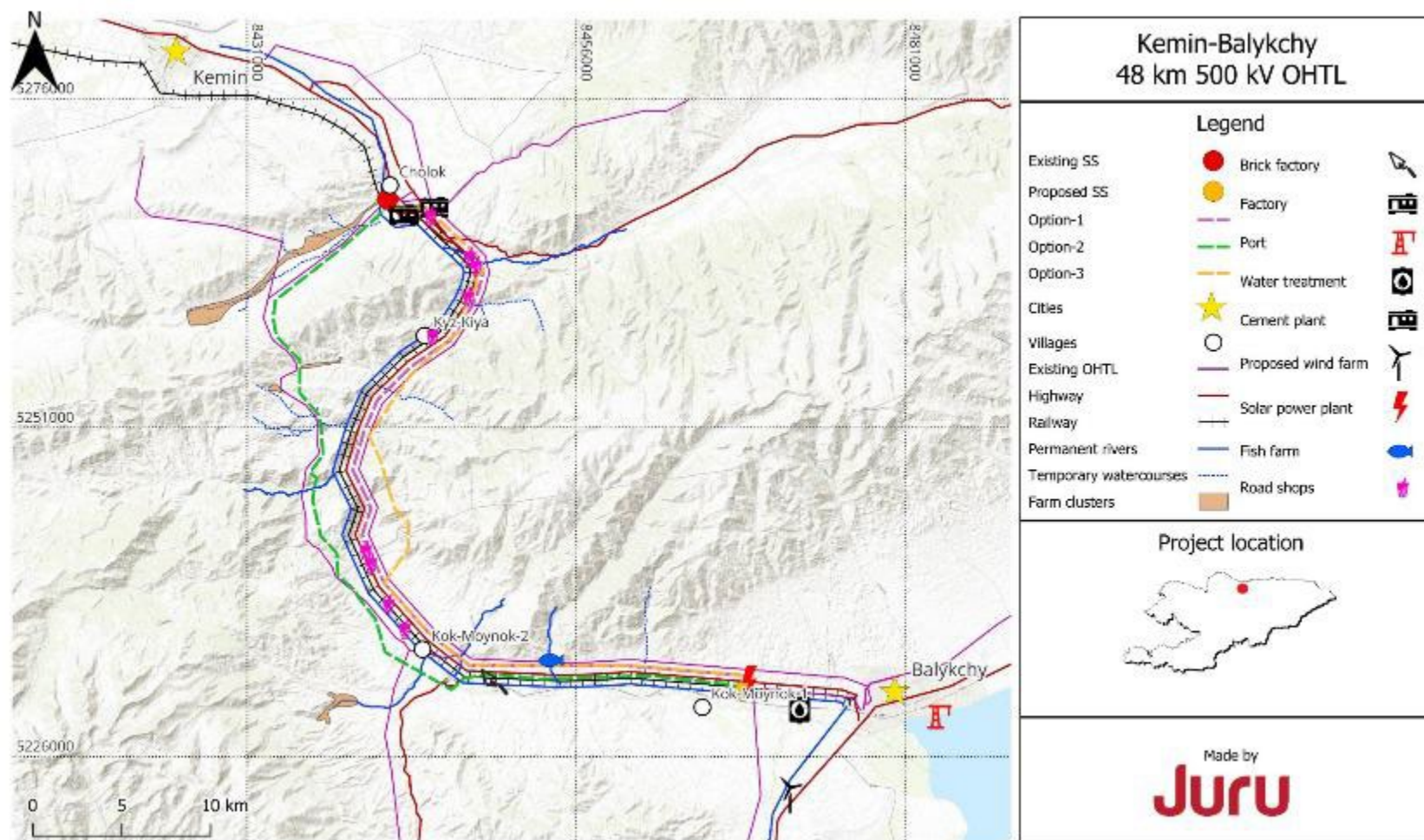
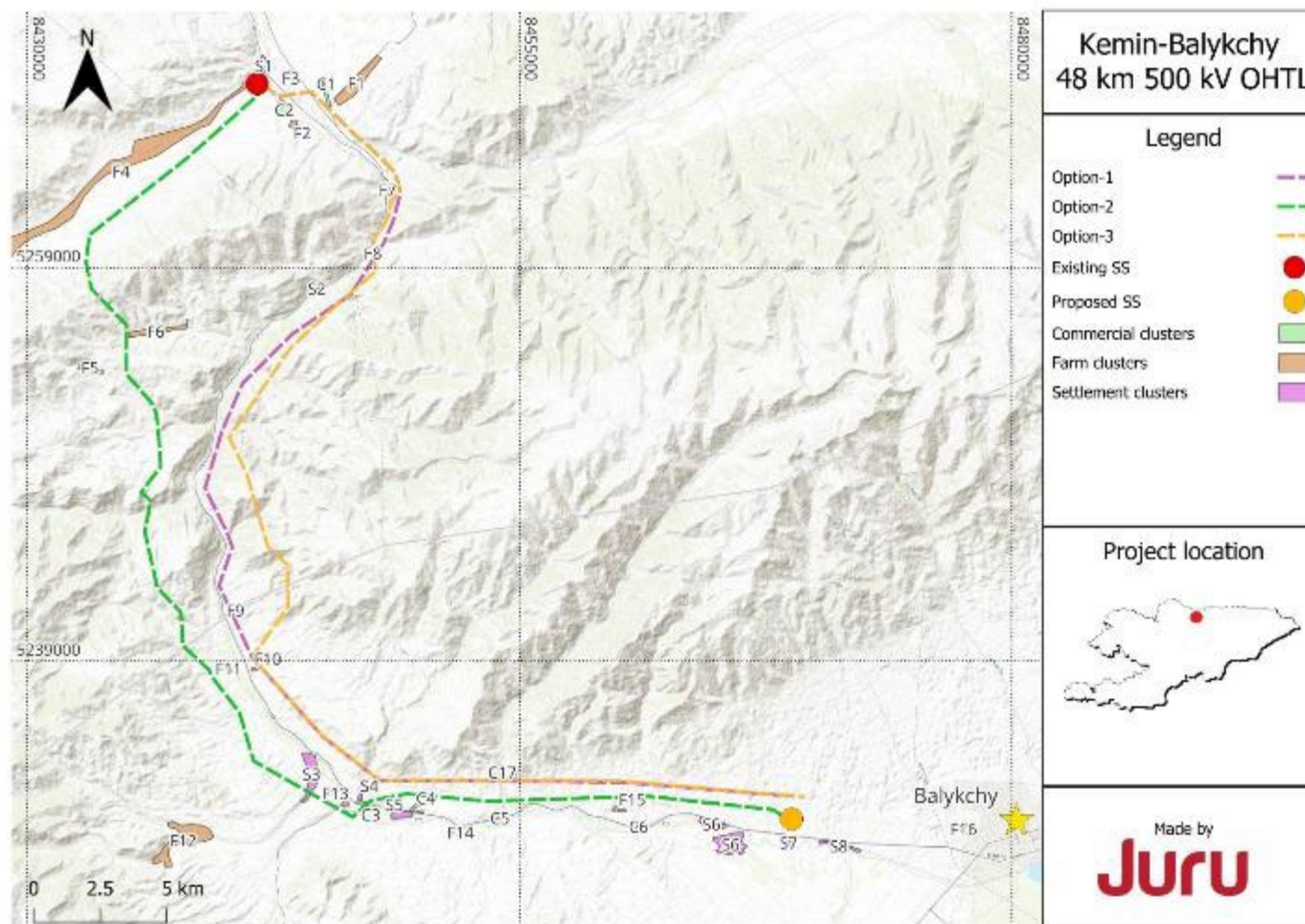


Figure 7: Receptor clusters along the OHTL options



The site for the potential new substation located near Balykchy is arid or semi-arid, with sparse vegetation consisting of small shrubs and dry grasses as shown in Figure 8. The site is easily accessible via the nearby EM11 highway, making it convenient for the transport of equipment and materials. The site is located close to the Chui river.

Figure 8: Location of the planned substation



The traffic on the main (EM11) road and its proximity to a tourist zone have contributed to roadside economic activity, including eateries and shops (Figure 9, Figure 11). On both sides of the road, closer to the mountains, there are scattered households (Figure 12), but no livestock grazing was observed during the visit., this will be confirmed during the ESIA phase engagement.

A railway with low freight train traffic and existing 220 kV OHTL runs parallel to the EM11 road (Figure 13).

Economic activities near both OHTL routes include production facilities and planned energy projects. Construction camps for a solar power plant were identified approximately 6 km west of Balykchy and a wind farm 12 km southwest of the city. A brick production facility (C4) is located along the highway in the Ton district (

Figure 14), while one construction material production facility (C1) is present in the Kemin district (*Figure 15*). These facilities are located at varying distances within the 2 km buffer of the planned OHTL; the C2 facility (a cement plant) is also near the OHTL, though this has not yet been confirmed. Other livelihood activities include farming activity within the Study area. Near Balykchy is a poultry farm (C16), and upstream on the Kiymat-Kur-Kol River, there is a fish farming facility (C17).

The city of Balykchy, of regional significance, has a permanent population of 42,875 people (including 42,380 in the city of Balykchy and 495 in the urban-type settlement of Orto-Tokoy). Further information about the settlements in the Project area is provided in section 4.6 below.

Water resource receptors include one of the country's largest rivers, the Chu River, which runs parallel to the OHTL route option 1 and the second half of route option 2. Depending on the option and final tower placement, the OHTL is expected to cross this river or its tributaries in 1 to 2 locations. In the suburbs of Balykchy, wastewater treatment facilities are located, which may be used by the Project and could potentially serve as a source of river pollution. One of the region's largest lakes, Issyk-Kul, is located 9 km southeast of the proposed Balykchy substation, with national and international ecological protections described in detail in section 4.7.

Due to the specific natural conditions and prevailing winds near the lake, semi-desert landscapes have formed, characterized by sparse saltbush and shrub vegetation such as ephedra and feather grass. The soil cover is thin, almost absent, and rocky (

Figure 16). Within the Boom Gorge, the slopes are marked by significant steepness, sparse vegetation cover, and erosion processes. On the right bank of the river, 3 km from route option 1 in the Kemin district, agricultural fields were observed, though they were fallow at the time of the visit.

According to the IBAT¹¹ report, Protected Planet data¹², and Birdlife International data¹³, the planned routes do not traverse any existing protected areas; however, due to their proximity, all the proposed options may affect the biodiversity of some protected and Key Biodiversity Areas (KBAs). Eight protected areas of national and international importance are identified within a 50 km buffer from the proposed OHTL route (refer to section 4.7 for further explanation). The closest protected areas are located only 2.5-3 km from the easternmost endpoint of the proposed OHTL route (for one of substation options) and include 4 overlapping protected areas with various protection statuses aiming to conserve Lake Issyk-Kul and its biodiversity. These are the "Issyk-Kul State Nature Reserve", the "Issyk-Kul Biosphere Reserve", the Ramsar site "Issyk-Kul State Reserve with the Lake Issyk-Kul" and KBA "Western Issyk-Kul Lake".

11 IBAT PS6 & ESS6 Report. Generated under licence 43172-72638 from the Integrated Biodiversity Assessment Tool on 09 October 2024 (GMT). www.ibat-alliance.org

12 UNEP-WCMC and IUCN (2024) Protected Planet: The World Database on Protected Areas (WDPA), [insert month/year of the version downloaded], Cambridge, UK: UNEP-WCMC and IUCN. Available at: <https://www.protectedplanet.net/country/KG>

13 BirdLife International (2024). The World Database of Key Biodiversity Areas. Developed by the KBA Partnership. Available at www.keybiodiversityareas.org. Accessed 25.11.2024

Figure 9: Kemin district villages



Figure 10: Ton district villages



Figure 11: Road shops and cafes along EM11*Figure 12: Example of stand-alone farmstead and households (mountain area)**Figure 13: Existing OHTL and railway along EM11*



Figure 14: Brick factory (C4)



Figure 15: Factories (C1)



Figure 16: Landscapes along the OHTL route (mountain areas)



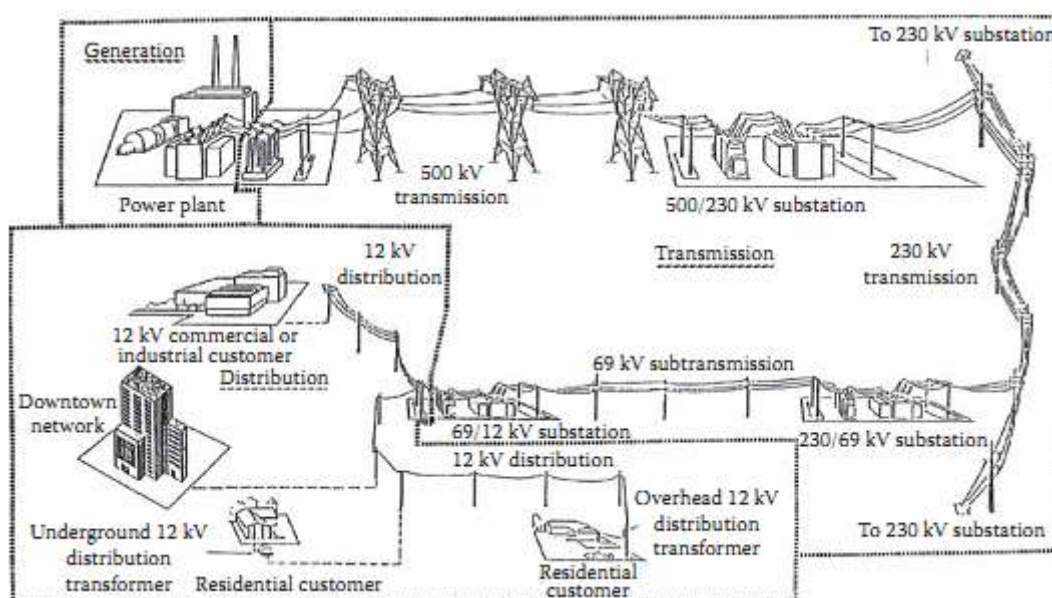
Figure 17: Site overview at new Balykchy substation*Figure 18: Route option 2 existing line and unpaved gravel road.*

3.5 Project components

3.5.1 Concept of energy transmission

Figure 19 shows the key features of a typical energy transmission and distribution system. The generating station produces electric energy at around 15-25 kV. At the generating station, a transformer is used to increase ("step up") the voltage to a voltage more appropriate for transmission (e.g., 500 kV as for this Project). The higher the voltage, the less energy loss is incurred during transmission. In the Kyrgyz Republic, 500 kV OHTL transmit electricity between 500 kV substations. At these substations, energy may then be stepped down to 220 kV for transmission at a more regional level and then to even lower voltages for distribution around cities, from which it is reduced to 110 kV for distribution along streets and then finally to 240/110V to supply homes.

Figure 19: Concept of electric energy transmission¹⁴



3.5.2 Main components

The main components of an OHTL are the towers, foundations, insulators, conductors (wires), and earth wire, as shown in

¹⁴ http://www.industrial-electronics.com/elec_pwr_3e_9.html

Figure 20. All components will be designed following the relevant statutes and norms of the Kyrgyz Republic and GIP. A summary of the key characteristics of the OHTL is provided in *Table 11*. A final decision on many technology choices, e.g., the type of OHTL tower or the number of towers, has not been made. Where the final decision may affect the potential E&S impacts, this is noted in Chapter 5; otherwise, it is considered that the final design alternatives have an equal effect from an E&S impact perspective.

Table 11: Summary of OHTL characteristics

Feature	Description Route option 1	Description route option 2
Circuit type	Single or double	Single or double
Number of phases	2 or 3	2 or 3
Approximate length of OHTL	48 km	52.2km
Elevations along the route, m ASL (meters above sea level)	256-1741	1283-2394
Total length of new access road (across whole line route)	10km	3 km
Tower Type	Combination of suspension, angle and terminal towers	
Tower height	30 to 40 m	30 to 40 m
Typical Span / Maximum span	300 m to 400 m / 1000m	300 m to 400 m / 1000m
Optical Ground Wire (OPGW)	Yes	Yes

Figure 20: Components of an OHTL (source: Juru)



3.5.3 Tower

Towers are typically self-supporting or guyed towers and are made from galvanised steel, depending on the final design choice. Typical tower designs are illustrated in Figure 21 to Figure 22 and comprise three different types of towers:

- Suspension towers (intermediate towers) — used to support the conductors on straight line stretches.
- Angle or deviation towers — used at points where the route changes directions.
- Terminal towers — used at substation entry.

The typical configuration of a 500 kV suspension tower is provided in Figure 21 (self-supporting lattice structure) and Figure 22 (guyed tower). Self-supporting towers have four ground-level foundation columns used to support the steel structure. For the guyed towers, two tower legs spread apart from the tower bridge (upper section of the tower) down to the tower base, and there are at least four guy lines for tower stability. The exact tower type, height will be dependent on the terrain (minimum permissible ground clearance), the minimum required span length to maintain sag clearance, spacing between the conductors and ground wire requirements. The tower arms hold the insulators and the conductors. Conductors carry two or three-phase circuits and are built with two-conductor bundles to reduce the formation of corona discharge and the resultant audible and radio-frequency noise.

Figure 21: Self-supporting 500 kV Steel Lattice Suspension Tower (single circuit) (source: Juru)

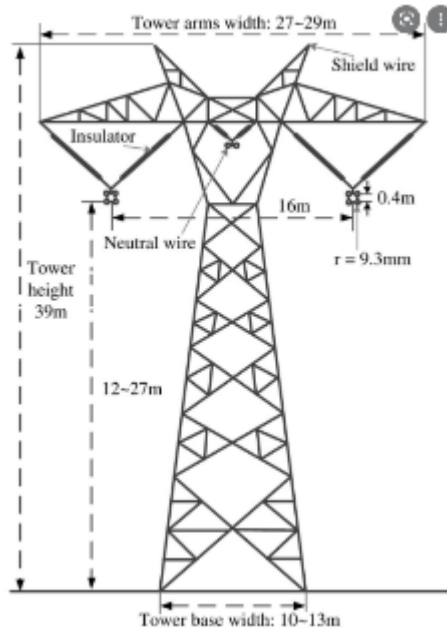


Figure 22: Example 500 kV H-Guyed suspension (intermediate) tower (single circuit) (source: Juru)

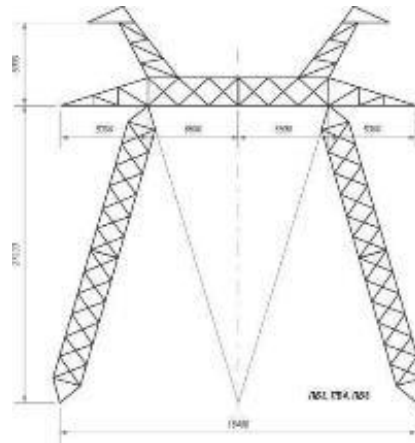


Figure 23: Example of 500 kV angle tower

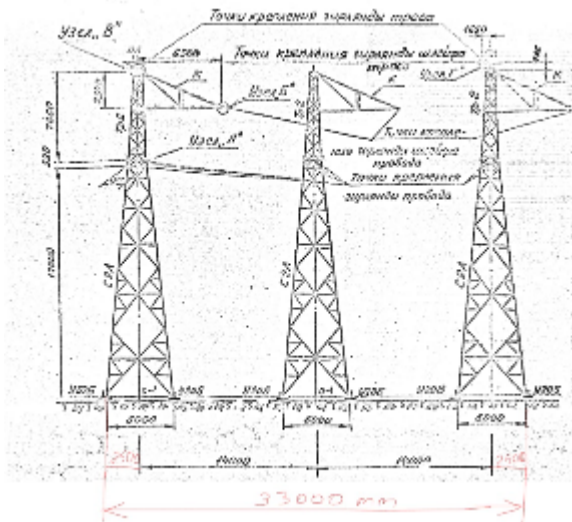
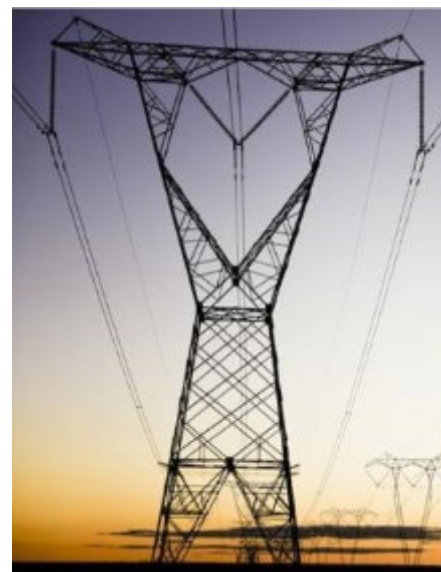


Figure 24: Self-supporting 500 kV Steel Lattice Suspension Tower (single circuit) (source: Juru)



3.5.4 Foundations and grounding

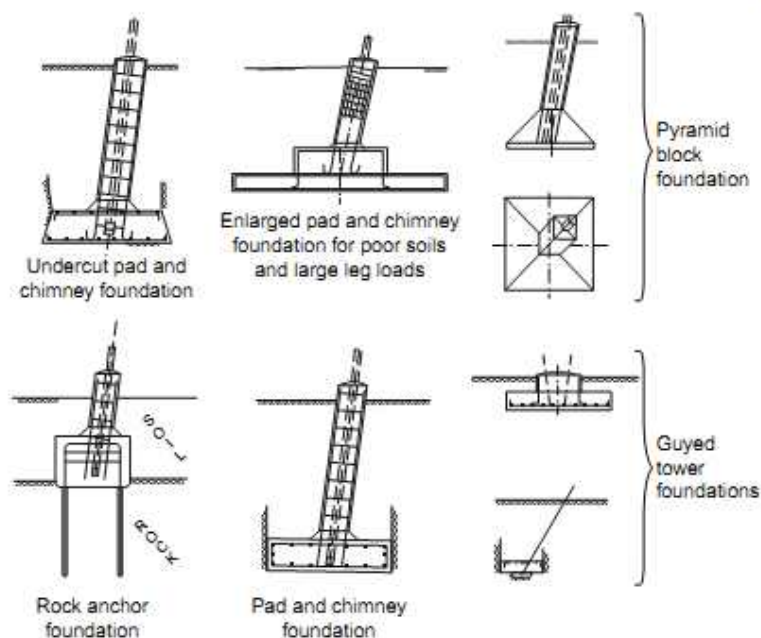
Tower footprint and foundation requirements are summarised in Table 12. At each tower location, the foundations are grounded to prevent risks from lighting strikes to workers or animals in the vicinity of the towers.

Table 12: Foundation characteristics (source: Juru and NEGK)

Tower Requirement	500 kV (self-supporting)	500kV (guyed)
Number of foundations	Four foundation columns at ground level	Two foundation columns at ground level
Average footprint	10m by 10m (100 m ²) (the footprint is defined as the outer of the foundation columns at ground level).	18.4m x 19.2m (353.28 m ²) (total) (b) (the footprint is defined as the outer border of the guy wires).
Foundation type	Actual size and type will depend on the type of tower and the sub-soil conditions. The main types are "piled", "pad and chimney", and "anchors". Angle towers will require more extensive foundations.	
Notes	Area inside the footprint can return to natural habitat, but not easily used for grazing.	The area inside the footprint can be used, although may restrict the movement of machinery – not preferred in agricultural areas due to guy wires.

Examples of different foundation requirements are presented in Figure 25.

Figure 25: Typical OHL tower foundation (source: industrial electronics.com)



3.5.5 Conductors (wires)

An electrical conductor is a material that conducts or transmits electricity. Typically, conductors are made at a certain specification to conduct electric current at the prescribed voltage. Common

conductors are the Aluminium Conductor Steel Reinforced (ACSR) type of conductor and the All-Aluminium Alloy Conductor (AAAC). Conductors are strung between towers to ensure a minimum electrical clearance height at the lowest point (the point equidistant between the two towers) considering parameters such as temperature, ice, wind load, and time. Typically, two or more conductors are used per phase, connected at intervals by spacers.

In addition to the conductor, the OHTL also has a shield wire (earth wire) that is strung above the phase conductors and is part of the line earthing system. The shield conductor protects the phase conductors (main wires) from lightning. New lines typically combine the shield wire with an Optical Ground Wire OPGW¹⁵ that strings across the top of the towers and provides the means for internal line protection, communication and control. The conductor will enter the SS via a terminal tower down to a height of approximately 15m, linking up with landing gantries in the substation. The conductors will link to the existing substation system via parallel steel structures between transformers within the substation footprint.

3.5.6 Insulators

Insulators isolate the towers from the live wires that carry the electricity. They are typically made of glass, ceramic, or composite materials and are attached to the towers. In a suspension tower, the insulators are vertical or V-arrangement. In a dead-end tower, the insulators are in the horizontal position. Dead-end towers are typically located every 5 to 15 towers and are placed there to section the OHTL conductor to minimise whole line faults. Examples of different insulators typically used are provided in *Figure 26* to *Figure 28*. Clearance distances between the structure's live and non-live parts will be maintained per national standards. Where these clearances pose an electrocution risk to perching birds, bird guards will be installed to prevent injuries.

¹⁵ The OPGW combines the functions of grounding and communications. An OPGW cable contains a tubular structure with one or more optical fibers in it, surrounded by layers of steel and aluminum wire. The OPGW cable is run between the tops of high-voltage electricity pylons. The conductive part of the cable serves to bond adjacent towers to earth ground, and shields the high-voltage conductors from lightning strikes. The optical fibers within the cable can be used for high-speed transmission of data, either for the electrical utility's own purposes of protection and control of the transmission line, for the utility's own voice and data communication, or may be leased or sold to third parties to serve as a high-speed fiber interconnection between cities (https://en.wikipedia.org/wiki/Optical_ground_wire)

Figure 26: Vertical insulator (source: Juru)

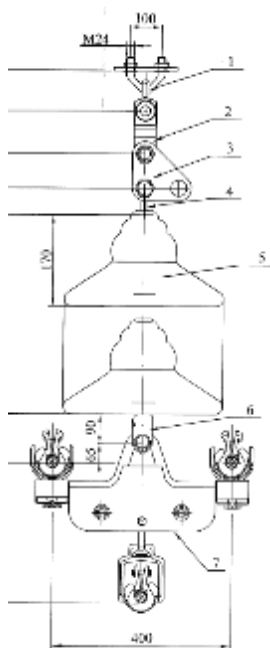


Figure 27: V-arrangement insulator (source: Juru)

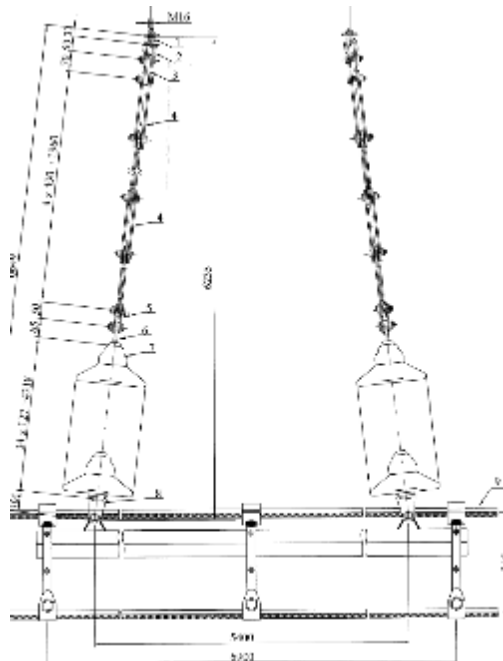
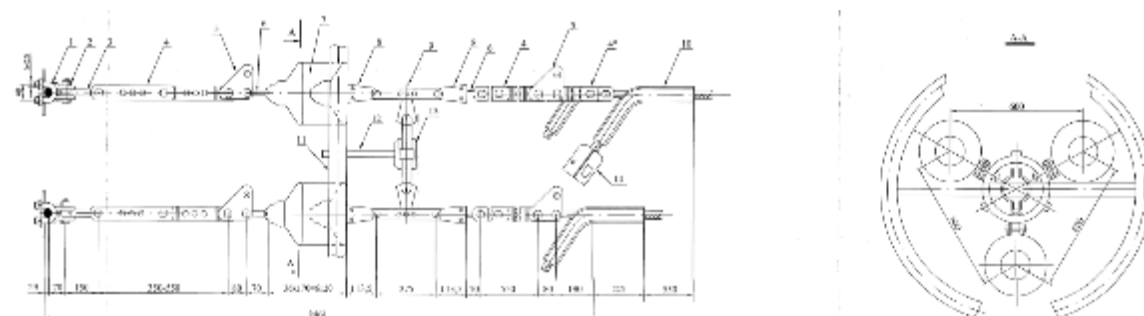


Figure 28: Horizontal insulator (dead-end tower) (source: Juru)



3.5.7 Kemin substation end-user works.

The 220 kV/500 kV Kemin SS began commercial operation in 2017. A new substation bay will be installed within the substation premises. The substation is enclosed by steel fencing and electric security around the perimeter, including office buildings and a car park. The compound is level and surfaced with stone chippings.

For the specific end-user works, no significant site preparation works will be required (e.g., soil investigation and environmental surveys). To connect the new 500 kV, a new 220/550 kV step-up transformer (plus supporting works) will be installed. Transformers are the equipment used where different operating voltages must interface (e.g., the existing 220 kV system with the planned 500 kV OHTL). As well as transforming the voltage, they introduce impedance between the systems, controlling fault currents to safe levels.

Construction activities include the following:

- Civil works consist of possible piling for new foundations, upgraded site drainage where necessary, foundation works, and bunds (where required).
- Plant installation involves delivering equipment to the site (including possible abnormal loads in transformers). Small cranes may be required to lift the plant into a position fixed to the foundations.
- Commissioning — electrical equipment and SCADA instrumentation systems are installed by specialist contractors in the substation operations room, where they are then commissioned to ensure they function correctly. Commissioning involves the testing of control systems.

It is not envisaged that there will be any need to transport raw materials (aggregates) to or from the site. Cement for the foundations is likely to be sourced from a nearby batching plant with no mobile batching plant envisaged. No upgrade or expansion works are required to the existing access road from the main road to the substation gate. There is expected to be sufficient space within the existing substation footprint to act as a laydown area for all equipment and materials required for the SS works.

3.5.8 Balykchy substation end-user works.

The 220 kV/500 kV Balykchy SS is currently in the project development stage. There is expected to be sufficient space within the existing SS footprint to act as a laydown area for the equipment and material required.

3.5.9 New substation

Subject to the final option determination, a new 200kV/500kV substation may be developed in place of the Balykchy substation. There are currently 2 options for these locations, located on greenfield and brownfield sites on the outskirts of Balykchy.

3.5.10 Access roads

Gravel tracks (in the northern section of route option 2) and the existing main road (EM11) will act as the main access route to the OHTL ROW. For route option 1, access is constrained, especially in the steep slopes on the northern side of the Chu river in the Boom Gorge and up to 10 km of new access road is expected to be required. For route option 2, gravel access roads were established during the construction of the existing 500kV and 220 kV lines in the area and these would be used for easier transportation of crews and materials to access route option 2 ROW. Only 3 km of new unpaved access road is expected to be required for route option 2 (Figure 29). Temporary tracks to each tower work front within the ROW will be established avoiding key biodiversity features.

Figure 29: Examples of access road conditions near Balykchy



3.6 Stages of the project cycle

The project cycle has four main stages: pre-construction, construction, operation and decommissioning¹⁶. Typical activities performed during each stage are listed in *Figure 30* and described below.

Before construction works commence, final decisions as to structure types, foundation requirements, conductor size and type, insulation, and line hardware, bird protection devices will be determined following the feasibility study requirements (to be completed) and the outputs of the ESIA.

The ROW and access routes will be surveyed, and the towers' OHTL centre line and locations will be marked (hereafter referred to as the tower work front). Based on the type of vegetation along the route, limited, if any, vegetation clearance is expected. Any required vegetation clearance will only be performed at the tower foundation locations, stringing positions and along access roads

¹⁶ Ultimate Guide to Electric Power Engineering: Transmission System: http://www.industrial-electronics.com/elec_pwr_3e_0.html

to the foundation sites from existing roads following the biodiversity mitigation requirements determined by the ESIA.

Construction of the OHTL itself typically progresses sequentially by one or more teams (of approximately eight to fifteen workers) working along the whole OHTL or simultaneously on multiple sections of the OHTL route. The key activities required at each work front are site clearance (rocks, vegetation), enabling works to establish vehicle access to each tower location, civil works (tower foundation works), steel delivery, steel erection, assembly and installation of the insulator, pilot wire installation, conductor stringing and then commissioning. Pre-mixed concrete will be delivered to the site in wagons along with steelwork for the foundation frames and bases, as illustrated in *Figure 31* and *Figure 32*). Alternatively, pre-cast foundation blocks will be used which will be manufactured outside the local area and delivered to the worksite.

Figure 30: Stages in the project cycle

Pre-construction	Construction - civil works	Construction mechanical and electrical works	Operation	Decommissioning
Finalize design	Secure worksites	Tower erection	Operation of OHTL	Removal of construction materials
Establishing the ROW / livelihood restoration	Construct access road (as needed)	Conductor stringing	OHTL/SS preventative maintenance	Rehabilitation of temporary storage and accommodation areas
Storing of materials	Transportation of civil construction materials to site	Connect conductor cable	Periodic / planned maintenance	Installation of security and safety requirements
Recruitment of local workforce / services	Vegetation clearance and levelling	Electrical assembly at SS	Monitoring and maintaining the OHL	Reinstatement of excavated areas
Identification of local materials	Excavations works at tower bases	Commissioning of OHTL and SS		
		Reinstatement of temporary work		

Figure 31: Example of tower foundation construction (source: NJDA, 2022)



Figure 32: Example of tower foundation construction (source: NJDA, 2022)



Figure 33: Example of tower assembly process (source: NJDA 2022)



Figure 34: Example of tower assembly process (source: <http://cscon.co.za/> and EDM)

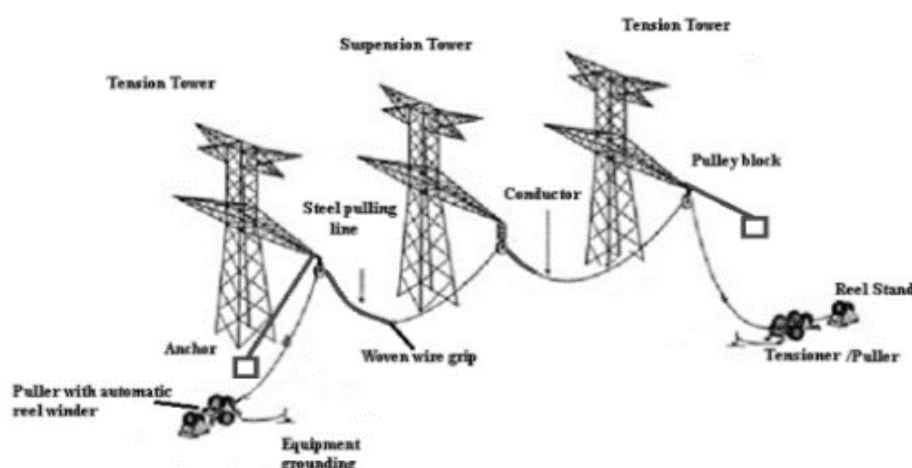


The tower is typically erected using a mobile crane, which lifts the assembled steelwork into position, see Figure 33 and Figure 34.

Stringing the OHTL is typically performed by one of four methods: slack stringing, semi-tension stringing, full tension stringing or helicopter stringing. The first two methods involve laying the conductor on the ground between the towers and lifting it into place. These methods do not keep the conductor off the ground between the towers. Full tension stringing is typically performed by using a guy wire/pilot wire that is used to “pull” the conductor from the “conductor reel” at the start of the stringing point to another “pilot line winder reel” where the guide/pilot wire is collected. Pull sections incorporate, on average, about four towers. However, it is possible to tailor the length of the pulling section to consider technical requirements for any human receptors that may be disturbed by the works or ecological sensitivities. Sufficient pulling capabilities on one end and tension capabilities on the other keep the wires clear of any obstacles on the ground during the

conductor's movement from the reel to its final sag position¹⁷. This approach is envisaged as the preferred option for this Project as it minimises the potential for damage to the conductor, minimises impacts on the ground, and removes the need to overcome obstacles such as pulling over roads, sensitive habitat types, etc. Helicopter stringing is typically used in particularly arduous terrain and is not envisaged as necessary for this Project. Stringing the conductor using a full tension stringing method is most likely for this project.

Figure 35: Stringing the conductor (source: Electrical World Magazine, 2021)



The main works associated with the operation of the OHTL are maintenance of the ROW, tower and line inspections (including visual inspections) and tower and conductor preventative maintenance work. Routine vegetation management and clearance along the ROW during operation is unlikely, given the slow-growing nature of the vegetation in the ROW. Preventative maintenance works are typically scheduled when the line can be taken out of operation (de-energised) to minimise health and safety risks from working on live equipment; however, maintenance work on live equipment cannot be ruled out and will be performed by highly specialised workers. There may also be a need for emergency works following an electrical fault or hardware failure resulting from missing bolts, lightning strikes, bird strikes etc.

OJSC NEGK will organise and implement preventative and emergency maintenance works following their corporate maintenance schedules, OJSC NEGK maintenance guidelines and procedures, and training requirements.

17 <https://electrical-engineering-portal.com/guidelines-for-the-construction-and-maintenance-of-transmission-lines>

The SS's will either be remotely operated or have one or two permanent workers (operating a shift system). The SS's maintenance works will be intermittent and within the operational site boundary.

Decommissioning or closure falls into one of two categories:

- end of life decommissioning (~40 years); and
- temporary work-site decommissioning (e.g., borrow pits, laydown areas, accommodation sites).

Both decommissioning activities will be required to remove all above and below ground structures and reinstate land to its original state. Typically, the conductors are removed section by section and immediately rewound using pulling and braking machines. The pylons are dismantled, and the foundations are removed from the ground and taken away by a lorry as soon as the project is finished, the temporary access roads are rehabilitated, and the land is restored to its original state. All waste from the site is collected and taken to a suitable water disposal facility aligned with GIP. A final survey of the area around the site is then carried out.

3.7 Other activities

3.7.1 Establishing the ROW

The land acquisition requirements for the ROW acquisition process will be fully discharged before mobilising any construction works within the ROW. It is expected that all works connected with the OHTL construction and operation will take place within the ROW. This will be further described in the Livelihood Restoration Framework (LRF).

3.7.2 Construction laydown area

Currently, the location of the construction laydown area has not been established. Temporary construction laydown areas will likely be set up at the substation locations and act as the primary storage site for general equipment and material laydown for use along the OHTL route. This location may include site offices, equipment and material storage, hazardous substances storage area, waste storage area, medical facilities, catering and welfare provisions. The construction laydown area amp may include temporary worker accommodation (section 3.7.6). The construction laydown area in this location would connect to the existing substation power supply (Kemin SS, existing Issyk-Kulskaya SS) or be powered by onsite diesel generators during the construction/decommissioning phases (new Balykchy SS). No power requirements are required during operation.

- Short-term mobile laydown areas may also be established at strategic locations along the OHTL route for overnight storage of key plant, equipment and materials, and necessary welfare facilities, e.g. mobile toilets and rest shelters. These may move along the OHTL following the construction works.

3.7.3 Water Supply

Exact requirements are still to be determined. It is expected that potable water for drinking and other welfare activities during the construction phase will be sourced from the municipal water supply system in Balykchy and/or Kemin and delivered to the construction camp and the OHTL work front by a tanker or bottled water. At least 4.5 litres per person daily will be available at each OHTL work front, particularly during hot weather. Plastic bottles will be removed from the site and recycled via third party contractors in line with the project waste management plan.

A minimum of 48 hours of storage is also expected at the laydown area and if required the accommodation facility. The daily water allowance per person will be 150 litres per day at the accommodation facility¹⁸. This is the daily water required to cater to the construction personnel needs.

Water requirements for construction are mainly limited to the tower foundation cement manufacturing process. Cement will be produced at an existing cement batching plant in the local area, or prefabricated concrete blocks delivered from outside the area will be used. A water needs assessment will be performed as part of the ESIA work. Based on the outcomes of the water needs assessment, licences for abstraction of water for the cement manufacturing process will be the responsibility of relevant third parties which the Project will vet during the procurement and contracting process.

3.7.4 Equipment and material supply chain

Key components of the OHTL and substations such as the steel towers, conductors, insulators and other electrical equipment (e.g., transformer / SCADA equipment) will be procured by the Main Contractor (tier 1 supplier) using sub-contractors and suppliers (tier 2 suppliers) in their supply chain and sourced from outside the Project area. All tier 1 and tier 2 suppliers will be subject to approval by JSC NEGK. Tier 2 suppliers and contractors are likely to include:

- key equipment suppliers (where they are not supplied directly by the main contractor);
- electrical commissioning contractor (for substation and OHTL commissioning works) (where it is not performed directly by the main contractor);
- local transportation contractor;
- civil contractor (local/regional) including cement manufacture.

As defined above, tier 1 and tier 2 suppliers are considered primary suppliers as per EBRD PR1. There are also likely to be several tier 3 suppliers providing the catering, accommodation, geotechnical, environmental, security, driving, and waste management services. These suppliers may be sourced from the local area or region.

¹⁸ Base on World Health Organisation (WHO) recommendations.

All suppliers must meet the Project E&S standards applied to the Main Contractor via back-to-back contractual obligations. All suppliers must demonstrate credentials relating to the prohibition of forced and child labour in their supply chain and health and safety standards that align with GIP and robust labour management policies (further information on this is described in subsequent sections). This will be emphasised in the Project plans and contracts.

Materials and key equipment are expected to be delivered to the nearest railway station (Rybachie) and then delivered to one of the construction laydown areas at either end of the OHTL. Onward transport of equipment to the work fronts will be via small and medium-sized vehicles on an as-needed basis to minimise the opportunity for theft or damage. Potential abnormal load deliveries may be required for new transformers delivered to the Kemin SS and/or Balykchy SS.

3.7.5 Workforce

The workforce requirements are still to be determined and will be outlined in the Project ESIA. The workforce will likely comprise the owner and Contractor workers, including civil and electrical engineers. Overall, the construction labour workforce requirements are unlikely to exceed 200 field workers during construction. The peak period for construction will be during the civil works period for the OHTL, and the substation works are predicted to last approximately nine months. The tower erection and electrical assembly at the substation sites will typically last approximately six months, overlapping with the end of the civil works. Approximately 70 skilled workers outside the region may be required during the commissioning phase. The remaining skilled and unskilled workers required for civil work will likely be sourced regionally or locally. There may be limited opportunities for local employment in unskilled labour positions (drivers, cleaners, labourers) and, if required, to support the temporary worker's accommodation facility. Opportunities to enhance local employment will be promoted through the labour management plan.

During operation, no permanent workforce is assigned to the OHTL operations. Existing employees of OJSC NEGK will be responsible for operations and maintenance (O&M) works and for implementing any operational phase health, safety, environmental and social obligations. An outside E&S consultant for this purpose may support NEGK.

3.7.6 Worker accommodation

All skilled labour from outside the province or country is expected to be accommodated in existing suitable accommodation in the region. There may be a need for a temporary accommodation facility adjacent to the laydown area, which will be confirmed during the ESIA. All existing worker accommodations will be identified in collaboration with local stakeholders and be to the standards set out in the IFC/EBRD Workers' Accommodation: process and standards (August 2009).

Smaller camps along the OHTL route are not expected as the overall length, and the quality of roads in the area mean that travel from the main cities to the work front and back in one day is realistic. This will be confirmed during the ESIA phase.

Local workers will reside at home and be transported daily from nearby towns to the work front.

3.7.7 Development schedule

The anticipated development schedule is set out in Table 13. The overall construction period for the OHTL and access roads is expected to last approximately 18 months, with the majority of the below-ground construction works expected to last approximately nine months and the above-ground steel erection and commissioning works nine months. Work at any one work front is expected to be short (approximately two weeks for civil works and separately another week for the conductor stringing).

Table 13: Current anticipated development schedule

Activity	Date
Project Categorisation	September 2024 (completed)
Scoping	January 2025 (this document)
Consultation on draft ESIA	May 2025
Finalization of the Submission of the draft ESIA	June 2025
EBRD 120-day disclosure period	October 2025
Finalise ESIA (including public consultation comments and ongoing studies)	August-September 2025
Financial close	Q4 2025 (immediately after signing)
Pre-mobilisation (finalisation of route corridor, tower micro-siting, planning and design)	Q1 2026
Construction Start	Q1 2026
Construction End	Q1 2027
Expected Lifetime	Approximately 30 years or more

3.8 Neighbouring and future planned projects

The scoping site visit identified several construction sites and other energy and water sector projects under development near the route options.

- Solar photovoltaic (PV) power plant - currently under construction and located 6 km to the West of Balykchy
- New wind power plant being operated by KyrgyzWind - 15 kilometres to the South-West from the existing Issuk-Kul SS and proposed OHTL.¹⁹

¹⁹ <https://invest.gov.kg/investmap/map.xhtml?lang=ru#>

- King Kliner factory - 300 meters from the OHTL route in the area of the Kemin substation (*Figure 36*) is a company specializing in the production of building facade materials. The facility has a well-secured perimeter with a high fence.
- Concrete plant - One kilometre east of the Kemin substation (*Figure 37*).
- Brick manufacturing facility - Twenty kilometres west of Balykchy and 600 meters from the planned OHTL route (*Figure 38*).

Figure 36: Construction material factory



Figure 37: Storage of materials of cement factory



Figure 38: Brick factory



4 Baseline Conditions

4.1 Introduction

Baseline data collection to inform the scoping assessment has been generated through a combination of approaches:

- Primary source information: Project site visit observations, including interviews, field surveys, consultation meetings, focus groups, and visual observations.
- Secondary source information: Desk-based review of laws, policies, reports from the relevant governmental and non-governmental institutions and existing national and international publicly available information data from websites and national EIAs.

The baseline data collection approach is supported by scoping phase stakeholder consultation as described in chapter 6. This will also be supplemented further by studies to be performed during the ESIA phase (see chapter 7). This chapter provides currently known baseline information on the following topics:

- Physical environment: Climate including precipitation temperature, humidity, wind, infiltration, climate vulnerability, topography, geology (including seismicity and other natural hazards), soils, water resources, air quality, environmental noise, transportation, communication and waste infrastructure.
- Socio-economic environment: land use, livelihoods and cultural heritage.
- Biological environment: protected areas, flora and habitats, avifauna, reptiles, and mammals.

4.2 Defining the AOI

The Project Area of Influence (AOI) is defined as the area over which the impacts of the Project are likely to be felt, including all its related or associated (where applicable) facilities such as water pipelines, access roads, borrow pits, accommodation facilities (where required) as well as any reasonably foreseen unplanned developments induced by the Project or cumulative impacts with the ongoing projects outlined in section 3.8.

The Project AOI is comprised of areas of direct impacts and indirect impacts as follows:

- Direct area of influence considers the physical footprint of the project such as the site layout, work staging area and area affected during construction and operation works (e.g., traffic patterns).
- Indirect area of influence includes area which may experience project related changes in combination with activities not under the direct control of the project (e.g., inward migration, induced development, visitor influx, access to employment).

The Project direct AOI often varies depending on the specific environmental or social aspect considered based on the extent an impact may be affected and can be influenced on a spatial and temporal level.

For the Scoping Report, a general AOI approximately 15 km from the OHTL route options has been defined considering the potential avifauna risks and to include wider communities in the AOI that may benefit from the Project and a buffer of 5 km for other potential impacts, including more limited range species and the nearest project communities (*Figure 39*).

4.2.1 Scoping site visit survey

For the scoping site visit, route option 1 and the southern portion of route option 2 were visited to identify natural features (*Figure 40*) and physical and social factors that may be relevant to the ESIA.

Figure 39: AOI map (scoping phase)

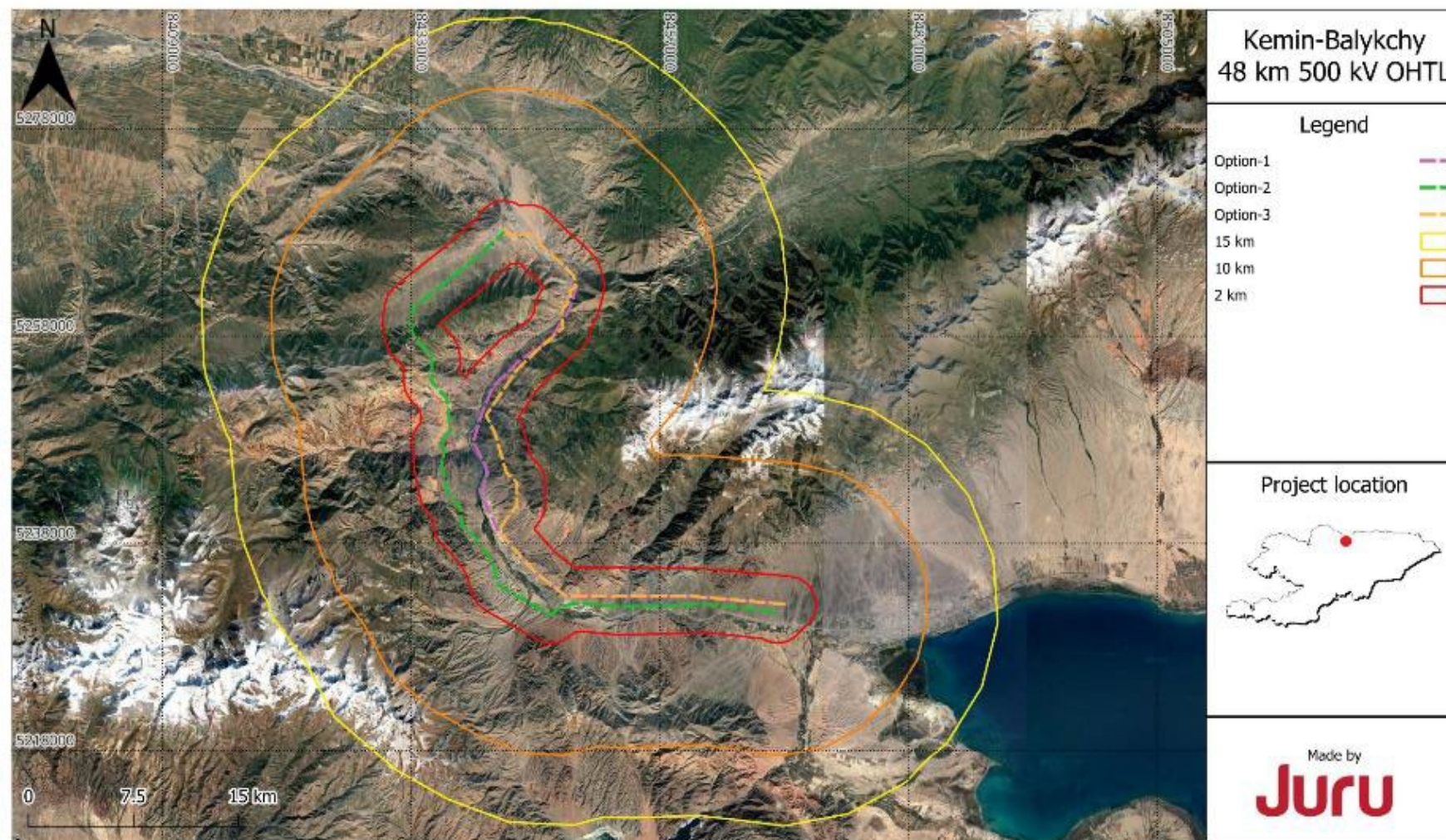
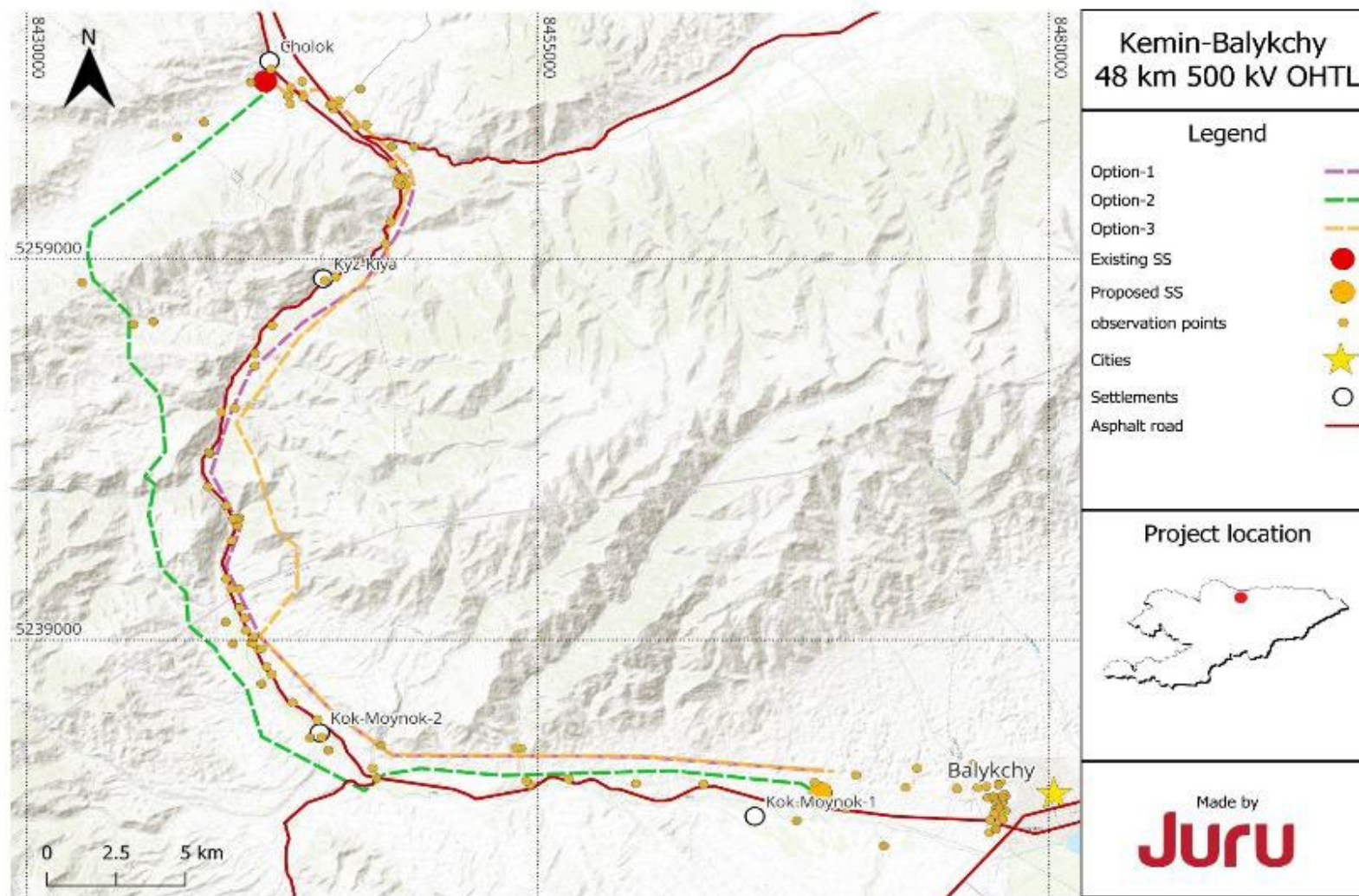


Figure 40: Observation points of the Scoping site visit



4.3 Geographic overview

The Kyrgyz Republic is geographically located in the Northern Hemisphere, in the northeastern part of Central Asia, occupying a section of the Pamir-Alay mountain range. It is bordered by the Kyrgyz Ala-Too mountain range, the Chu River to the north, and the Kakshaal-Too and Alay mountain ranges to the south. Kyrgyz Republic is a landlocked country in Central Asia, bordered by Kazakhstan to the north, Uzbekistan to the west and northwest, Tajikistan to the southwest, and China to the south and southeast. Mountains cover 94% of the country.

The total area of the country is 199,900 km². Its territory stretches 925 km from east to west and 454 km from north to south. The landscapes of Kyrgyz Republic are shaped by the country's continental distance from seas and oceans, its rugged terrain, and high altitude: 94.2% of the territory lies above 1,000 meters, 40.8% above 3,000 meters, with an average elevation of 2,750 meters above sea level. These and other factors contribute to the diversity of natural conditions. The Kyrgyz Republic features all-natural zones typical of the Northern Hemisphere, except tropical zones. The complex mountainous terrain and various ecological conditions have resulted in a rich diversity of soil, vegetation, and wildlife. The country's landscapes include deserts, steppes, meadows, forests, shrub thickets, wetlands, alpine tundra, and other vegetation types.

The Kyrgyz Republic possesses vast water resources, including seven major river basins (28,000 rivers and streams) and more than 2,000 lakes²⁰.

The Kyrgyz Republic consists of seven regions and two cities of national significance: Batken, Jalal-Abad, Issyk-Kul, Naryn, Osh, Talas, and Chui.

The project geography encompasses the Chui and Issyk-Kul regions. Key information about these regions is provided in Table 14.

Table 14: Geographic overview

Region	Location/ District of AOI	Total area	Distance of the AOI
Chui region	North of Kyrgyz Republic / Kemin District	20 200 km ²	30,98 km
Issyk-Kul region	Northeast of Kyrgyz Republic / Ton District and Balykchy City	43100 km ²	26,47 km

20 Geography of the Kyrgyz Republic, Part 1. Physical Geography of the Kyrgyz Republic: Study Guide / Edited by Yu.V. Shinko. - Bishkek, KRSU Publishing House, 2021. - 242 pages

4.4 Physical baseline

4.4.1 Climatic conditions

The Kyrgyz Republic lies within zones of moderately continental and sharply continental climates in the northern parts of the country and a subtropical climate in the south. According to the Köppen-Geiger classification, the country has 11 climatic regimes (*Figure 41*).

Due to the diversity of geomorphological conditions, Kyrgyz Republic is divided into four climatic regions: Northern and Northwestern (I), Northeastern (II), Southwestern (III), and Inner Tien Shan (IV). The Project area is situated within the Northwestern (I) (near Kemin SS), Northeastern (II) (Near Balykchy) and Inner Tien Shan (IV) (within the Boom gorge) regions (*Figure 42*). According to SNIP KR 23-02:2000, the general Study area belongs to subzone IIB and is classified as a dry zone in terms of humidity.

The nearest meteorological station, “Balykchy,” is located on the northern outskirts of Balykchy city (absolute elevation 1657.8 meters) and provides observational data that can will be collected to support the ESIA.

I. Northern and Northwestern Kyrgyz Republic.

This region includes the Chui and Talas valleys and the surrounding mountain ranges, which are characterized by a moderately warm and sufficiently humid climate. Precipitation peaks in spring and early summer, with moderate winter precipitation influenced by the Siberian anticyclone. The latter half of summer in the lower zones is arid.

In the Northern and Northwestern climatic region, average January temperatures range from -5° to -10°C, while average July temperatures are +20° to +25°C. In the lowlands, absolute temperature extremes vary from -44°C to +46°C. The climate is classified as moderately warm and relatively humid. Precipitation increases from north to south, ranging from 370 mm to 500 mm, and reaches 1,000 mm or more on the slopes. The precipitation maximum occurs in April-May in the lower parts of the valleys and May-June in the mountains.

II. Northeastern Kyrgyz Republic.

This region includes the Issyk-Kul Basin. The area experiences peak precipitation in summer and minimal precipitation in winter, as low winter clouds forming below 3,000 meters are blocked by mountain ranges and rarely penetrate the Issyk-Kul Basin. The climate of the Northeastern region is influenced by the non-freezing Issyk-Kul Lake and features maritime characteristics with mild winters, relatively warm summers, and smooth temperature transitions between seasons. The average January temperature ranges from -3° to -7°C, while in July, it ranges from +17° to +23°C. In the lower parts of the basin, temperatures vary between -27°C and +34°C.

Moisture conditions change from west (dry) to east (almost temperate humid). Annual precipitation is 100–120 mm in the west, 250–300 mm in the central basin, and up to 400 mm in the east. The maximum precipitation occurs in July-August, and the minimum in January-February.

Two stormy winds are prominent in the basin: "Ulan" in the west and "Santash" in the east. The "Ulan" wind is particularly strong, reaching speeds of 25–30 m/s.

- Inner Tien Shan

The Inner Tien Shan is characterized by the coldest and least humid climate, distinguished by low evaporation rates at relatively low temperatures. In the high-altitude zone, where precipitation exceeds evaporation, glaciers and snowfields cover significant areas. The annual precipitation pattern is with the peak occurring in May, June, and July.

The Inner Tien Shan is the coldest region, with temperatures in the lowlands ranging from -3° to -5°C in January and +20° to +25°C in July. Extreme temperatures fluctuate between -50°C and +37°C²¹.

In the Chui region, westerly winds prevail, while in Issyk-Kul, wind conditions are shaped by local circulations. During the day, breezes often blow from the lake to the land, and at night, the pattern reverses. The frequency of strong winds in the Issyk-Kul Basin is significantly higher than in the rest of the country. On average, the central and eastern parts experience 20–50 days of strong winds per year, while the western basin sees over 70, with some years recording up to 120 days. Along the lake, the predominant wind is the westerly "Ulan", while the eastern part experiences the easterly "Santash". When these winds occur simultaneously, they can form typhoon.

Precipitation in the zone varies as one moves from west (up to the Boom Gorge) to east (toward the city of Balykchy). In the plains of the Chui region, the average annual precipitation is 400–500 mm. In the northwestern part of the Boom Gorge, it decreases to 300–400 mm, dropping further to 200–300 mm in the southeastern part of the gorge, and finally reaching 100–200 mm on the eastern shore of Issyk-Kul.

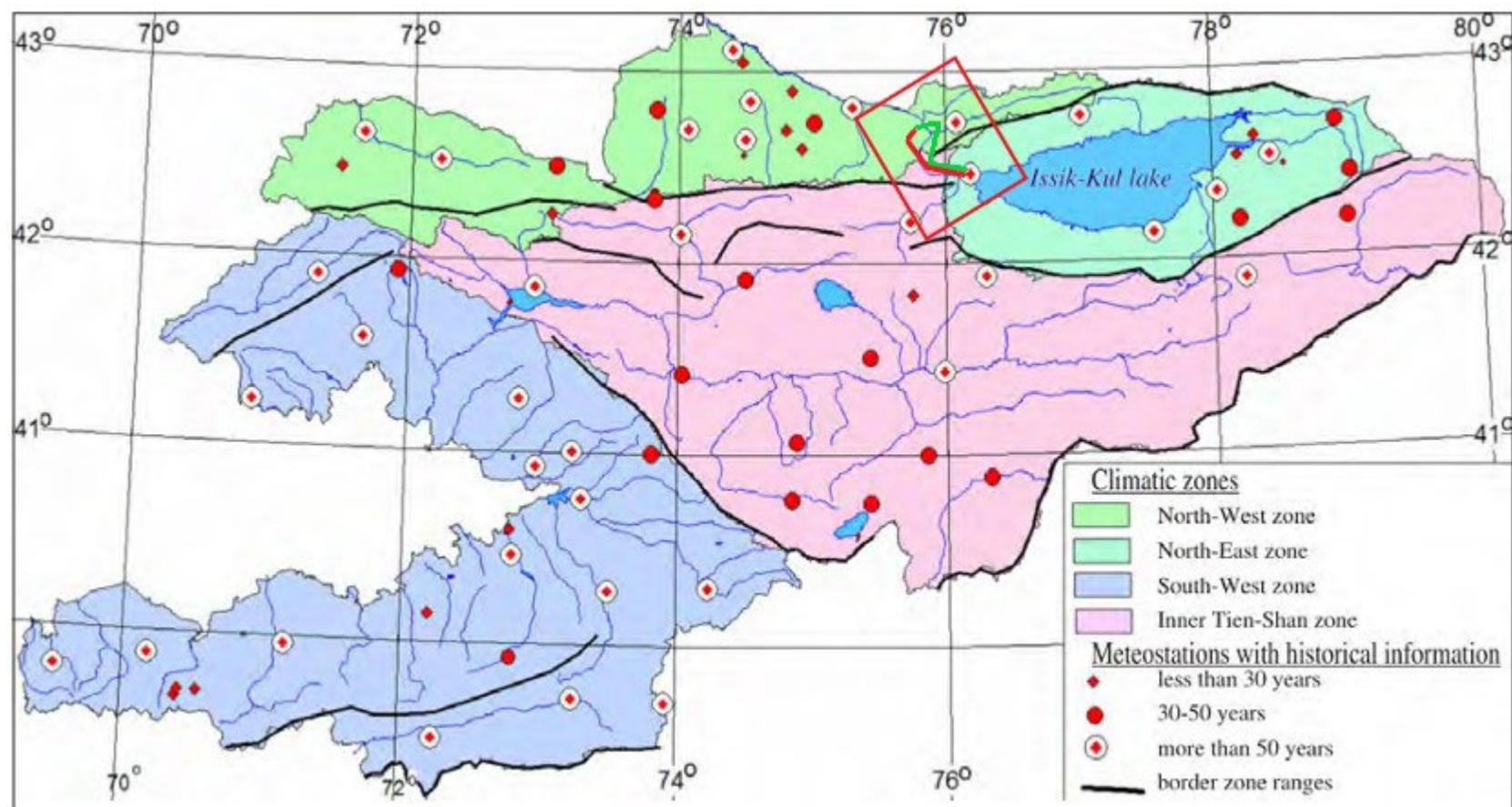
According to the Köppen-Geiger classification, the project route lies in the BSk zone (B – arid, S – steppe, k – cold), with the extreme eastern part of the route falling into the BWk zone (B – arid, W – desert, k – cold).

In the city of Tokmok in the Chui region (50 km west of the Study area), for which long-term weather data is available, the average July temperature is +20.17°C, and the average January

21 Geography of the Kyrgyz Republic, Part 1. Physical Geography of the Kyrgyz Republic: Study Guide / Edited by Yu.V. Shinko. - Bishkek, KRSU Publishing House, 2021. - 242 pages

temperature is -6.7°C. Annual precipitation exceeds 400 mm, with a summer maximum of +37°C and winter lows reaching extreme values²².

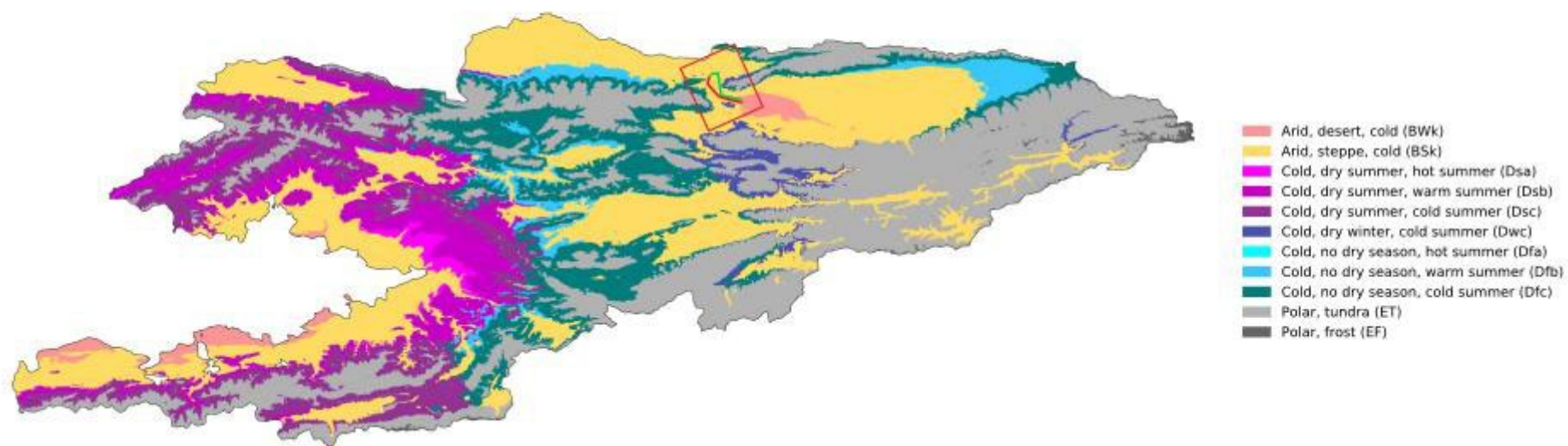
²² <https://weatherandclimate.com/kyrgyzstan/chuy>

Figure 41: Climatic Regions of Kyrgyz Republic²³

23 Climate Profile of the Kyrgyz Republic – Ilyasov Sh., Zabenko O., Gaidamak N., Kirilenko A., Myrsaliev N., Shevchenko V., Penkina L. – Bishkek, 2013 – 99 pages.

Figure 42: Kyrgyz Republic Climate Map by Köppen-Geiger²⁴

Köppen-Geiger climate classification map for Kyrgyzstan (1980–2016)



²⁴ Beck, H., Zimmermann, N., McVicar, T. et al. Present and future Köppen-Geiger climate classification maps at 1-km resolution. Sci Data 5, 180214 (2018)

4.4.2 Climate projections

Climate models consistently predict warming across the entire territory of Kyrgyz Republic during the 21st century. Under the climate change scenario with the highest greenhouse gas emissions (RCP 8.5), the temperature increase in the country is projected to exceed global averages, reaching a rise of 5.3°C by 2090²⁵. This scenario also predicts a significant increase in the number of days with temperatures exceeding 40°C in the plains. Currently, such temperatures are atypical and extreme for the country's population²⁶. The most climate-vulnerable sectors are:

- Water resources;
- Hydropower;
- Emergency response;
- Agriculture;
- Public health;
- Forest resources and biodiversity.

According to the **Climate Risk Profile of the Kyrgyz Republic**²⁷ and the **Climate Profile of the Republic**²⁸, the country may face the following risks as a result of warming:

- By 2090, the average temperature could increase by up to 5.3°C above baseline levels, with extreme temperatures in lowland areas (regularly exceeding 40°C)
- Increased intensity of droughts (occurring every 15 years)
- Reduction in snow cover and glacier degradation (glacier runoff is expected to peak around 2040), leading to a risk of water shortages after depletion
- Seasonal shifts
- Decrease in overall precipitation levels and changes in its seasonal distribution
- Increased risk of floods and landslides
- Deterioration in water resource quality
- Reduction in alpine ecosystem areas
- Elevated threats to forest ecosystems (including increased fire frequency)

25 Asian Development Bank, World Bank. Climate Risk Country Profile: Kyrgyz Republic (2021) (Source: https://www.adb.org/publications/climate-risk-country-profile-kyrgyz-republic?utm_source=chatgpt.com).

26 <https://pk.kg/news/inner/bolshe-zharkih-dnej-tayanie-lednikov-i-zasuhi-to-chto-vlechet-izmeneniya-klimata-v-kyrgyzstane/>

27 Asian Development Bank, World Bank. Climate Risk Country Profile: Kyrgyz Republic (2021) (Source: https://www.adb.org/publications/climate-risk-country-profile-kyrgyz-republic?utm_source=chatgpt.com).

28 Climate Profile of the Kyrgyz Republic – Ilyasov Sh., Zabenko O., Gaidamak N., Kirilenko A., Myrsaliev N., Shevchenko V., Penkina L. – Bishkek, 2013 – 99 pages.

- Decline in soil fertility.

4.4.3 Topography

The proposed route options are located at altitudes ranging from 1,500 to 2,000+ meters above sea level. The topography plays a significant role in shaping the landscapes and natural conditions. The topography of the area is shown in *Figure 43*, and the elevation profile along the OHTL route is depicted in *Figure 44*.

The substation is located in area that is predominantly flat to gently sloping, which is favorable for construction activities.

Figure 43: Topography map of the project route (Source: <https://www.maps-of-the-world.org/maps/asia/Kyrgyz Republic/large-scale-physical-map-of-Kyrgyz Republic-with-other-marks.jpg>)

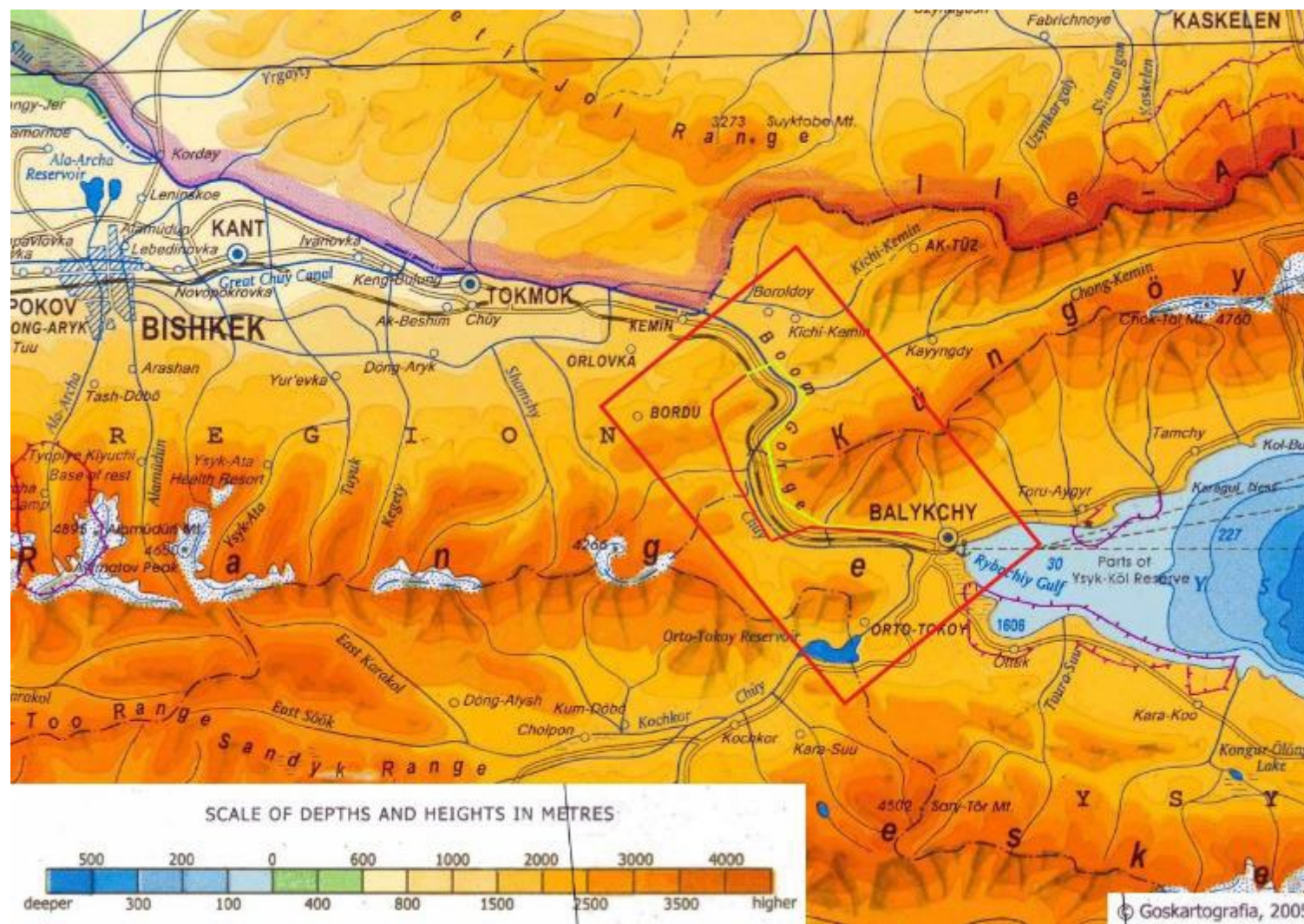


Figure 44: Elevation profile of project route (Source: Google earth)



4.4.4 Geology and seismicity

The Kyrgyz Republic is located in a region with high seismic activity, making earthquake risks significant. Earthquakes with a magnitude of 5 or higher occur on average once a month, while those with a magnitude of 7 or higher happen every few decades. The most vulnerable zones include the cities of Osh, Jalal-Abad, Bishkek, and their surrounding areas²⁹.

Kyrgyz Republic encompasses a large portion of the Tien Shan and the northern regions of the Pamirs. The Tien Shan is bordered to the north and west by the Kazakh Shield and Turan Plate, and to the south by the Tarim Platform. It experiences intense submeridional compression, which is one of the primary causes of frequent earthquakes. The two main seismic zones—the Northern Tien Shan and Southern Tien Shan—are located in the northern and southern border areas of the republic, where strong earthquakes have historically occurred.

The southwestern part of the Tien Shan is particularly seismically active, with more than 2,000 earthquakes recorded annually. In contrast, the northeastern part of the Tien Shan has significantly lower seismic activity, although some very strong earthquakes have been documented in the past. On average, 3,000 earthquakes are recorded annually across the country³⁰. The seismic activity in Kyrgyz Republic and the earthquake epicenters are shown in *Figure 45* and

29 Measuring Seismic Risk in Kyrgyz Republic: Seismic Risk Reduction Strategy. World Bank. 2017

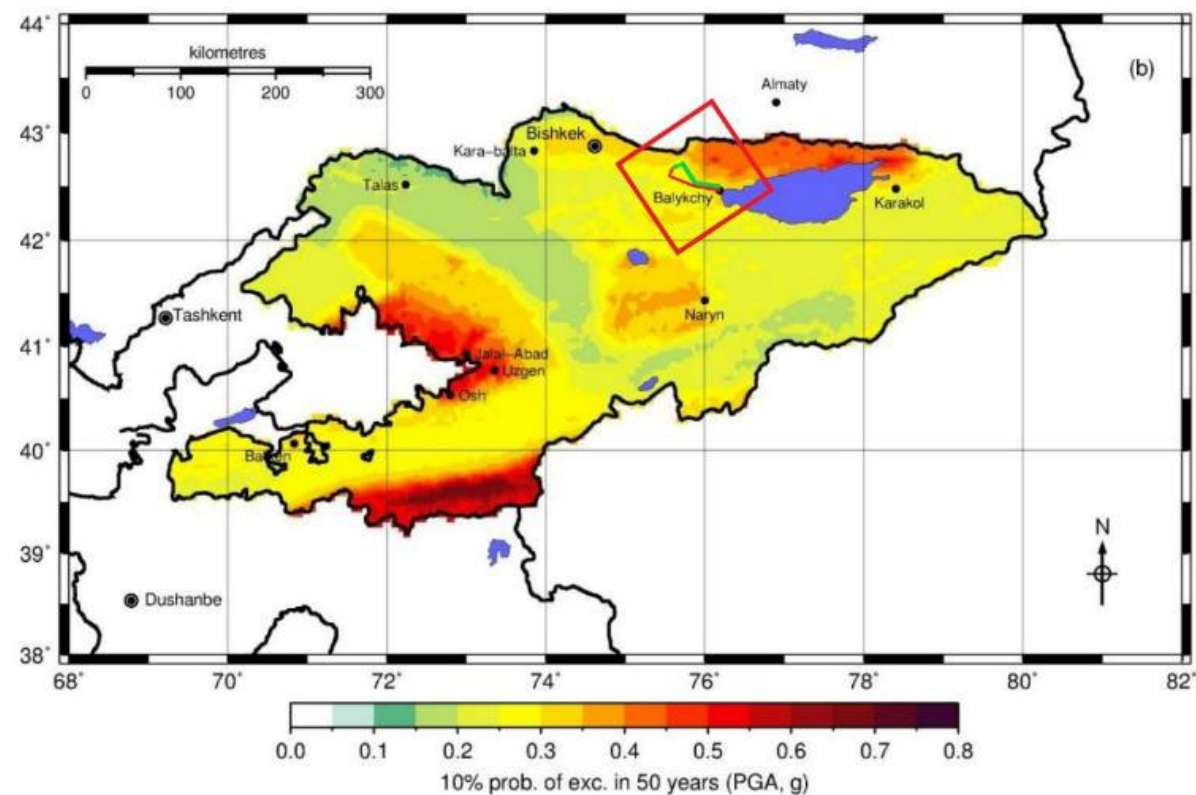
30 A.G. Frolova, K.D. Dzhanuzakov, E.V. Pershina, R. Shukurova. Seismicity of the Kyrgyzstan Territory. Izvestiya of the National Academy of Sciences of the Kyrgyz Republic, 2012, No. 3.

Figure 46, respectively.

According to the “Seismic Zoning Map of the Kyrgyz Republic” (scale 1:1000000) developed by the Institute of Seismology of the National Academy of Sciences of Kyrgyzstan and approved by the State Agency for Construction and Local Government of the Kyrgyz Republic (Order No. 20 dated 23.03.2012) the scoping study area lies along a conditional boundary between seismic intensity zones: the left bank is considered to be in an 8-intensity zone, while the right bank is in a 9-intensity zone. On the Chui region side, the expected earthquake intensity is up to 9 (

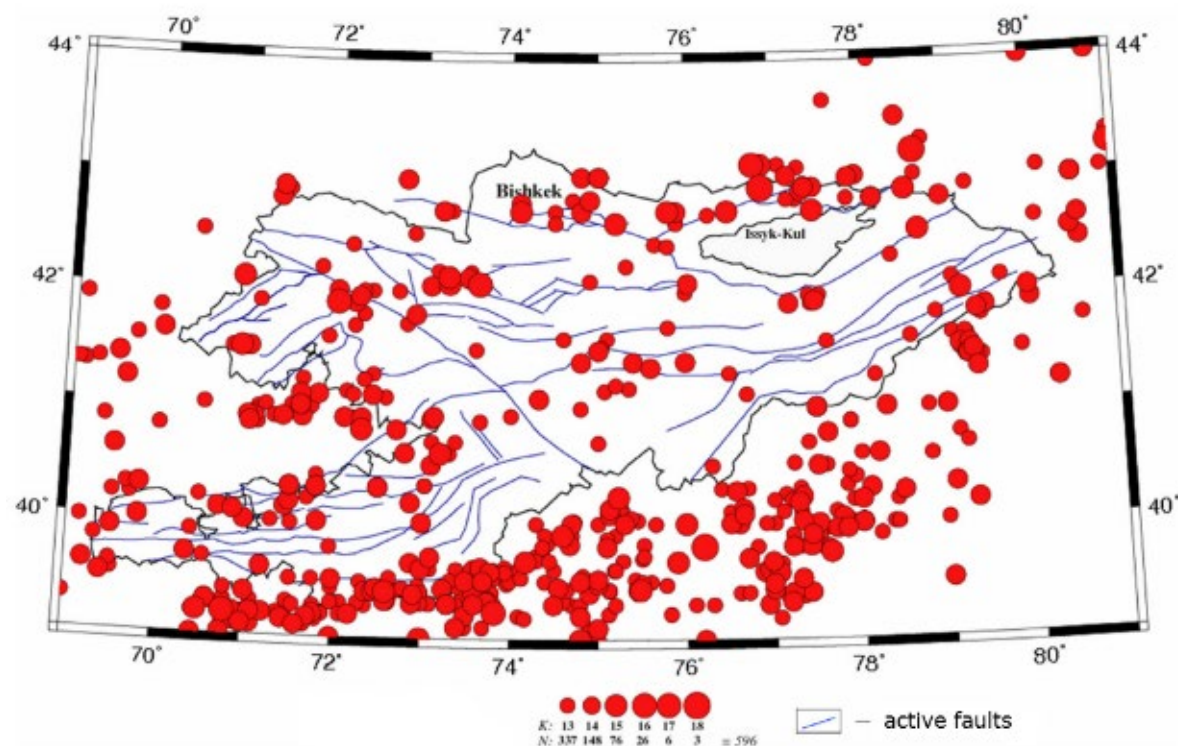
Figure 47).

Figure 45: Map of earthquake force³¹ probability in the Kyrgyz Republic (Source: Measuring Risk in Kyrgyz Republic, Seismic Hazard Assessment Report, World Bank, 2017)



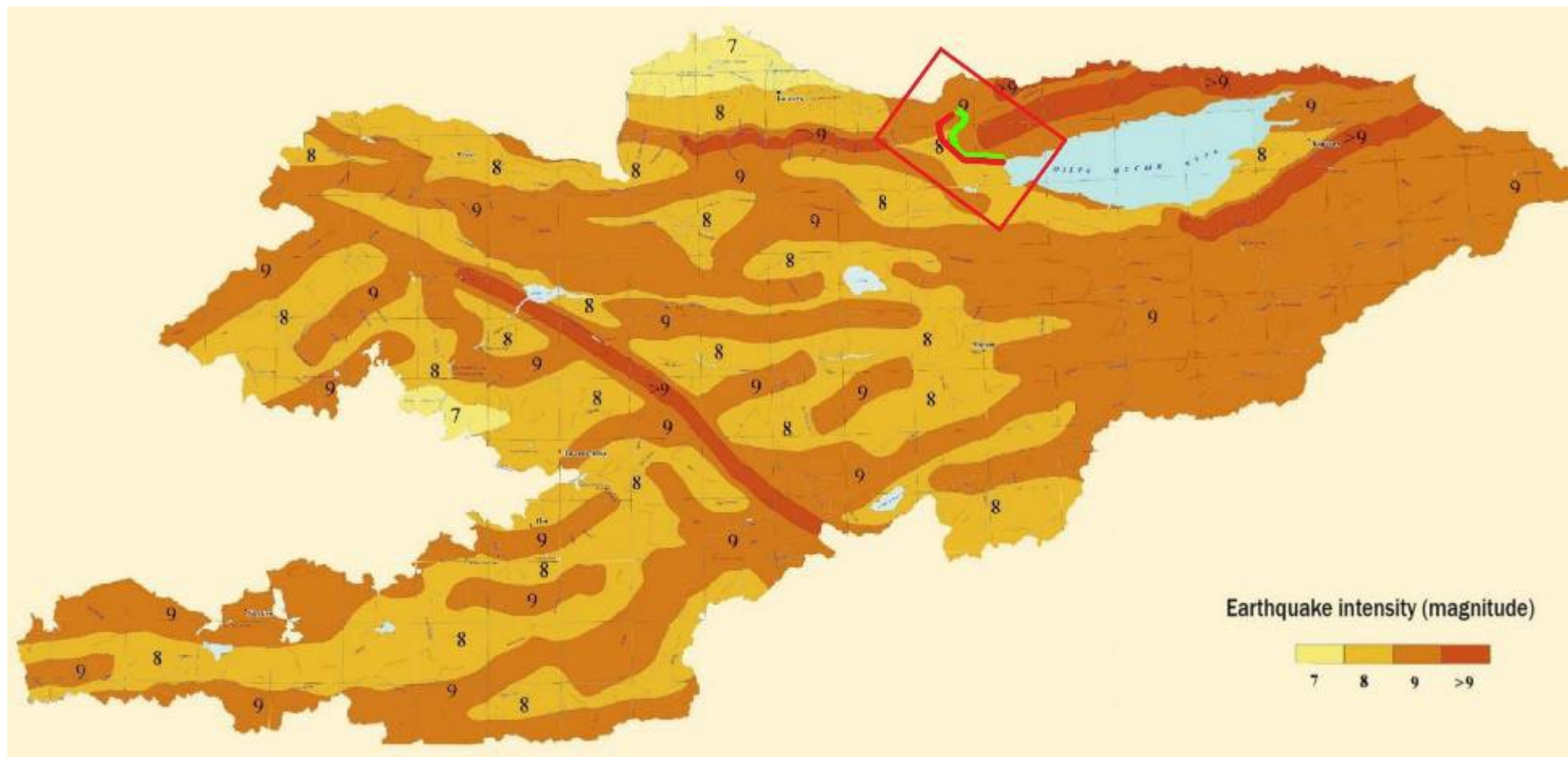
31 It is measured in PGA (Peak Ground Acceleration) and expressed as a fraction of the acceleration due to gravity g (g (gravitational constant)). It characterizes the maximum rate at which the ground accelerates at a specific point during an earthquake

Figure 46: Map of Earthquake Epicenters in the Kyrgyz Republic³² (Source: A.G. Frolova et al. Seismicity of the Kyrgyz Republic Territory. *Izvestiya of the National Academy of Sciences of the Kyrgyz Republic*, 2012, No. 3)



³² In the map legend, K denotes the energy class of the earthquake, and N represents the number of earthquakes.

Figure 47: The location of the OHTL route relative to the country's seismic intensity zones (Source: Map of Ground Shaking Intensity in Points for Probable Maximum Earthquakes in the Territory of Kyrgyz Republic. Institute of Seismology, National Academy of Sciences of the Kyrgyz Republic, 2018)



4.4.5 Soils³³

The complex topography of Kyrgyz Republic results in diverse soil coverage³⁴. According to the monograph Soils of the Kyrgyz SSR³⁵, 11 main soil types are identified in the country:

- Serozems
- Gray-brown desert-steppe stony soils
- Light-brown soils
- Chestnut soils
- Chernozems
- High-mountain soils
- Mountain slope soils
- Mountain forest soils
- Alpine belt soils
- Subalpine belt soils
- High-mountain barren soils

The general characteristics of the country's soils include low thickness (ranging from 0.2–0.5 m on mountain slopes to 1.5–3 m in plains and intermontane basins), medium to heavy loam texture, high carbonate content, and increased alkalinity. These properties impact agricultural use, such as fertilizer application rates and irrigation practices. The main soil issues in Kyrgyz Republic are erosion and salinization.

According to the land cadaster of Kyrgyz Republic, 5 million hectares, or 45.7% of agricultural land, are affected by erosion³⁶. Factors influencing soil erosion include the morphogenetic structure of the soil, physical-chemical properties, slope gradient, vegetation cover, and erosion type.

For arable irrigated soils, slopes of 3–4° are considered highly eroded, while steeper slopes are categorized as severely eroded. For pasture soils, erosion becomes significant at slopes of 25–35° and severe at 35–40°. The main types of erosion in Kyrgyz Republic are water, pasture, and wind erosion. Measures to combat erosion include maintaining high vegetative cover (90%) with climax

33 Due to the large body of data accumulated under the Soviet classification, this chapter discusses the USSR Soil Classification System³³ alongside the international World Reference Base for Soil Resources (WRB) classification

34 World Reference Base for Soil Resources. IUSS Working Group WRB. 2022.

35 Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

36 Collection of Articles from the Scientific and Academic Community of Kyrgyzstan: "Explore". 2023.

vegetation, plowing along slopes, developing proper irrigation systems, and preventing overgrazing³⁷³⁸.

Soils in the Study area According to the Soil Map of the USSR (

³⁷ Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

³⁸ K.K. Kenjahimov, Temirbek или Ilchbek. ECOLOGICAL PROBLEMS OF SOIL EROSION IN KYRGYZSTAN. ИЗВЕСТИЯ ВУЗОВ № 1, 2010.

Figure 48), are within the zones of **brown desert-steppe soils** and **mountain chestnut soils**.

Brown Desert-Steppe Soils (Figure 49)

Found in western Issyk-Kul at altitudes of 1,620-1,820 m, these soils are associated with stony deserts of foothill plains. Strong winds (15-20 m/s), prevalent year-round, influence their formation, leading to wind erosion. Vegetation is sparse, consisting of saltbush-shrub communities with 15-20% ground cover. The soil profile is uniform, with a thin (1-3 cm) loose light-gray crust on top and widespread stoniness. The texture ranges from light to heavy loam, with low humus content (1-2%), carbonate content of 5-10%, and pH values of 8.2-8.8. These soils are saline and sodic, with poor microflora^{39,40}. Due to low cation exchange capacity and microbial activity, these soils are highly vulnerable to chemical pollution, while their low vegetative cover and wind erosion result in poor physical stability.

Mountain Chestnut Soils (Figure 50)

These soils are widespread in Kyrgyz Republic, found on low mountain slopes of varying erosion levels and dissected by watercourses. Carbonate-rich parent materials are present at shallow depths, resulting in low humus content. Vegetation is sparse and primarily consists of short-grass steppe species (feather grass, fescue) and dwarf shrubs. They are further divided into light chestnut and dark chestnut soils. **Light chestnut soils** have a gray-brown humus horizon, poorly differentiated soil profiles, and a weak crumbly structure. Their texture is light to medium loam, with humus content of 2.5-3.5%, carbonate presence from the surface, pH of 8.6-9.0, and cation exchange capacity of 15-20 meq per 100 g. **Dark chestnut soils** have a darker humus horizon, lower carbonate content, and no effervescence from the surface. Humus content is 4.5-6.5%, pH is 7.6-8.5, and cation exchange capacity is 28-32 meq per 100 g^{41,42}. Both soil subtypes share vulnerabilities to erosion and chemical pollution, but dark chestnut soils are more resistant to contamination, though their absolute resistance is low. Due to their location on slopes, these soils are especially erosion-prone.

The FAO-UNESCO Soil Map⁴³, which served as a basis for the WRB classification, includes information on dominant and associated soils, their texture, and the relief forms where they occur. The Study area, based on this map (Figure 51), falls within the XI16-2b zone in Issyk-Kul and I-K-2c in Boom Gorge and the Chui region.

XI16-2b means the following:

³⁹ Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

⁴⁰ Soil science. Part 2: Types of soils, their geography and use. Moscow, 1988.

⁴¹ Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

⁴² Soil science. Part 2: Types of soils, their geography and use. Moscow, 1988.

⁴³ FAO-Unesco Soil. Volume VIII:North and Central Asia. 1978.

XI-16: Xeric Luvisols

2: Medium texture

b: Slopes of 8-30%

Xerosols are soils that have an argillic B horizon, and they may also feature a calcic or gypsic horizon beneath the argillic horizon. The argillic horizon is a soil layer formed by clay accumulation. In the current WRB classification, Xerosols have been reclassified as Calcisols or Gypsisols, depending on whether they contain a calcic or gypsic horizon I-K-2c means the following:

I-K: Lithosols dominate, associated with chestnut soils

2: Medium texture

c: Slopes exceeding 30%

Lithosols are soils with a soil layer up to 10 cm thick underlain by bedrock. In the WRB classification, this group of soils has been revised and is now referred to as Leptosols. Leptosols can have a depth of up to 25 cm, with variants characterized by a thin soil layer of up to 10 cm, forming on calcium-rich parent materials and containing a large amount of rocky material in the profile.

Chestnut soils are characterized by a mollic horizon, and they may also have calcic or gypsic horizons, potentially lacking a natric horizon, salinity indicators, and signs of hydromorphism. The mollic horizon has a strong structure, a base saturation of over 50%, and organic matter content of 1–4%. Chestnut soils have been incorporated into the WRB classification.

Thus, regardless of the classification system, the soils in the Study area are shallow, low in stability, susceptible to erosion and chemical impacts, and yet serve as a foundation for the region's vegetation and wildlife.

Soil sampling performed at locations along Route option 1 indicates alignment with the general soil characteristics and structure for the area and does not indicate any major sources of contamination or naturally elevated concentrations of metals. Soil sampling confirmed that the soils belong to the previously described types. The soils have a weakly developed and poorly differentiated profile with high stoniness, reaching a depth of about 20–40 cm, an alkaline pH (around 8), and heavy metal concentrations close to the upper limits established by national regulations⁴⁴. All analysed samples, except for one, show no signs of agricultural use or significant accumulation of organic matter. The most fertile sample was taken from the right bank of the Chu River in the Kemin District - its profile coloration indicates a relatively high organic matter content,

⁴⁴ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Annex21).

and the soil at the sampling location had the most developed profile. The lands within the Boom Gorge are considerably polluted due to significant anthropogenic transformation of the area. The sample from the gorge had the highest heavy metal concentrations and the least developed soil profile., see also Annex F. A full summary of results will be provided for preferred route option in the ESIA.

Figure 48: Location of the OHTL route relative to soil cover (Source: Atlas of the USSR. Nature Maps. Soil Map / Main Directorate of Geodesy and Cartography under the Council of Ministers of the USSR. Moscow. 1983. pp. 104–105)

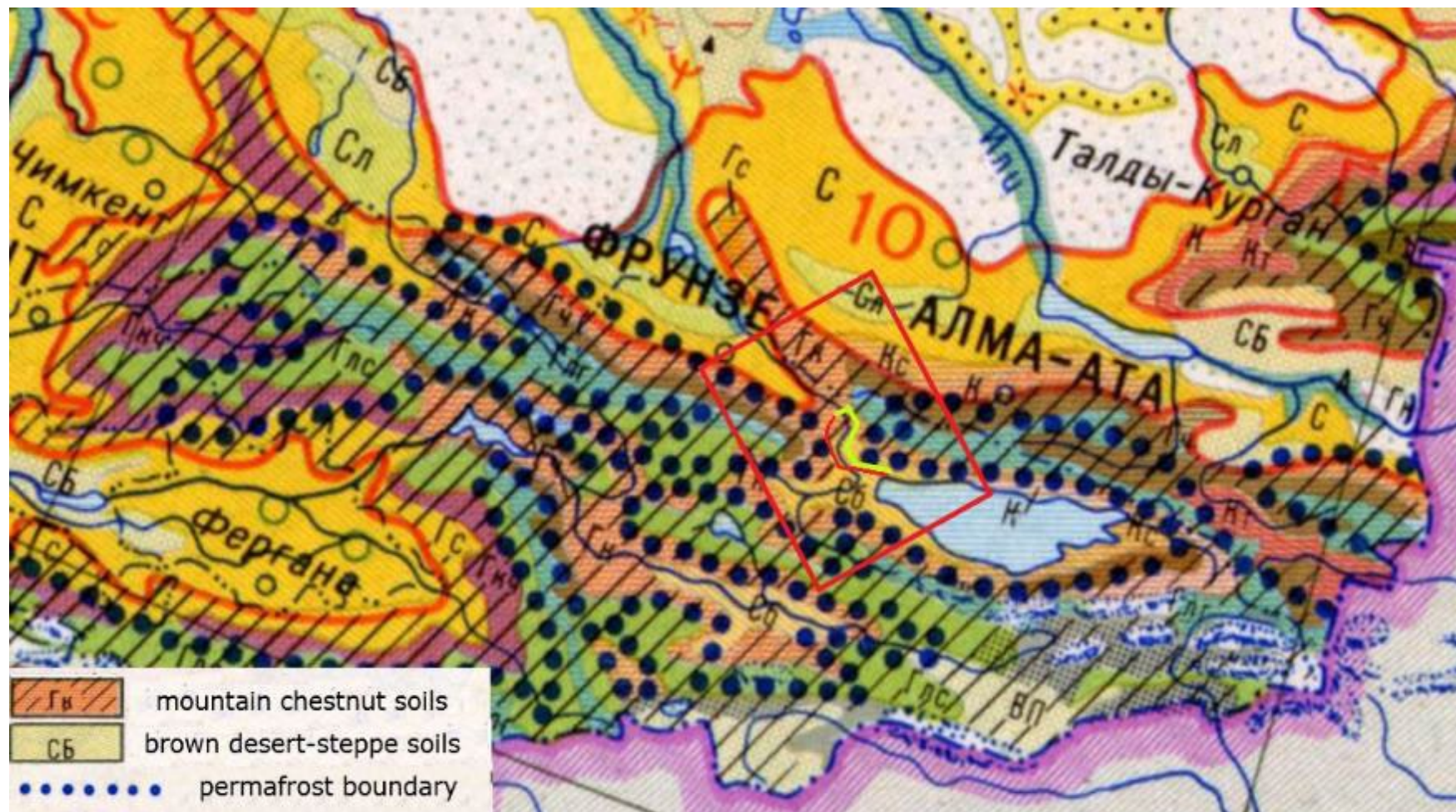


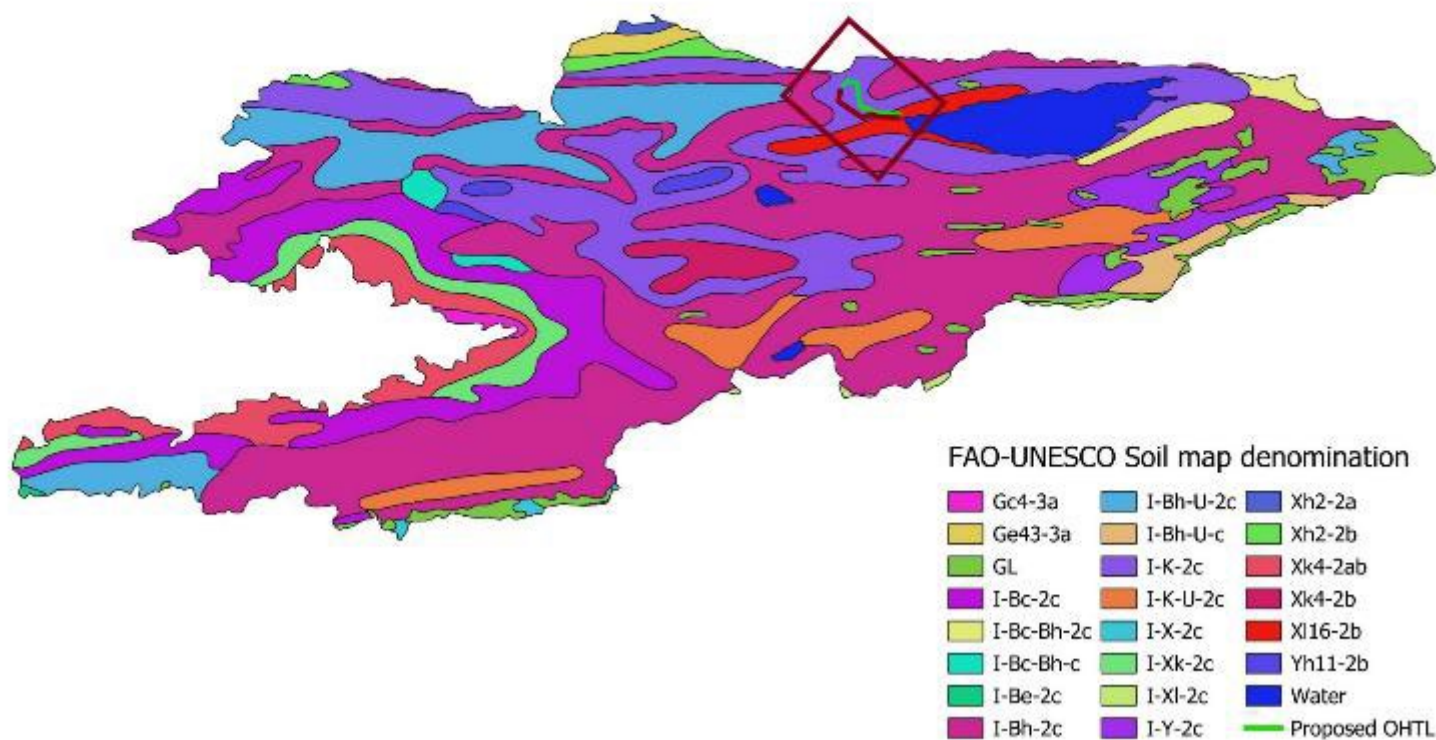
Figure 49: Brown desert-steppe soils



Figure 50: Mountain dark chestnut soil under snow cover, excavation



Figure 51: The OHTL area in relation to the FAO-UNESCO Soil Map (Source: <https://data.apps.fao.org/map/catalog/srv/eng/catalog.search#/metadata/cc45a270-88fd-11da-a88f-000d939bc5d8>)



4.4.6 Air quality

Air quality in Kyrgyz Republic is determined by both economic activity and natural conditions. The rugged terrain, the presence of intermontane basins, and the continental climate hinder the movement of air masses, which often results in the absence of horizontal air movement in urban areas. As a result, the annual average concentrations of almost all detectable impurities in cities exceed actual emissions. In non-industrial areas of the country such as the Study area, air pollution decreases. For example, studies of aerosol air pollution in the Issyk-Kul region showed satisfactory levels⁴⁵.

If we consider the winter periods as the heating season, in December 2023, the average PM_{2.5} pollution levels in the Chui region ranged from 64 µg/m³ (1.8 times the permissible exposure limit (MPC)) in Tokmok to 82 µg/m³ (2.3 times the MPC). The cleanest air was observed in the northern part of the Issyk-Kul region, where PM_{2.5} concentrations in the city of Cholpon-Ata were only 30 µg/m³, below the MPC. Even on individual days, the maximum concentrations were lower than in other regions—48 µg/m³ (1.4 times the MPC). This low level of pollution is attributed to specific air circulation patterns and the proximity of Lake Issyk-Kul⁴⁶. In the Study area, air quality in the Chui region is in a pollution zone hazardous for certain population groups, while in the Issyk-Kul region it is favorable (*Figure 52*).

The outcomes of the baseline survey work performed to date along Route option 1 indicate that air quality in the project AOI may be slightly degraded with high concentrations of carbon monoxide (CO), nitrogen dioxide (NO₂), and particulate matter (PM_{2.5} and PM₁₀). Despite the high values and exceedance of WHO⁴⁷ standards, the concentrations are at the upper limit of permissible levels or only slightly exceed them according to national standards⁴⁸, see also AnnexF. A full summary of results will be provided for preferred route option in the ESIA and further analysis will be performed to understand the sources of these emission in the area of impact.

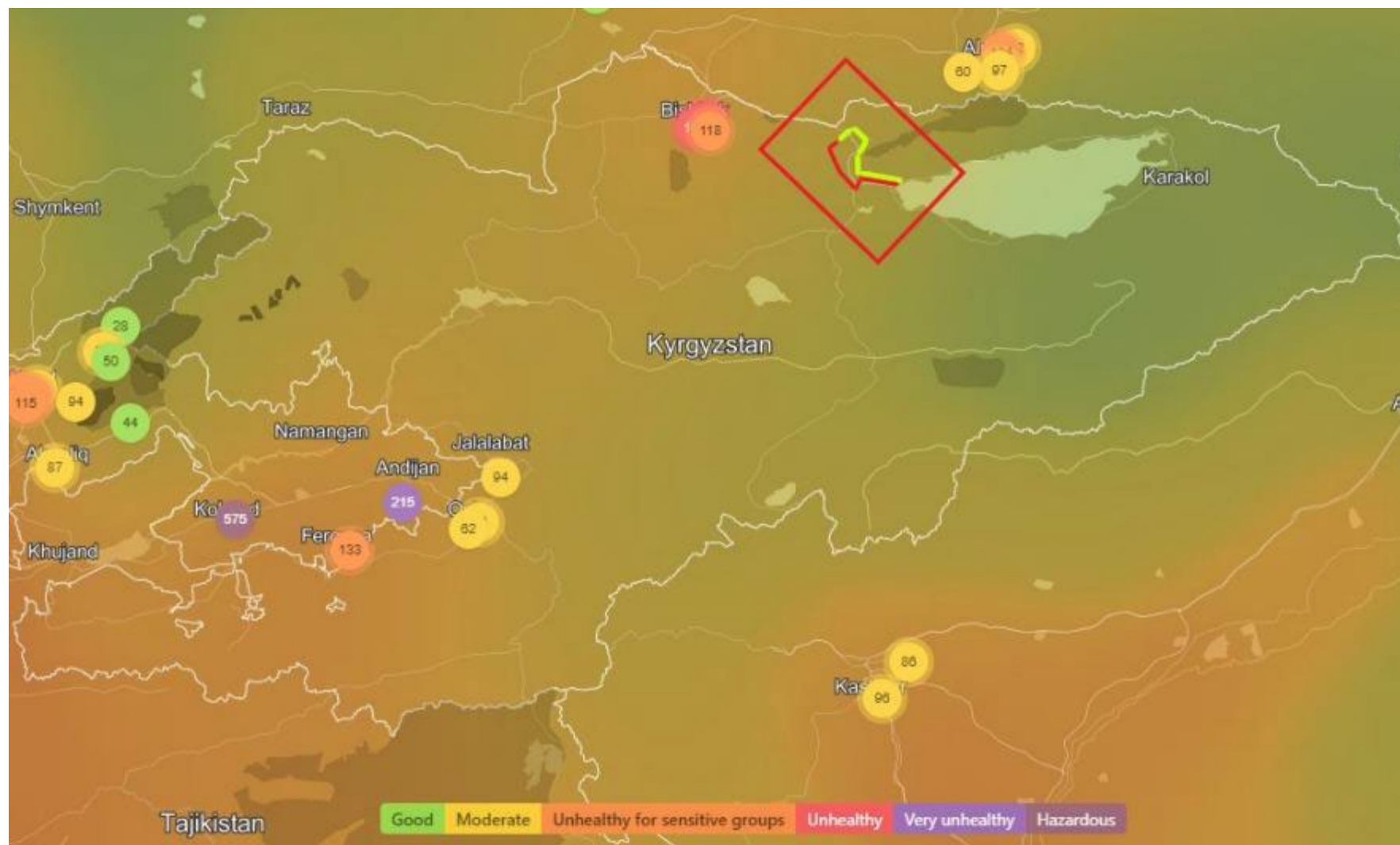
⁴⁵ T.D. Sargazakov, Sh. Jusupkeldiev. MEASUREMENTS OF SURFACE AEROSOL CONCENTRATIONS OF ISSYK-KUL BASIN, THEIR MICROSTRUCTURE AND SOME MICROPHYSICAL CHARACTERISTICS. Bulletin of KRSU. 2017. Volume 17. No. 12. pp. 190–194.

⁴⁶ SEASONAL REPORT ON AIR QUALITY IN THE REGIONS AND MAJOR CITIES OF KYRGYZSTAN, NGO "MOVEGREEN".

⁴⁷ The WHO Ambient Air Quality Guidelines

⁴⁸ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Approximate Safe Levels of Pollutant Exposure in the Atmospheric Air of Populated Areas" according to Annex17).

Figure 52: Air quality in Kyrgyz Republic (Source: AQair)



4.4.7 Environmental noise

The Study area runs alongside the EM-11 highway, which has relatively active traffic, and the Bishkek-Balykchy railway, primarily used for freight transport. During the scoping site visit, railway traffic was minimal. During the tourist season, this railway is also used for passenger trains. Transport infrastructure is the main source of noise in the area.

The outcomes of the baseline noise survey work performed to date at settlements and farms along Route option 1 further confirm that noise levels in the project AOI are moderate. Throughout the day, noise levels fluctuate slightly, remaining within the range of 42–45 dB, with a slight decrease at night. The main source of noise is the highway, making its level relatively constant. Thus, the daytime standard of 55 dB⁴⁹ is met, while nighttime levels are at the upper limit of the permissible 45 dB or slightly exceed it, see also AnnexF. A full summary of results will be provided for preferred route option in the ESIA.

4.4.8 Geology and hydrogeology

Kyrgyz Republic includes the Central and almost the entire Western Tien Shan, with part of the Pamir-Alay located in its far southwestern region. One of the characteristic features of the geological structure of the Kyrgyz Republic is the presence of two major complexes forming its mountain rocks: pre-Mesozoic and Meso-Cenozoic. The first is represented by diverse sedimentary, magmatic, and metamorphic rocks, which are intensely deformed and have a very complex internal structure. The second complex consists of weakly deformed, unmetamorphosed, predominantly continental sedimentary terrigenous layers. The rocks of the lower complex form numerous ranges of the Tien Shan, while the Meso-Cenozoic sediments fill the intermontane basins. Only the Fergana and Zaalay ranges are primarily composed of rocks from the upper complex.

The Study area belongs to the Northern Tien Shan fold system, which includes Caledonides of the folded area prevalent in the northern mountain ranges of the Tien Shan and in the basement of intermontane basins. These are distinguished by extensive development of sedimentary, metamorphic, and igneous rocks of pre-Paleozoic and early Paleozoic age. Middle and late Paleozoic deposits and intrusions are relatively less widespread⁵⁰.

⁴⁹ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Sanitary Rules and Standards “Noise in Workplaces, Residential and Public Buildings, and Residential Areas” according to Annex14)

⁵⁰ Geology of the USSR. Volume 25. Kyrgyz SSR. Part 1. Geological Description. Book 1. 1972.

According to the geological map of the Kyrgyz Republic⁵¹, the project routes crosses territories with a complex composition, particularly in the Boom Gorge area (*Figure 53*). Near Balykchy, the OHTL options passes through Quaternary deposits, while in the Boom Gorge, as the option 1 moves toward the Kemin substation, it successively encounters Permian, Cambrian, Devonian, Carboniferous, and Proterozoic formations. A similar set of deposits is characteristic of option 2. Carboniferous deposits are represented to a lesser extent, and the northern section of the OHTL runs through a valley composed of Quaternary deposits. Near the substation, the deposits transition back to Quaternary layers.

4.4.9 Hydrogeology

Significant reserves of underground freshwater and mineral-thermal waters have been identified in Kyrgyz Republic. The primary resources of high-quality underground freshwater are concentrated in intermontane basins. A total of 44 deposits have been explored, of which 20 are intended for domestic, drinking, and industrial water supply, while the rest are used for irrigation. The potential reserves of the highest quality underground freshwater amount to approximately **13.6 km³**. Kyrgyz Republic uses 20–25% of its available water resources, with the remaining flow passing to neighbouring countries: Kazakhstan, China, Tajikistan, and Uzbekistan.

The reduction of forest ecosystems and the increasing development of gold deposits along riverbeds and valleys negatively impact water resources and contribute to the formation of hydrological geohazards.

The main resources of high-quality underground freshwater are concentrated in intermontane basins. These basins vary in structure, which can include three levels: lower, middle, and upper.

- The **lower level** is formed by Paleozoic and Proterozoic rocks, with a predominantly fractured nature of water permeability.
- The **middle level** consists of Mesozoic-Cenozoic formations, including Neogene-lower Quaternary deposits, with porosity-fracture and fracture-based water permeability, and less commonly porosity-based. The underground waters in these levels are subject to restricted or highly restricted movement, primarily influenced by geological processes.
- The **upper level** is almost universally thicker and consists of Quaternary deposits of varying genesis and composition, with predominantly porous water permeability. The most productive aquifers are found in these layers. In the upper parts of the basins, underground water is formed through the infiltration of surface waters and partially through hidden drainage from surrounding mountain masses.

The Study area lies within the zone of external intermontane artesian basins with three-level structures in parts of the route outside the gorge and in hydrogeological masses of varying

51 State Agency for Geology and Mineral Resources under the Government of the Kyrgyz Republic, 2008

structures within the Boom Gorge (*Figure 54*). The Issyk-Kul and Chui regions together hold **48% of all freshwater resources in the country**⁵². According to the well location map, several springs and existing wells are located near the Study area (*Figure 55*).

The main sources of pollution of surface and underground waters are agricultural activities, industrial enterprises, municipal sewage systems, livestock farms, and household waste. Underground waters in upper aquifers, which have intensive interactions with surface waters, are particularly vulnerable to pollution.

52 Groundwater of Kyrgyzstan: Issues of Use and Preservation. L.E. Orolbaeva. Mining Journal, 2016, No. 8, pp. 41–47.

Figure 53: The Project area in relation to the Geological Map of the Kyrgyz Republic (Source: State Agency for Geology and Mineral Resources under the Government of the Kyrgyz Republic, 2008)

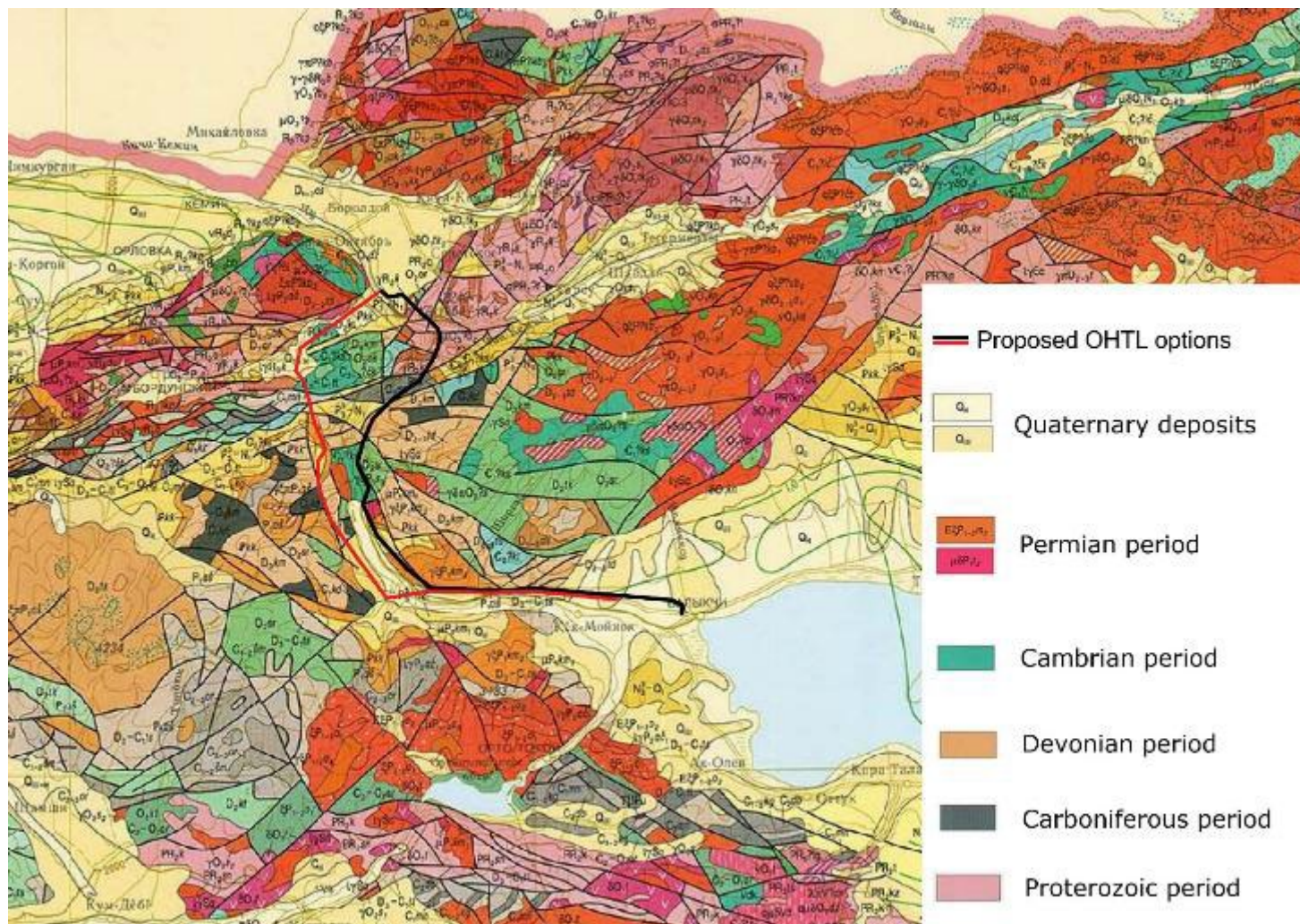


Figure 54: Map of hydrogeological zoning. 1 - Hydrogeological masses; 2 - Intermontane external artesian basins with three-level structures; 3 - Intermontane internal basins with three-level structures; 4 - Intermontane internal basins with two-level structures; 5 - Slope basins. (Source: Groundwater of Kyrgyz Republic: Issues of Use and Preservation. L.E. Orolbaeva. Mining Journal, 2016. No. 8, pp. 41-47.)

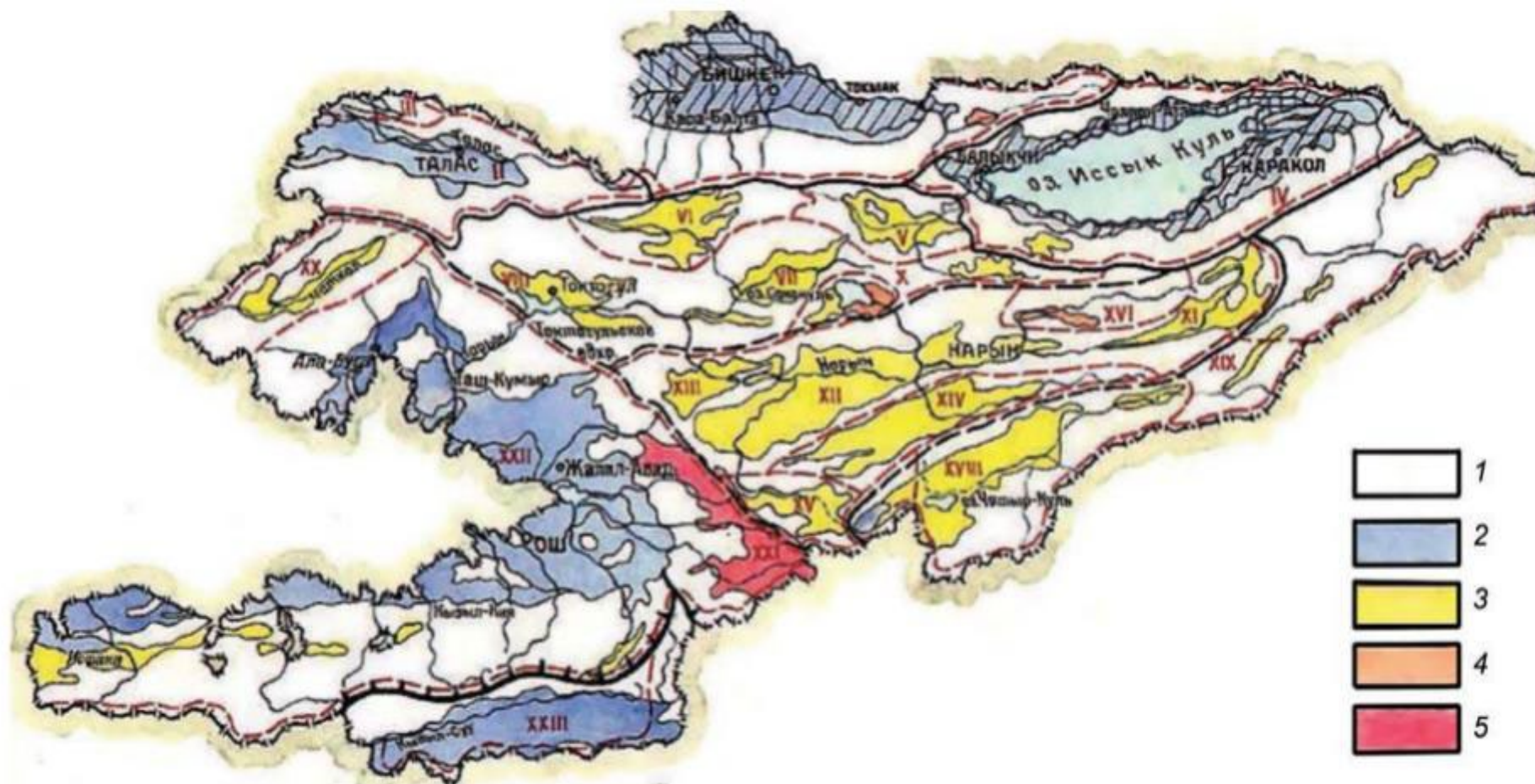
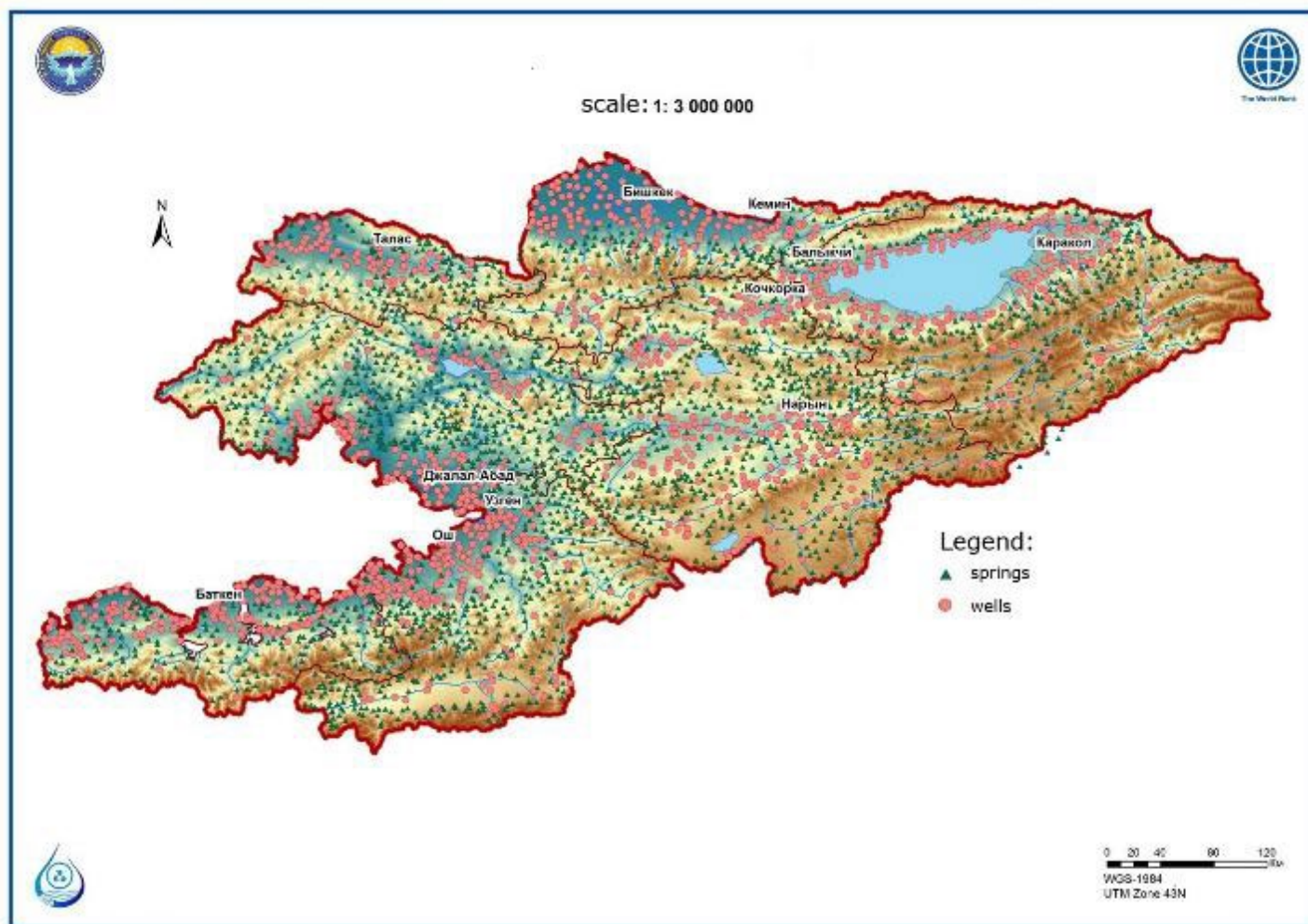


Figure 55: Locations of springs and wells in the Kyrgyz Republic (Source: Geological Map of the Kyrgyz Republic. State Agency for Geology and Mineral Resources of the Kyrgyz Republic, 2017)



4.4.10 Water resources

Kyrgyz Republic possesses significant mountain water resources, with an estimated total water reserve of 2,458 cubic kilometres. This includes 650 cubic kilometres of water (26.4%) stored in glaciers, 1,745 cubic kilometres in lakes (71%), 13 cubic kilometres of potential underground water reserves (0.5%), and an average annual river runoff of 44.5 to 51.9 cubic kilometres (2%). Kyrgyz Republic's water resources are divided into six river basins: Talas, Naryn-Syr Darya, Karadarya-Syr Darya-Amu Darya, Issyk-Kul-Tarim, and Chu. The Study area belongs entirely to the Issyk-Kul-Tarim and Chu basins (*Figure 56*).

The Issyk-Kul and Chui regions, through which the Study area passes, account for 24% and 10% of the country's water resources, respectively. The river runoff in these regions is 289,000 and 251,000 cubic meters per square kilometre. Of this, 95% of the water is used for agriculture, with the Chui region being the leader in water abstraction (34% of all water withdrawn).

The brackish, endorheic Issyk-Kul Lake holds special significance for the country, with part of its basin within the potential impact zone of the Project. The lake, of tectonic origin, was formed through faults, subsidence, and depressions in the Earth's surface. Key characteristics include:

- Area: 6,236 km²
- Length: 178 km
- Maximum width: 60 km
- Maximum depth: 668 m
- Average depth: 278 m
- Volume: 1,738 km³

Over 50 rivers flow into Issyk-Kul, with a total annual runoff exceeding 3 km³. The lake's pH ranges from 7.95 to 8.82, and salinity is 6.22 g/L. Its waters are uniform in terms of salinity, specific weight, and chemical composition due to its depth⁵³. Near Balykchy and southward along the lake's shore, several canals likely discharge brackish water after irrigation.

Route option 1 runs parallel to the Chu River, one of the region's largest rivers. The Chu forms from glaciers in the Terskey Ala-Too and Kyrgyz ranges, with a catchment area of 62,500 km² and a length of 1,067 km⁵⁴. The Study area covers a section of the river between the Orto-Tokoy Reservoir and the river valley near Kemin. In this stretch, the river actively meanders, periodically splitting into branches, with a floodplain width of up to 1 km. During the late autumn project visit,

53 Long-term dynamics and seasonal changes in the hydrochemistry of the Issyk-Kul Lake basin (Kyrgyzstan). T. Asankulov, T. Abuduwaili, G. Isanova, M. Long, E. Duulatov. *Arid Ecosystems*, 2019, Vol. 25, No. 1 (78), pp. 79–87.

54 Hydrological profile of the watershed of the transboundary Shu River basin. Zh.S. Mustafayev, S.D. Dauletbay. *Hydrometeorology and Ecology*, 2022, No. 2, pp. 32–46.

many of the meanders were dry. The Orto-Tokoy Reservoir regulates river levels for irrigation purposes.

The Route option 2 crosses the Chu River upstream of the village of Kok-Moinok-2, after which it turns southeast into the mountains. The route crosses two right tributaries of the Chu River and several seasonal streams within the gorges. Upstream from the Kok-Moynok-1 village, two water intake canals originate:

- The left canal diverts water to agricultural fields.
- The right canal directs water toward wastewater treatment facilities near the riverbank.

Further downstream of the Boom Gorge, additional canals divert water to large agricultural fields on the river's right bank. These structures are shown in Figure 17. The Chu River receives many tributaries along the OHTL route, the largest being the right-bank tributary, the Chon-Kemin River. Two additional right-bank tributaries exist between the villages of Kok-Moynok-1 and Kok-Moynok-2 (one identified as Kiyamat-Kur-Kul) and three periodically drying streams. On the left bank, there are two permanent and two temporary tributaries.

Artificial ponds near the Kemin substation are used for irrigation or livestock watering. Water bodies in the planned OHTL area are shown in *Figure 57*.

Due to the underdeveloped nature of mountain soils, groundwater in Kyrgyz Republic's mountainous areas emerges on steep slopes and flows into river valleys through existing depressions. *Figure 58* highlights areas where groundwater lies shallow (0–3 m) and may surface during flooding.

The outcomes of the baseline survey work performed to date along Route option 1 further confirm that water quality in the project AOI meets national standards⁵⁵ with low concentrations of heavy metals and an expected pH of 8, see also AnnexF. A full summary of results will be provided for preferred route option in the ESIA.

⁵⁵ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum permissible concentrations of chemical substances in water bodies for domestic and drinking water use" according to Annex16).

Figure 56: Water basins of Kyrgyz Republic (Source: https://nwrmp.water.gov.kg/?page_id=1165&lang=ru_RU)

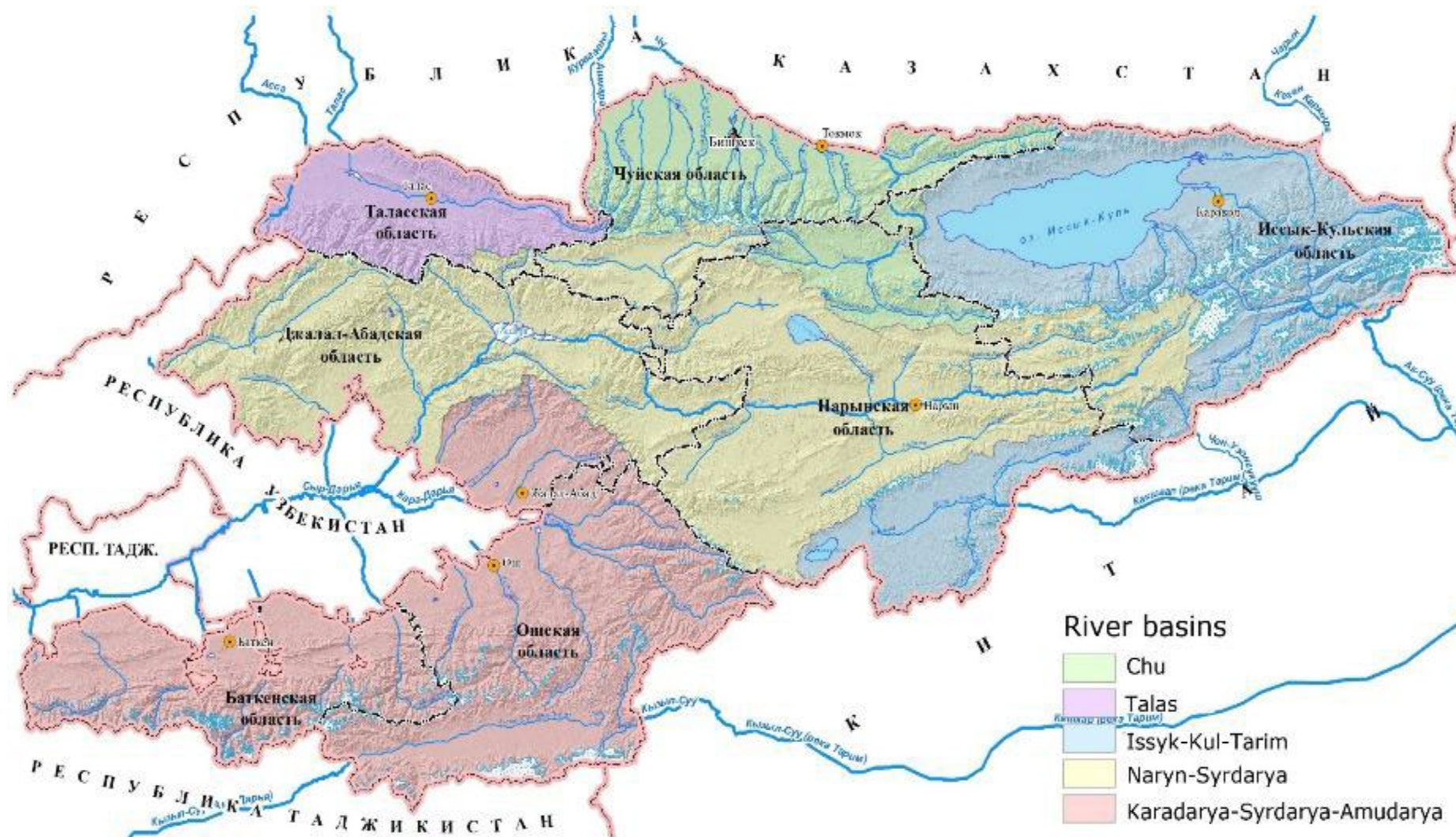


Figure 57: Water objects of the Project area

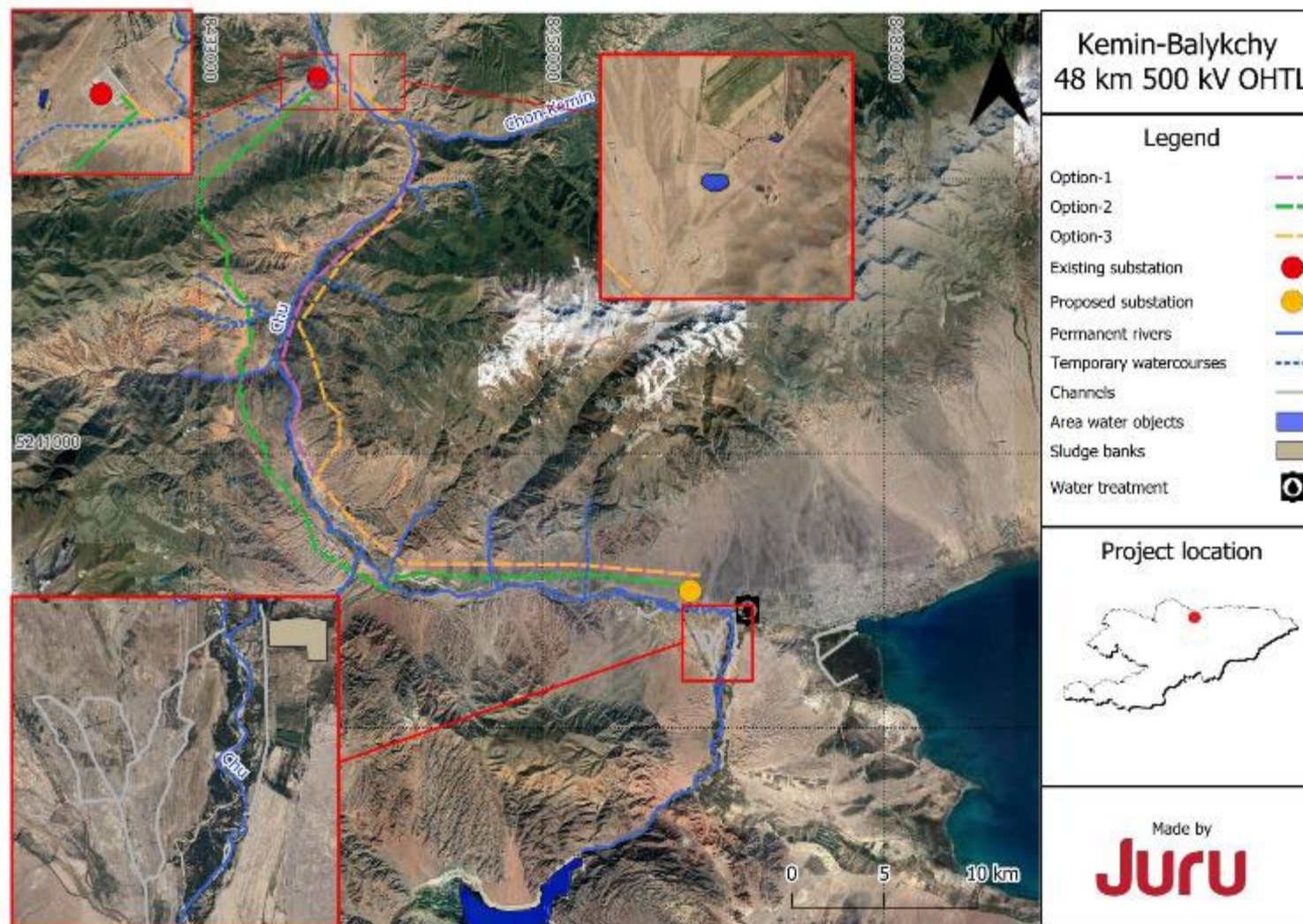
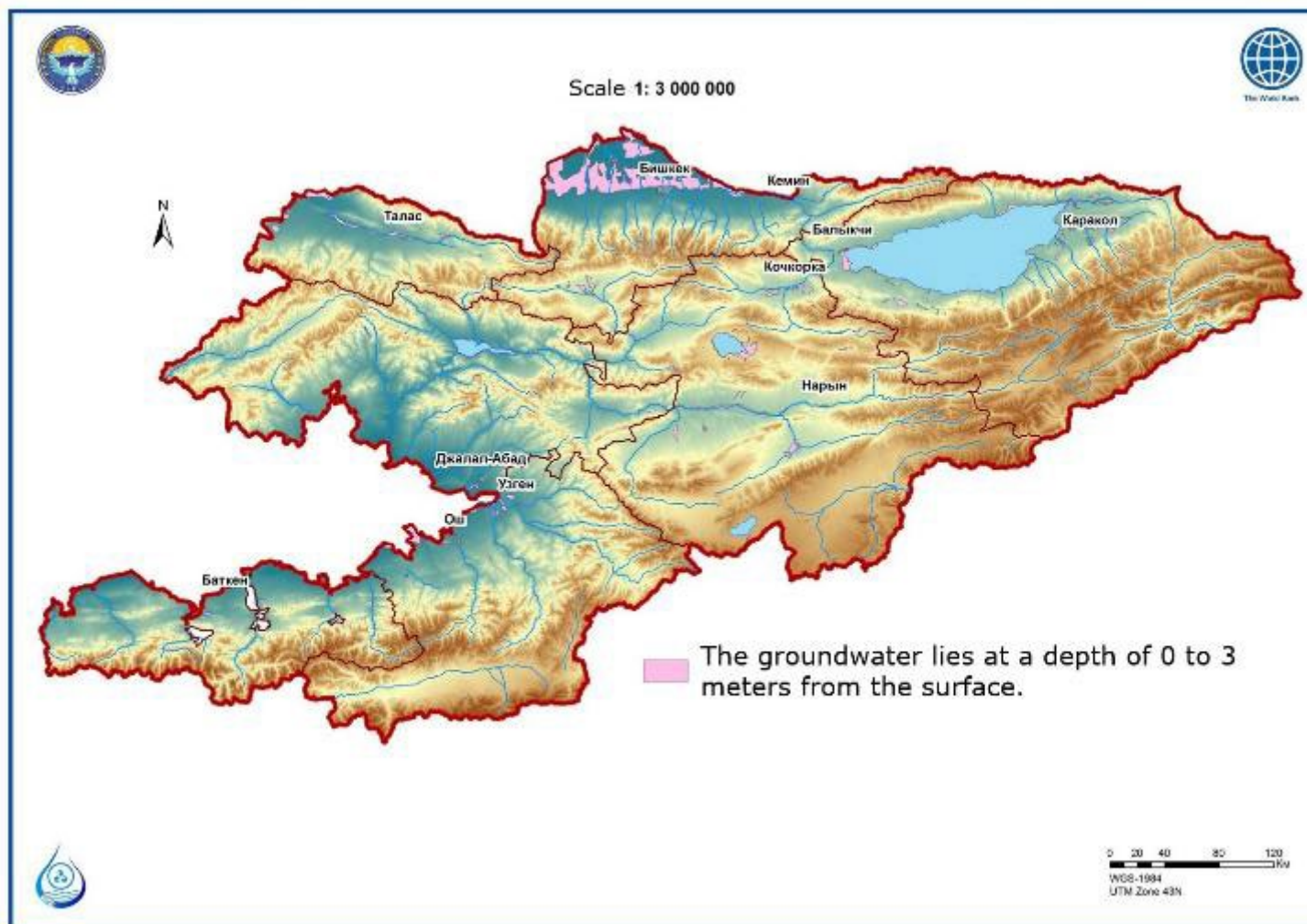


Figure 58: Zones of shallow groundwater in Kyrgyz Republic (Source: Flooding Zones Map, Ministry of Emergency Situations of the Kyrgyz Republic)



4.4.11 Traffic and transportation infrastructure

The Kyrgyz Republic ranks 132nd out of 160 countries in the Logistics Performance Index (LPI) for 2018, scoring 2.38 out of 5, which is approximately 57% of the leading country's score. The main logistics challenges in developing countries, including Kyrgyz Republic, are:

- Limited quality of infrastructure, including roads, railways, ports, and ICT infrastructure.
- Low quality of logistics services, such as customs procedures and transport services.
- Lengthy export-import processing time.
- Lack of reliability in delivery performance.⁵⁶

The nearest major highway to the proposed Study area is the EM11 highway which connects cities in the Chui (including Bishkek), Issyk-Kul, and Naryn regions through other major highways. In the Issyk-Kul region, the EM11 splits, with the EM23 turning towards the Naryn region, and the EM11 continuing eastward to Balykchy city; then the EM11 changes to the EM07 leading to the farthest point of the region, linking cities such as Cholpon-Ata, Tyup, and the regional capital, Karakol. At the nearest point the EM11 passes within 1km of the existing Kemin substation and 1km of the existing Balychuk substation. Route option 1 runs broadly parallel to the EM11 for the majority of the right of way. Route option 2 runs parallel to a local gravel road until the village of Kok-Moynok-2. At this point Route option 1 and 2 follow a more similar path broadly following the main road to the proposed substation locations. In all cases it is expected that materials and equipment will be delivered via the EM11 to the start of the OHTL and then use small local gravel loads access from the EM11 to access the OHTL ROW. Near the Kemin substation, the M-036 road branches off from the EM-11 highway, where a lower traffic load is expected. The community of Cholok is located along this road.

A second transport artery in the vicinity of the Study area is the railway, which starts at the border in the Chui region, passes through Bishkek, and ends at the Rybachye station in Balykchy. Additionally, a port exists in Balykchy, though its current operational status is unknown and will be explored further as part of the ESIA data collection.

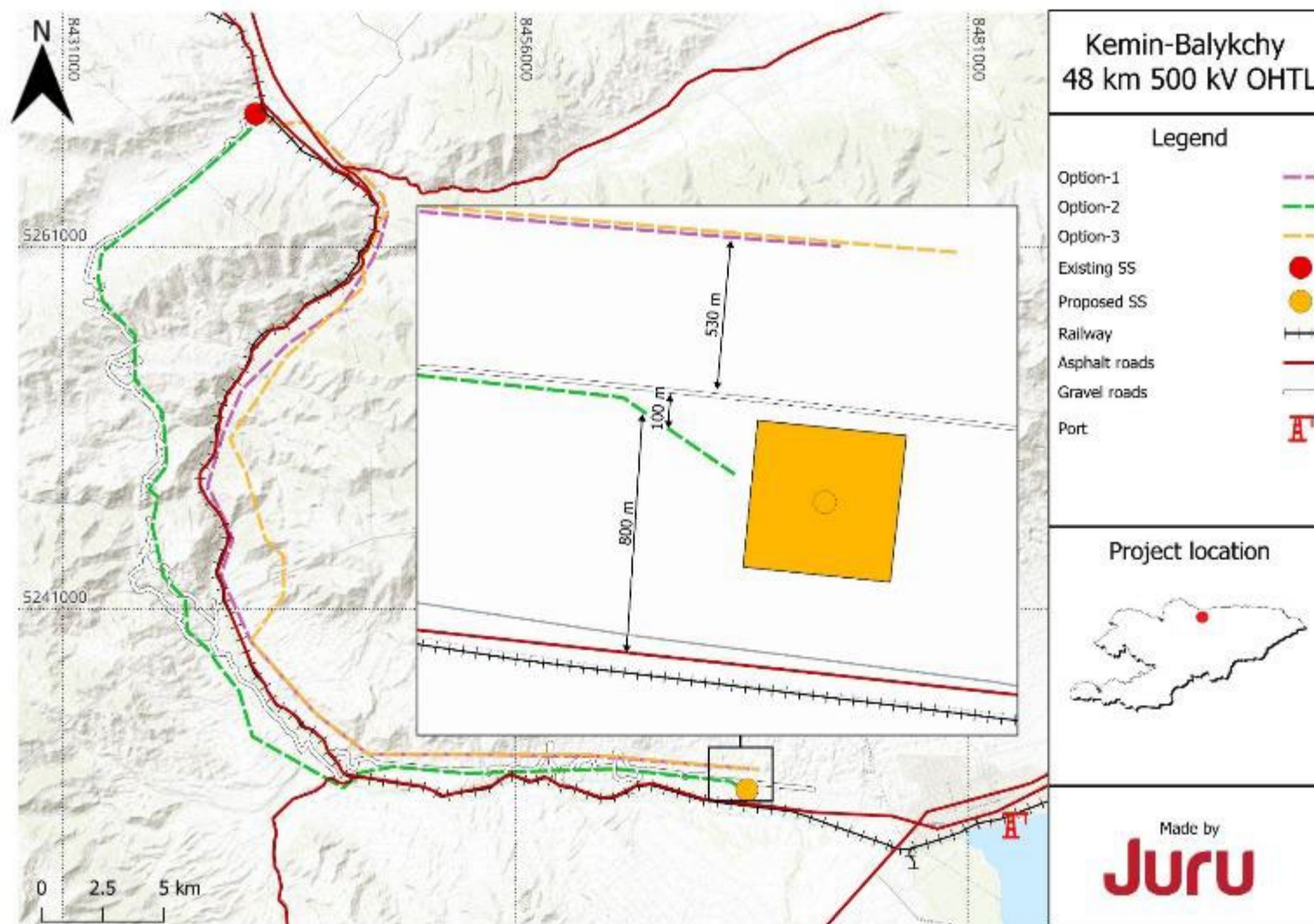
The main transport arteries in the Study area are shown in *Figure 59*. Further information on the type of road, traffic volumes, condition and suitability for use by the Project will be collected to support the ESIA work.

The outcomes of the baseline survey work performed to date along Route option 1 further confirm the expected traffic load: approximately 500 vehicles pass through the EM-11 highway per hour, mostly consisting of passenger cars, with 5–10% being trucks. In the area of the Kemin substation,

⁵⁶ World Bank. 2018. The Logistics Performance Index and its Indicators. Washington, DC.

on the M-036 highway, the traffic volume was around 100 vehicles per hour, see also AnnexF. A full summary of results will be provided for the preferred route option in the ESIA

Figure 59: Transport infrastructure of the Project area



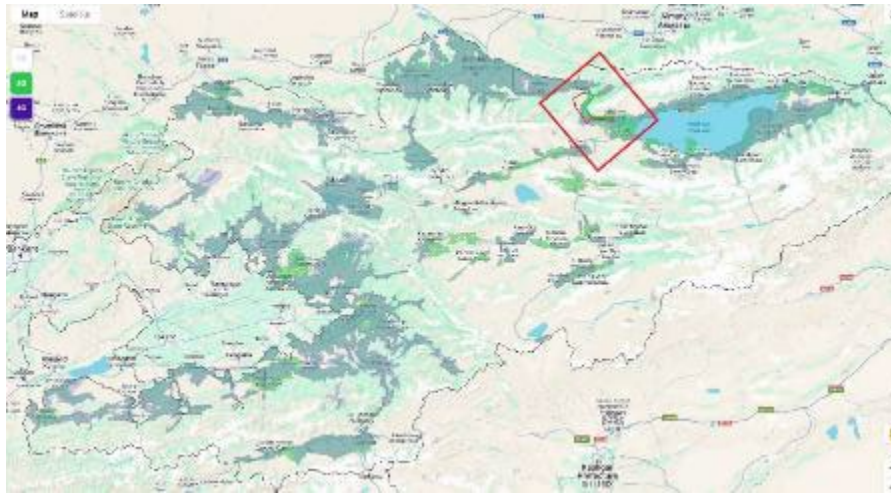
4.4.12 Communications

According to data from the State Communications Agency, by the end of 2021, 4G networks covered 96% of the 2,130 officially registered settlements in Kyrgyz Republic. However, 1.9% of the settlements remained outside mobile network coverage due to the absence of power transmission lines.

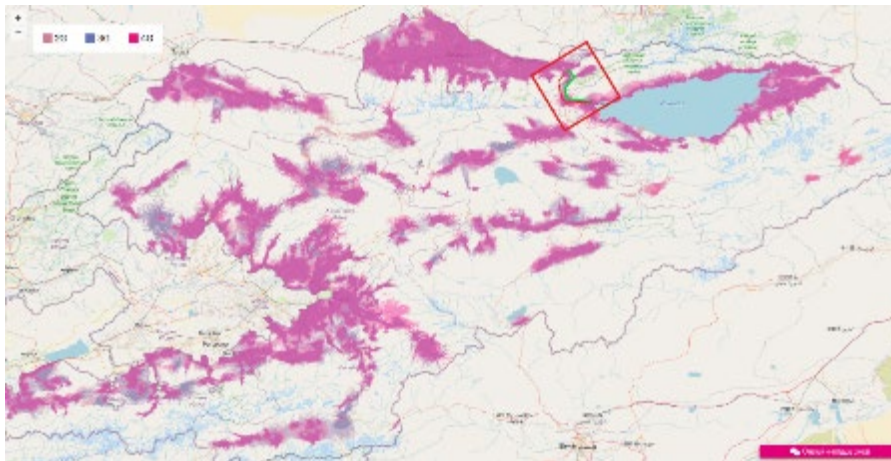
According to data from the country's major telecom operators, two major operators fully cover the Route option 1 area with mobile networks and the internet, with partial gaps only for one operator. The Route option 2 area is not covered by mobile networks within the northwestern part. Coverage networks for Mega, O, and Beeline operators are shown in *Figure 60* (a, b, c), respectively.

Open data also indicates the location of a DWDM point from the national communications operator, Kyrgyztelecom. DWDM (Dense Wavelength Division Multiplexing) is a system for transmitting and receiving information via fiber-optic cables. The nearest DWDM points to the Study area are located in the village of Toru-Aygyr, 19 km east of Balykchy, and in the village of Tegirmenti, 23 km northeast of the confluence of the Chu and Chon-Kemin rivers and the closest point of the OHTL route (*Figure 61*).

Figure 60: Internet Coverage in the Territory of Kyrgyz Republic (Source: Official websites of the Providers)



a)

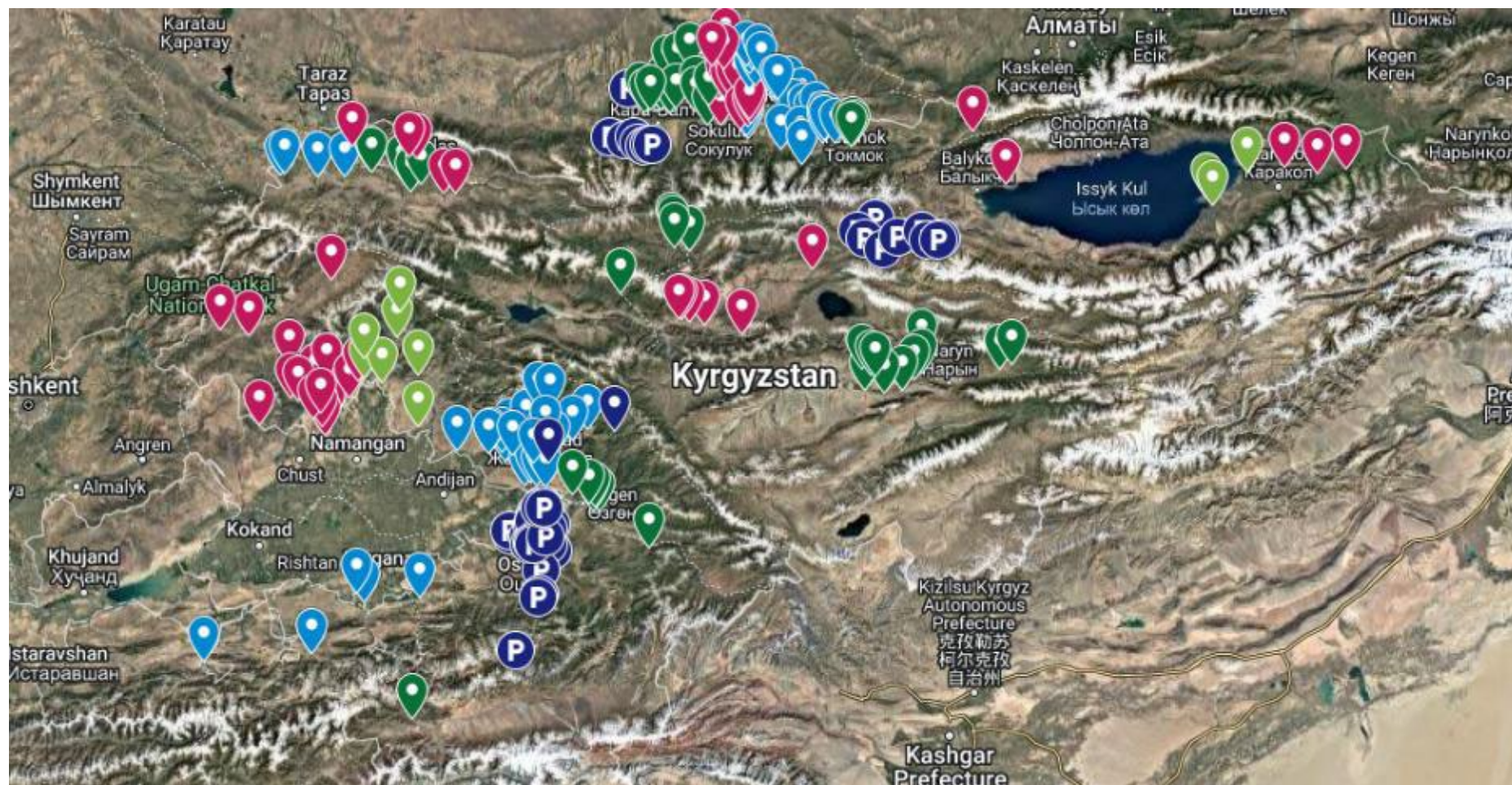


b)



c)

Figure 61: Location of the DWDM system in the Kyrgyz Republic (Source <https://www.kt.kg/dcasa/>)



4.5 Land Use

The Study area route passes through two districts belonging to different regions: Kemin District in Chui Region and Ton District in Issyk-Kul Region traversing a variety of land types. Only a small portion of the route is in apparent economic use.

In the area of the Kemin substation (850 m from the substation), the route may pass close to an adjacent concrete plant and a construction materials plant.

For Route 1, within the Boom Gorge, on both the Kemin and Ton districts' sides, no significant economic activity has been identified due to the steepness of the slopes. One anticipated type of activity in this zone could be livestock grazing; however, no herders were observed during site visits.

In the Ton District, in the foothill zone, a distance of 22 km west of Balykchy, the Study area represents a semi-desert zone with sparse vegetation, periodically intersected by depressions of mountain rivers. This area may be seasonally used for livestock grazing, and horticulture could occur in river depressions, with cultivation of trees from the Rosaceae family (apples, pears) and sea buckthorn. Some of this area is Forestry Committee land.

The Route 2, which originates at the Kemin substation and runs in a southwestern direction, crosses a plain for approximately 10 kilometers. This section of the line is close to several buildings used by herders and farmers and areas used mostly for grazing activities. After crossing the highest ridge, the route continues through mountainous terrain. The area is intersected by sparse gorges, where farms and pastures are located on both sides of the line. The zones between the gorges can also be used as pastures. Along this section, there is a wildlife rehabilitation center, "The Nature and Biodiversity Conservation Union (NABU Kyrgyzstan)". Further along, the OHTL reaches a Chu river valley, crossing agricultural fields near the village of Kok-Moinok-2, followed by the river and a railway. After this, the OHTL route runs parallel to option 1.

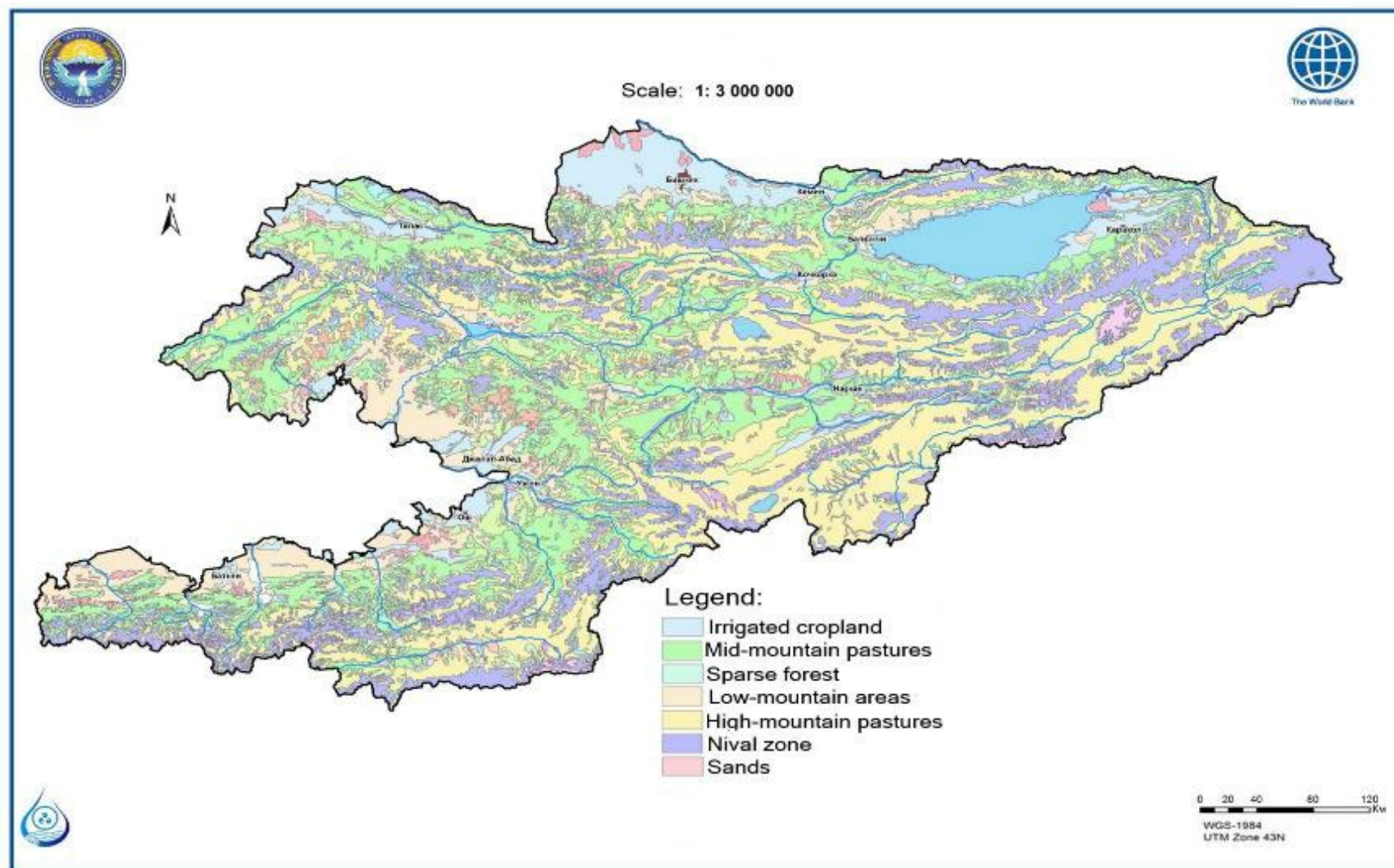
Directly in the suburbs of Balykchy, about 240 hectares are periodically used for horticulture, including land plots adjacent to the existing Issyk-Kul substation.

In the Balykchy area, some land on the left bank of the Chu River, 2 km south of the transmission line route, may also be used for agricultural purposes, as evidenced by the presence of a canal system. However, active use of these lands has not been confirmed.

Figure 62: Land of Forestry Committee*Figure 63: Water ditch*

According to the land use map (*Figure 64*), the project route passes through lands primarily used as pastures or unused low-mountain zones. It should also be noted that the Study area borders the high-mountain pasture zone in the Ton District, a sand deposit zone, and irrigated farming lands near the Kemin substation in Kemin District.

Figure 64: Land Use Map of Kyrgyz Republic (Source: Land Use Map of the Kyrgyz Republic. National Water Resource Management Project, 2017.)



4.6 Socio-economic overview

4.6.1 Introduction

Kyrgyz Republic is divided into seven regions (oblast) administered by appointed governors. Each region comprises several districts (raions), administered by government-appointed officials. Sub-district, self-governing, rural community administrations (ayil okmutu), consisting of up to 20 small settlements (ayils), have their own elected mayors and councils.⁵⁷

The proposed options of OHTL route crosses the regions of Chui (Kemin district) and Issyk-Kul (Ton district). Two ayil okmutus and four settlements (ayils) are situated in close proximity to the proposed OHTL routes. The ayils of Kok-Moynok 1 and Kok-Moynok 2, which fall under the control of the Kok-Moynok ayil okmutu, are situated approximately 1 km and 17 km, respectively, from the planned Balykchy substation. The third ayil is Kyz-Kiya, which falls under the control of the Kyzyl-Oktyabr ayil okmutu, and the final Cholok ayil is also under the control of the Kyzyl-Oktyabr ayil okmutu.

4.6.2 Demographics

The population of Kyrgyz Republic is 7,200,000⁵⁸. The country's extensive mountainous terrain has resulted in a significantly lower population density compared to other Central Asian countries. As of the beginning of 2024, the population of the Ton district was 60,552, while the population of the Kemin district was 51,905. The breakdown of the population of the 2 Study area ayil okmutus and 4 Study area ayils is provided in Table 15 below.

Table 15: Population of Study area communities (ayils)

No	Name of ayil okmutu	Name of ayil	Total population	Households
1	Kok-Moynok ⁵⁹	Kok-Moynok 1	1022	164
2		Kok-Moynok 2	632	116
3	Kyzyl-Oktyabr ⁶⁰	Kyz-Kiya	86	22
4		Cholok	60	15
5	Total		1800	317

57 https://www.adaptation-fund.org/wp-content/uploads/2020/10/AFB.PPRC_26.b.8-Proposal-for-Kyrgyzstan.pdf

58 <https://stat.gov.kg/en/statistics/naselenie/>

59 Kyzyl-Oktyabr ayil okmutu's passport

60 The total population statistics for the beginning of 2024 have been sourced from <https://stat.gov.kg/en/statistics/download/operational/825/>, while the household statistics have been taken from the passport of Kemin district for 2022.

The Kyzyl-Oktyabr ayil okmutu population is comprised of a greater number of females than males. Similar information was requested from Kok-Moynok ayil okmutu, but has not yet been provided, it will be included in the ESIA.

Table 16: Gender distribution of the Study area ayil okmutus

Ayil okmutu	Population	Male (%)	Female (%)
Kyzyl-Oktyabr 57 ⁶¹	6,579	3,076 (46.75%)	3,503 (53.25%)

The gender distribution in terms of Study area ayils is not yet available and will be provided in the ESIA report.

4.6.3 Economy, Employment and Livelihoods

4.6.3.1 Chui region

The Chui Region comprises eight districts (Alamudun, Chui, Jayyl, Kemin, Moskva, Panfilov, Sokulov and Ysyk-Ata) and the city of Tokmok. It remains one of Kyrgyz Republic's most economically significant areas due to its fertile agricultural land, industrial infrastructure, and strategic location near the capital, Bishkek. The Gross Regional Product (GRP) for 2023 grew by 5.7%, reaching approximately 118.5 billion KGS, supported by strong growth in agriculture and industrial activities. Industrial production rose by 4.1%, amounting to 50.9 billion KGS.⁶²

Agriculture, forestry, and fisheries remain the backbone of the region's economy, contributing 33% of the GRP. The region produces essential crops such as wheat, sugar beets, and vegetables, alongside significant dairy and meat outputs. The manufacturing sector, heavily concentrated near Bishkek, accounted for 44% of the country's industrial production, focusing on food processing, textiles, and construction materials.

Kemin District is known for its mountainous terrain and fertile valleys, making it an important centre for both agriculture and livestock breeding. In 2023, the district produced 6.3 billion KGS worth of agricultural products, focusing on potatoes, barley, and hay production, which are well-suited to its high-altitude environment. Livestock farming, particularly sheep and cattle, also plays a significant role in the district's economy. The district's agricultural output represented 7.2% of the region's total.⁶³

Livelihoods in the district are diverse, with rural communities relying on farming, livestock, and agro-industries, while urban populations are engaged in commerce, services, and public

61 Annual report of Kyzyl-Oktyabr ayil okmutu

62 <https://www.akchabar.kg/en/news/natsstatkom-zavershil-itogovie-rascheti-vrp-za-2023-god-otmetiv-rost-utbszkipjizonihw>

63 <https://akipress.com/news:691499>

administration. Labour migration to Russia and Kazakhstan remains significant, with remittances forming a critical income source for families.

4.6.3.2 Issyk-Kul region

The Issyk-Kul Region is comprised of five districts (Ak-Suu, Jeti-Oguz, Ton, Tup and Issyk-Kul) and two cities, Karakol and Balykchy. The Region continues to be a vital economic zone due to its tourism, agriculture, and mining activities. The Gross Regional Product (GRP) for 2023 increased by 5.2% to approximately 71.8 billion KGS, while industrial production accounted for 22.5 billion KGS, a growth of 3.6%.⁶⁴

Tourism is the primary economic driver of the region, with over 1.6 million national and international tourists visiting the region annually. In 2023, the services sector, fuelled by tourism, contributed 40% of the GRP. Agriculture provided 27% of the GRP, with significant outputs in fruit farming, livestock, and fishing.⁶⁵

Ton District plays a critical role in the agricultural and tourism sectors of the region. The district produced 6.3 billion KGS worth of agricultural products in 2023, representing 11.2% of the region's agricultural output. Ton's tourism revenue has grown steadily, thanks to its picturesque landscapes, beach resorts, and increasing interest in ecotourism activities.

Livelihoods in Issyk-Kul are highly seasonal, with households engaging in tourism-related jobs during peak months and relying on subsistence farming in the off-season. Fishing and trade along Lake Issyk-Kul's shores are also significant, while labour migration continues to support household incomes through remittances.⁶⁶

4.6.3.3 Project Study area

There are several cement manufacturing factories, a brick factory, a poultry farm, and several commercial centres located in the Study area that could be impacted by the Project construction. These elements are of critical importance to the regional economy and the livelihoods of the local population. During the scoping visit observations. A full mapping of the preferred route option will be undertaken for the ESIA.

4.6.4 Land use, agriculture and natural resources

Land in the Kyrgyz Republic's primarily falls under agricultural use or mountainous terrain. Agricultural land is commonly subdivided into permanent pastureland (48%), arable cropping land (7%) and forestry land (4%); the remainder of the land in the country is non-productive land in the

64 <https://stat.gov.kg/ru/opendata/category/28/>

65 <https://www.adb.org/projects/55250-001/main>

66 <https://visitsilkroad.org/destination/kyrgyz-republic/issyk-kul/>

higher altitudes, rocky outcrops, glacial and snowfields, as well as urban areas. A significant proportion of the land in the AOI districts is rural. In Ton district, approximately 97% of the population resides in rural areas.

The initial observations determined that most of the land in the Study area is mountainous and rocky, unproductive land. Some of the land is used for horticulture in addition to forestry. During the consultations with owners of two gardens it was identified that they mainly plant apple and apricot trees. Other household activities that support livelihood activities in the Study area are herding and fishing activities.

During the site visit, several herder's houses with stables were identified (



Figure 65 -

Figure 78). Interviews with Kemin district herders revealed that grazing may occur in the wider area around both route options. This will be confirmed during the ESIA phase for the preferred route.

Figures below show the type of potentially impacted land users in the Study area.



Figure 65: Commercial centres



Figure 67: Poultry farm



Figure 66: Cement manufacturing factory



Figure 68: Cement manufacturing factory



Figure 69: Herder's house with stable



Figure 70: Fish farm



Figure 71: Example of household Garden



Figure 72: Herder's house with stable



Figure 73: Herder's house with stable



Figure 74: Herder's house with stable



Figure 75: Herder's house with stable



Figure 76: Herder's house with stable



Figure 77: Unidentified fenced area



Figure 78: Unidentified fenced area

It is worth noting that the final route option will avoid all residential areas and shepherd huts, thereby minimising any direct impact on these assets.

Information from the cadastral departments of Balykchy, Ton, and Kemin districts is still forthcoming and will be addressed during the ESIA phase.

4.6.5 Access to healthcare and education

There are three educational establishments in Kok-Moynok ayil okmutu, two of them are in the Project AOI. Kok-Moynok 1 has a secondary school with an enrolment of 201 students, while Kok-Moynok 2 has an elementary school with an enrolment of 82 students. However, it should be noted that neither village has a kindergarten. There is a paramedic and midwife station in each ayil.⁶⁷

The Kyzyl-Oktyabr ayil okmutu oversees eight educational establishments, comprising three schools and five kindergartens. There are six healthcare establishments in the ayil okmutu, including a family practice group, a paramedic and a midwife station⁶⁸. The village level information is not yet available for Kyzyl-Oktyabr ayil okmutu and will be provided in the ESIA report.

4.6.6 Language and ethnicity

The passport of Kok-Moynok ayil okmutu revealed that the nationality of Kok-Moynok 1 and Kok-Moynok 2 ayils is 100% Kyrgyz. This information was also verified during consultations with the chairmen of the ayils and residents at each of the Study area villages. It should be noted, however,

⁶⁷ Kok-Moynok ayil okmutu's passport

⁶⁸ The paramedic and midwife station represents the closest medical unit for rural residents, offering a convenient source of medical care. It forms part of a larger network of medical outpatient clinics, nursing hospitals, and local hospitals.

that the majority of residents are also able to understand and speak Uzbek and Russian. Furthermore, no ethnic minority groups or indigenous peoples were identified in the Study area villages.

With regard to the Kyzyl-Oktyabr ayil okmutu the ethnic composition and language abilities are expected to be similar to Kok-Moynok, however, the requisite information (to be found in the community passport which has been requested from the ayil okmutu) is not currently available and will be provided in the ESIA report.

4.6.7 Indigenous Peoples

EBRD PR7 defines Indigenous peoples (IPs) as a social and cultural minority group... possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous ethnic or cultural group and recognition of this identity by others
- Collective attachment to geographically distinct habitats, traditional lands or ancestral territories, in the Study area and to the natural resources in these habitats and territories
- Descent from populations who have traditionally pursued non-wage (and often nomadic/transhumant) subsistence strategies and whose status was regulated by their own customs or traditions or by special laws or regulations
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society or culture and
- A distinct language or dialect, often different from the official language or dialect of the country or region

During the site visit and subsequent communications with the nearest communities, no IPs were observed or identified. Consequently, it can be confirmed that IPs are not present in the AOI.

4.6.8 Labour and human rights

The Kyrgyz Republic is a member state of the United Nations and thus has pledged to actualize international mechanisms on human rights. These have included the adoption of the UN's Universal Declaration of Human Rights and core conventions of the ILO to socialize and actualize the protection of human rights as well as labour standards within the country. Some of the key national institutions for human rights in the Kyrgyz Republic include:

- Office of the Ombudsman: Entailed in the protection of the rights and freedoms of its citizens, it is extensively involved in complaints addressing human rights violations.
- National Institute for Human Rights: An opportunity is given to develop and implement such policies as the National Action Plan on Business and Human Rights with UNDP support.

Recent Developments in Kyrgyz Republic:

- **Gender Equality and Women's Rights:** The Kyrgyz Republic passed laws on combating gender-based violence and human trafficking. At the same time, enforcement remains weak; domestic violence is particularly inadequately addressed. However, the government does collaborate with civil society in supporting victims and raising awareness.
- **Business and Human Rights:** Since 2022, the Kyrgyz Republic has been working to bring its legal framework into line with international standards for enhanced corporate accountability under the UN Guiding Principles on Business and Human Rights.
- **Labour Rights:** While certain protections exist, informal employment is quite high, with precarious conditions prevailing for many workers. Efforts continue toward improved labour rights awareness and in the mechanisms of enforcement. There are still legal restrictions to jobs that women can undertake.
- **Environmental Justice:** The country has developed legal frameworks and capacity-building among legal professionals and environmental stakeholders to improve issues related to environmental justice.

Despite these, some of the biggest challenges in Kyrgyz Republic today are corruption, lack of comprehensive data about human rights abuses, and limited access to justice for rural populations and migrants. Project level human rights risks and impacts will be further explored in the ESIA.

4.6.9 Infrastructure and services

The infrastructure within the Study area includes essential utilities such as local transmission lines, the Chu River, that are of critical importance to the regional economy and the livelihoods of the local population.

The Study area benefits from a well-developed transportation infrastructure. Balykchy city, Ton district and Kemin district are linked to other regions of the Kyrgyz Republic via the main EM11 highway. This highway plays a crucial role in facilitating local and regional travel, as well as the movement of goods and people. Furthermore, the Bishkek-Balykchy railway passes through mountainous terrain, offering access to the western shore of Issyk-Kul Lake. This railway is renowned for its scenic vistas and plays a pivotal role in regional connectivity. However, its operational frequency is constrained, with the majority of its services concentrated on passenger transit during the summer months, catering to seasonal demand.

In addition, the NABU Kyrgyzstan Wildlife Rehabilitation Centre is located in close proximity to Option 2. This facility is dedicated to the conservation and rehabilitation of endangered species, with a particular focus on the snow leopard.

Collectively, these infrastructure components enhance accessibility and provide a robust foundation for local industries and communities within the Study area.

Figure 79: Railway

Figure 80: Chu river



4.6.10 Poor and vulnerable groups

According to the Asian Development Bank (ADB), as of 2022, 33.2% of the population of the Kyrgyz Republic lived below the national poverty line. In 2023, 0.9% of working people in the Kyrgyz Republic earned less than \$2.15 a day in purchasing power parity.⁶⁹ Due to the significant impact COVID-19 has had on the Kyrgyz Republic's economy, employment, and people's incomes, 20 years of development gains were erased in four years. The cost of staple foods in 2023 were more than 50% higher than in early 2020 (before the impact of COVID-19 was felt). In the Kyrgyz Republic, around two out of five households cannot afford a portion of healthy food, which causes micronutrient deficiencies in women and children that last a lifetime. Less than 70% of children aged 6 months to 5 years meet the minimum dietary diversity, and 47% of them, are deficient in iron and other micronutrients. This is also the case for teenage girls.⁷⁰

A total of 207 vulnerable individuals are currently residing in Kok-Moynok ayil okmutu, including: One hundred and fifty-two individuals are classified as living with disabilities, these are either due to illness, or due to disabilities that they have lived with since childhood (55 individuals).⁷¹ The Kyzyl-Oktyabr ayil okmutu has not yet provided the requisite information, which will be included in the ESIA report once the necessary data has been collated. Additional information on poverty and vulnerability will be identified during the completion of the socioeconomic surveys and community consultations.

4.6.11 Cultural heritage

There are two locations in the Kyrgyz Republic that are on the UNESCO World Heritage List. It is not anticipated that the Project will have any impact on either of these locations. The nearest location to the Project site is in Balasagun City (Chui region), approximately 48 km from Kemin substation.⁷²

69 <https://www.adb.org/where-we-work/kyrgyz-republic/poverty>

70 <https://www.wfp.org/countries/kyrgyz-republic>

71 Passport of Kok-Moynok ayil okmutu

72 <https://whc.unesco.org/en/statesparties/kg/>

The Project scoping site visit on 13-14 November 2024 revealed the visual presence of cemeteries and monuments within 300-1300 meters of the proposed Project alignment. During the site visit, four cemeteries were identified, two in Balykchy city, one in Kok-Moynok 2 ayil and one in Cholak ayil. Additionally, several single graves, sculptures and statues have been discovered along the EM11 highway. However, none of them is directly impacted by the Project (Figure 81).

Figure 81: Cultural heritage objects

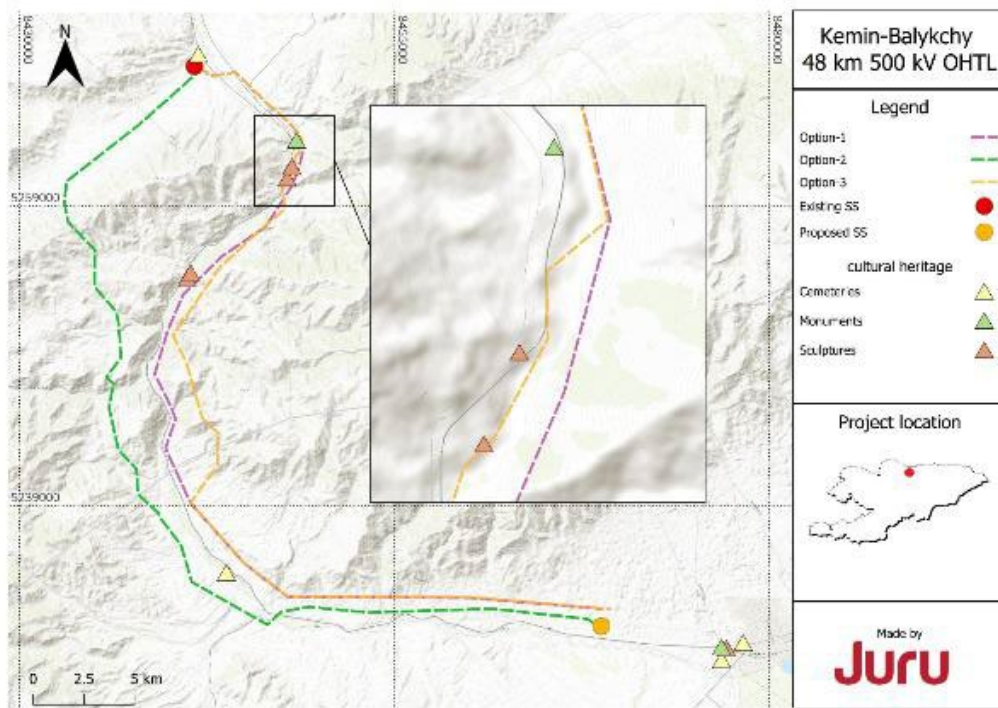


Figure 82: Cemeteries of Cholak ayil (1300 meters away from the OHTL)



Figure 84: Sculpture (500 meters away from the OHTL)

Figure 83: Cemeteries of Balykchy city (350 meters away from the OHTL)



Figure 85: Grave (1000 meters away from the OHTL)



Figure 86: Sculpture (500 meters away from the OHTL)



Figure 87: Sculpture (330 meters away from the OHTL)



4.7 Biodiversity overview

4.7.1 Introduction

Like most of the country, the territory surrounding the site is dominated by mountains, intersected by valleys and gorges. Elevation and topography greatly affect weather conditions, which, in turn, affect habitat and biodiversity along the proposed OHTL routes. Mountain specialist species, such as Snow Leopard (*Panthera uncia*), Siberian Ibex and Himalayan Snowcock are found in the surrounding high mountains. The biodiversity of the high-altitude desert of the western part of the Issyk Kul Province, which is unique for the country, is represented by some desert species, including several species of sandgrouses, larks and jerboas.

Outside the mountains, most of the areas adjacent to the OHTL route options (within 2km buffer) are within relatively flat landscapes are used either for agriculture (orchards, hayfields), open plains or as pastures. Slopes of hills and mountain ranges may be used for grazing as well, where possible, while the steepest slopes and areas with difficult access due to the absence of access roads support largely natural habitats. Habitats along the highway connecting the Issyk-Kul and Naryn Provinces with the Chu Province, are substantially disturbed, however, they still support some wildlife more tolerant to human presence. However, the terrain of route option 2 is more likely to be less disturbed as grazing and hunting are limited due to topography and difficult access, some areas are likely to support biodiversity in more natural conditions.

4.7.2 Protected areas

Eight protected areas of national and international importance were identified within a 50 km buffer from the proposed OHTL route (*Figure 88*, *Figure 89*; *Table 17*). The closest protected areas are located only 2.5-3 km away from the easternmost endpoint of the proposed OHTL route and include 4 overlapping protected areas with various protection statuses aiming to conserve Lake Issyk-Kul and its biodiversity. These are the “Issyk-Kul State Nature Reserve”, the “Issyk-Kul Biosphere Reserve”, the Ramsar site “Issyk-Kul State Reserve with the Lake Issyk-Kul” and KBA “Western Issyk-Kul Lake”. The first three PAs cover the whole area of Lake Issyk-Kul and its shore, while the KBA covers not only the western bay of the lake but also some of the adjacent floodplain and riverine forest. Lake Issyk-Kul itself is an important wintering site for migratory waterbirds, with up to 70,000 birds recorded annually in winter. The lake also has 28 fish species, including 7 endemic species.⁷³

The KBA “Western Issyk-Kul Lake” was designated as an important wintering site for thousands of migratory birds, including Black-necked Grebe *Podiceps nigricolis*, Red-crested Pochard *Netta rufina* and Whooper Swan *Cygnus cygnus*.⁷⁴ Another protected area, which is located 12.5 km to the south of the project site is the “Kochkor” Wildlife Refuge, which was established for the conservation of hunting species of birds in the area located to the west of the Ortotokoi Reservoir. As located close to the mouth of the Chu River, the water surface of this bay rarely freezes in winter, regularly providing shelter to several thousands of wintering waterfowl congregating in this part of the reservoir, including Ruddy Shelduck, Red-crested Pochard and Common Pochard (IUCN VU). This bay, as well as the adjacent area of the shore, is also used by migrating birds as a stopover site

73 <https://rsis.ramsar.org/ris/1231?language=en>

74 <https://www.keybiodiversityareas.org/site/factsheet/27414>

Figure 88: Protected areas of national and international importance within 50 km buffer around the proposed OHTL Route option 1.

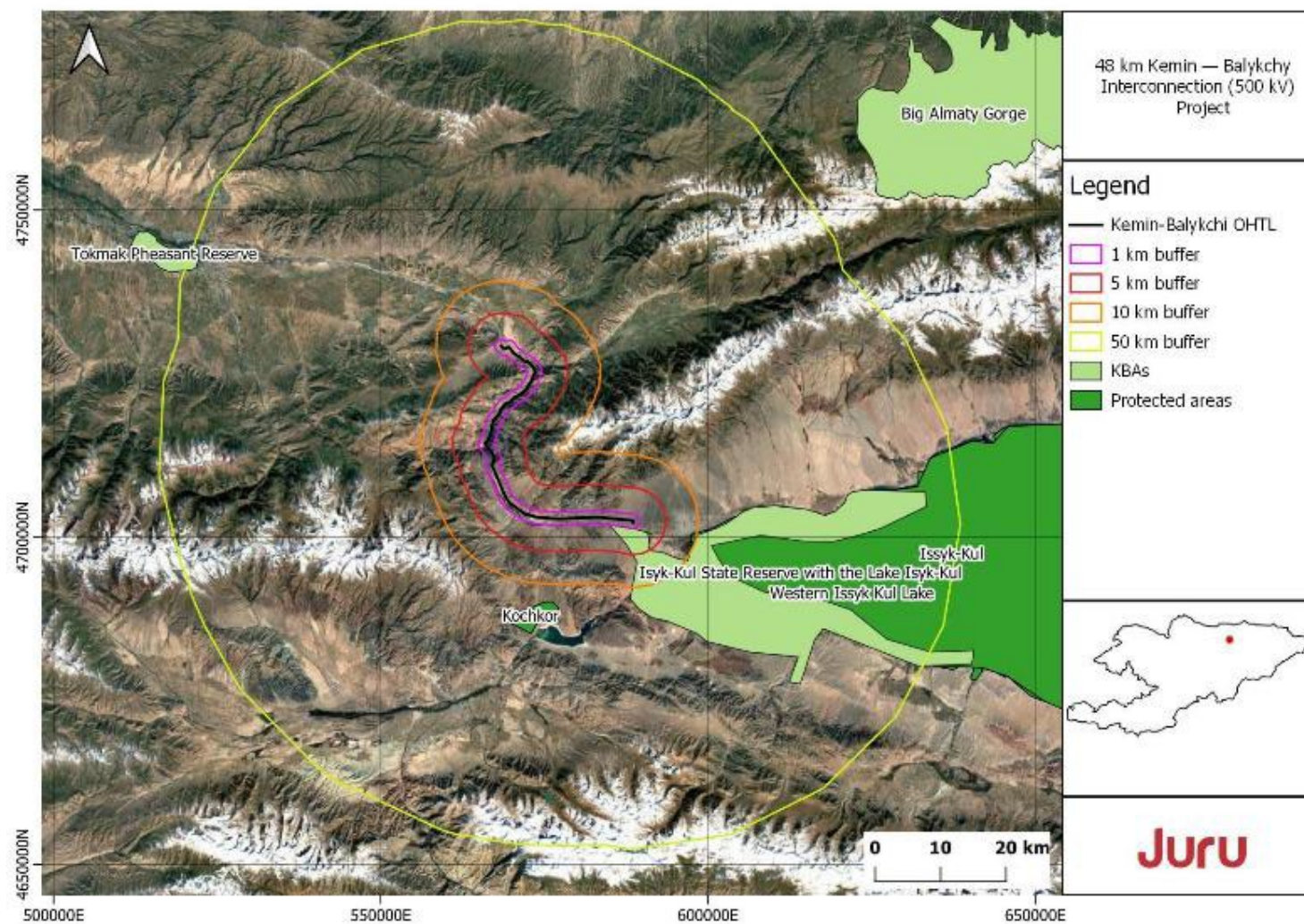


Figure 89: Protected areas of national and international importance within 50 km buffer around the proposed OHTL Route option 2.

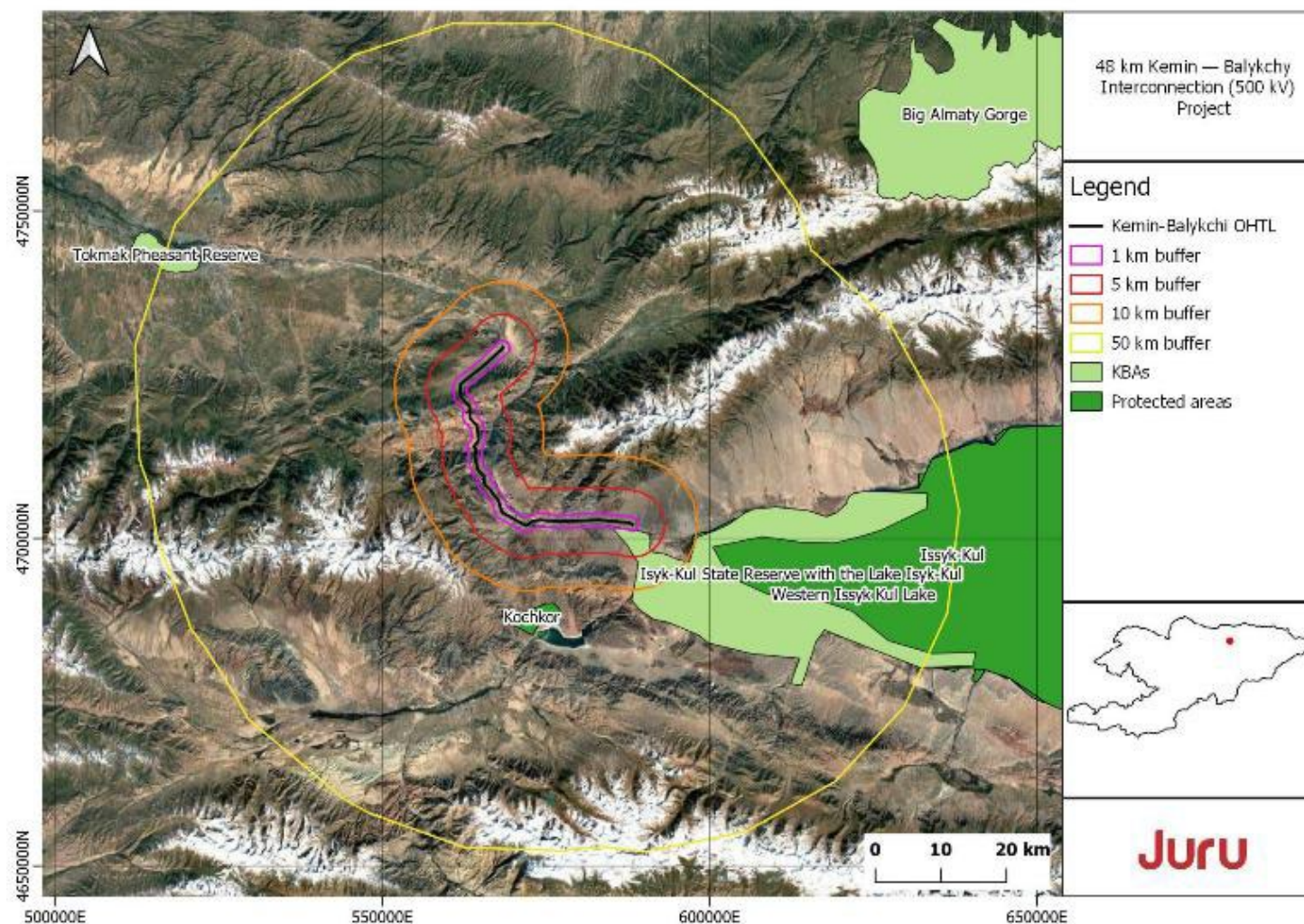


Table 17: Protected areas within a 50 km buffer around the proposed OHTL routes

Area name	Distance to the project site	IUCN Category	Status	Designation	Recommendation
Issyk-Kul	2.5 km	Ia	Designated	State Nature Reserve (Ia Category) ¹	Assess for critical habitat.
State Nature Sanctuary 'Karakonuz Tract' (Kazakhstan)	33 km	IV	Designated	Zakaznik (IV Category)	Assess for critical habitat
Kochkor	12.5 km	IV	Designated	Wildlife Refuge (IV Category)	Assess for biodiversity risk
Issyk Kul	2.5 km	Not Applicable	Designated	UNESCO-MAB Biosphere Reserve	Assess for biodiversity risk
Isyk-Kul State Reserve with the Lake Isyk-Kul	2.5 km	Not Reported	Designated	Ramsar Site, Wetland of International Importance	Assess for biodiversity risk
Western Issyk Kul Lake	1 km	Not Applicable	NA	KBA	Assess for critical habitat
Tokmak Pheasant Reserve	44 km to Option 2 and 48.3 km to Options 1 and 3	Not Applicable	NA	KBA	Assess for critical habitat

¹UNEP-WCMC and IUCN (2024), Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], November 2024, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net

Currently, the proposed infrastructure does not directly impact the protected areas identified above. The potential for direct impacts on birds who may interface with the project will be confirmed during the ESIA phase, and the need for an Appropriate Assessment will be confirmed.

4.7.3 Flora and habitats

Field survey data collected to date (14–18 September 2024) were used to prepare a scoping phase habitat classification map for route option 1 (Figure 90). A total of 17 distinct potential habitat types were identified during the scoping site visit (Table 18). Among these, 12 habitats were classified as Natural Habitat (as per EBRD PR6) two habitats, Farmland and Urban areas, were categorized as Modified, reflecting significant anthropogenic alterations. The route habitats observed are also expected to be applicable to route option 2. During the ESIA phase, further surveys will be required to confirm the habitat types under the preferred route for the ROW and other impacted areas and any relevant EU habitats designations.

Table 18: Habitat Classification⁷⁵

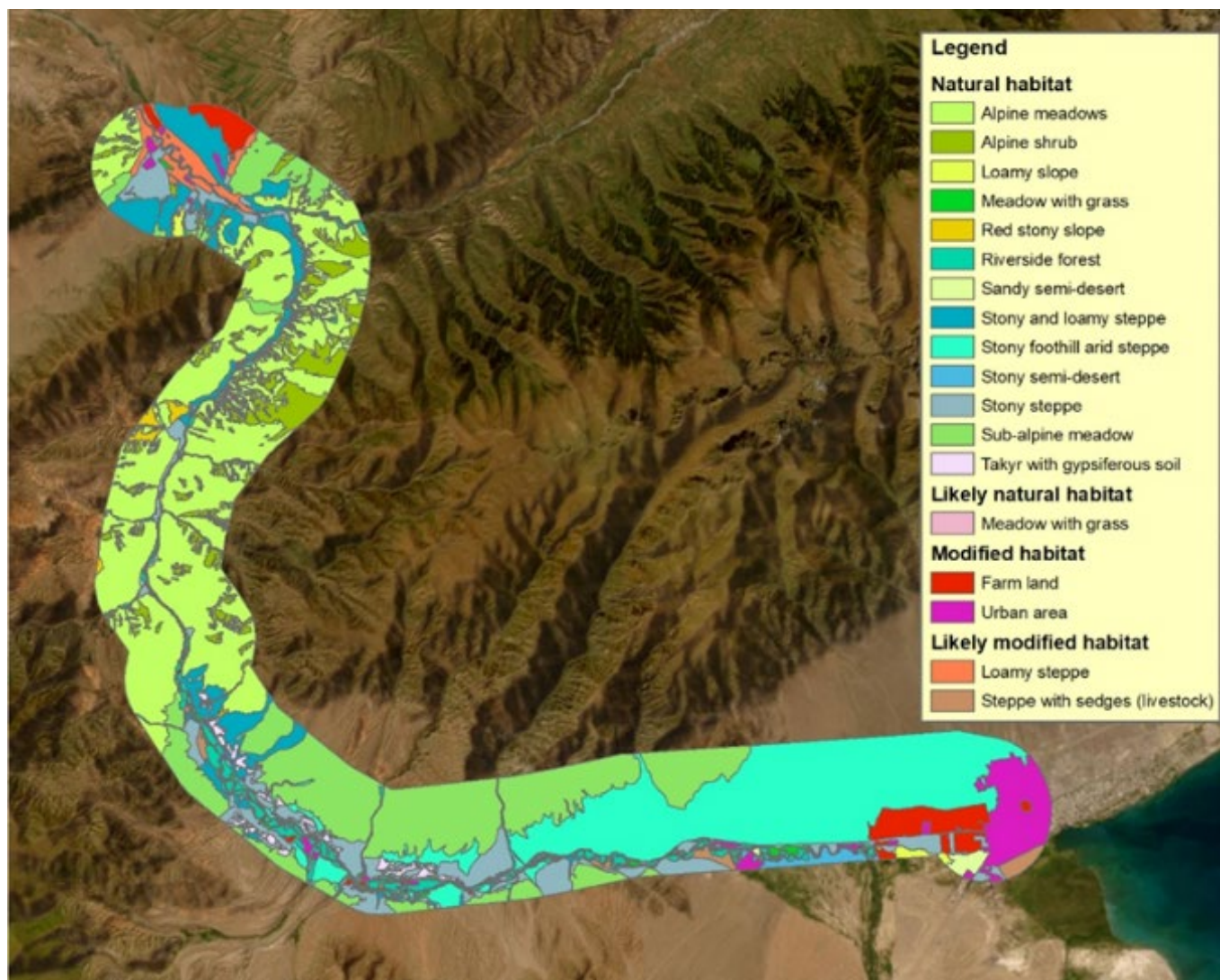
No	Habitat Type	Classification	Area (ha)
1	Alpine Meadows	Natural	7264
2	Alpine shrub	Natural	1632
3	Sub-alpine meadow	Natural	5104
4	Riverside forest	Natural	1061
5	Sandy semi-desert	Natural	96
6	Loamy steppe	Natural	386
7	Red stony slope	Natural	125
8	Stony foothill, arid steppe	Natural	5148
9	Stony semi-desert	Natural	138
10	Stony steppe	Natural	2082
11	Stony and loamy steppe	Natural	1611
12	Takyr with gypsiferous soil	Natural	269
13	Meadow with grass	Likely Natural	87
14	Loamy slope	Likely Modified	89
15	Steppe with sedges (Livestock)	Likely Modified	190

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GBIF.org (28 November 2024) GBIF Occurrence Download <https://doi.org/10.15468/dl.yfrsvn>

No	Habitat Type	Classification	Area (ha)
16	Farmland	Modified	768
17	Urban areas	Modified	985

Figure 90: Habitat map in 2 km buffer (Option 1)

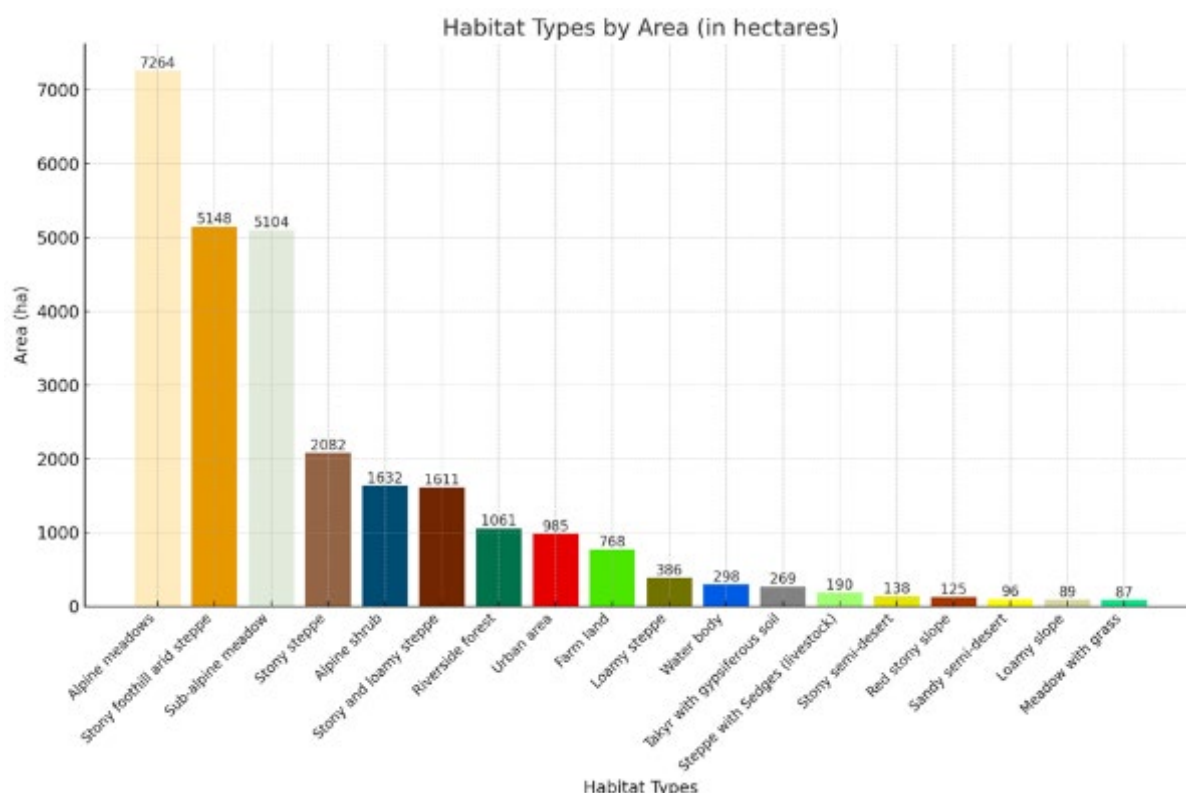


The most prevalent habitat is likely Alpine meadows, covering 26.6% of the total area, primarily concentrated in high-altitude regions. This is followed by Stony foothill arid steppe (18.8%) and Sub-alpine meadow (18.7%), both found in mid-elevation zones. Other notable natural habitats include Stony steppe (7.6%), Alpine shrub (6%), and Stony and loamy steppe (5.9%), distributed across transitional zones. Riverside forest, comprising 3.9% of the area, is mainly located along watercourses.

Smaller habitat classes include Modified habitats, such as Urban areas (3.6%) and Farmland (2.8%), as well as specialized natural habitats like Loamy steppe (1.4%), Water bodies (1.1%), and Takyr with gypsiferous soil (1%). Rare habitats, including Sandy semi-desert, Steppe with Sedges (Livestock), and Stony semi-desert, account for less than 2% of the total area. The least represented types are Red stony slope (0.5%), Loamy slope (0.3%), and Meadow with grass (0.3%), all confined to specific locations within the Study area.

This classification underscores the ecological complexity and variability of the study region for further assessment of impact in the ESIA.

Figure 91: Habitat types of scoping study area.



Alpine meadows (Figure 92). The Alpine meadows habitat is widely distributed along the OHTL corridor within the buffer zone, particularly in higher elevation areas and is typical of route option 1 and route option 2. These meadows are characterized by dense herbaceous vegetation, which thrives in cooler temperatures and well-drained soils. The proximity to mountain slopes creates a favourable microclimate for high-altitude flora, including *Caragana kirghisorum* and *Ephedra species*.

Figure 92: View of Alpine meadows.



Alpine shrub (Figure 93). The Alpine shrub habitat is predominantly distributed in the northern sections of the OHTL corridor within the buffer zone. These habitats are typically found in mid to high-elevation zones and are characterized by dense shrub cover that thrives under cool, moist conditions. The proximity to mountain slopes and ridges creates a favourable environment for species such as dwarf shrubs and other hardy vegetation adapted to alpine climates. The distribution of alpine shrubs along the OHTL highlights the interaction between the natural landscape and infrastructure development, emphasizing the need for careful management to minimize ecological impacts.

Figure 93: View of Alpine shrub.



Loamy slope (Figure 94). The Loamy slope habitat type is sparsely distributed within the study area and primarily located at specific sections along the OHTL corridor. This habitat is associated with moderate slopes featuring loamy soils, characterized by their well-balanced texture, fertility, and moderate water-holding capacity.

Figure 94: View of Loamy slope.



Loamy steppe (Figure 95). The Loamy steppe habitat is concentrated in specific sections within the northern part of the buffer zone near the OHTL corridor. This habitat is characterized by its fertile loamy soils, which provide a balanced structure suitable for vegetation growth. Loamy steppes typically support a mix of grasses and herbaceous plants, making them an important ecosystem for biodiversity and grazing activities.

Figure 95: View of Loamy steppe



Meadow with grass (Figure 96). The Meadow with grass habitat occurs sparsely in small patches along the OHTL corridor within the buffer zone. These meadows are characterized by their open grassy cover, dominated by herbaceous vegetation, which thrives in areas with moderate moisture availability and well-drained soils.

Figure 96: View of Meadow with grass.



Red stony slope (Figure 97). The Red stony slope habitat is confined to small, scattered areas within the buffer zone. These habitats are characterized by exposed rocky terrain with reddish tones, often associated with arid and unstable slopes. The absence of vegetation is a result of poor soil development, low moisture retention, and challenging climatic conditions. This habitat primarily occurs in elevated, mountainous areas where erosion and rock fragmentation dominate the landscape.

Figure 97: View of Red stony slope.



Riverside forest (Figure 98). Riverside forests are primarily distributed along streams and rivers within the study area. These habitats typically feature species from the genera willow (*Salix*), poplar (*Populus*), birch (*Betula*), and tamarix (*Tamarix*). In some areas, they are also interspersed with sea buckthorn (*Hippophae rhamnoides* L.), which thrives in riparian conditions.

Figure 98: View of Riverside forests.



Sandy semi-desert (Figure 99). The Sandy Semi-Desert habitat is sparsely distributed within the study area and is primarily located in isolated patches in the southern part of the OHTL corridor. These habitats are characterized by sandy soils with low water-holding capacity, creating an arid environment with sparse vegetation cover. Flora in these areas is typically composed of drought-tolerant species adapted to sandy and nutrient-poor conditions such as *Krascheninnkoviana ceratoides*, *Salsola australis*, *Stipa glareosa* and *Nitraria sibirica*.

Figure 99: View of Sandy Semi-Desert .



Steppe with Sedges (livestock) (Figure 100). The Steppe with Sedges (Livestock) habitat is represented by small, scattered patches throughout the buffer zone. This habitat is characterized by its dominance of sedge species (*Carex* spp.) and grass cover, which make it an ideal grazing area for livestock. These steppes are typically found in flat or gently rolling terrains with well-drained soils, and their vegetation thrives under semi-arid climatic conditions.

Figure 100: View of Steppe with Sedges (Livestock).



Stony and loamy steppe (Figure 101). The Stony and Loamy Steppe habitat is widely distributed in patches throughout the study area, particularly along slopes and rugged terrains. This habitat is characterized by its stony and loamy soils, which provide moderate fertility and support vegetation adapted to semi-arid conditions.

Figure 101: View of Stony and Loamy Steppe.



Stony foothill arid steppe (Figure 102). The Stony Foothill Arid Steppe habitat is predominantly distributed in the southern portion of the buffer zone. This habitat is characterized by arid conditions, stony soils, and sparse vegetation, primarily composed of drought-tolerant grasses, shrubs, and herbs adapted to semi-arid environments.

Figure 102: View of Stony Foothill Arid Steppe.



Stony semi-desert (Figure 103). The Stony Semi-Desert habitat is characterized by rocky terrain with sparse vegetation cover, primarily composed of drought-resistant species adapted to harsh semi-arid conditions. These habitats are found in regions with minimal soil development and are dominated by stones and gravels, limiting the establishment of dense vegetation.

Figure 103: View of Stony Semi-Desert.



Stony steppe (Figure 104). The Stony Steppe habitat is characterized by rocky terrain with sparse vegetation cover, primarily composed of xerophytic species adapted to semi-arid conditions. These habitats are typical of areas with shallow soils overlying bedrock or gravel, creating challenging conditions for plant establishment.

Figure 104: View of Stony Steppe.



Sub-alpine meadow (Figure 105). The Sub-Alpine Meadow habitat is characterized by dense herbaceous vegetation, dominated by grasses, sedges, and flowering plants, which thrive in the cool and moist conditions of the sub-alpine zone. These meadows are found in transitional zones between alpine and forested habitats, often along gentle slopes or valley bottoms.

Figure 105: View of Sub-Alpine Meadow.



Takyr with gypsiferous soil (Figure 106). The Takyr with Gypsiferous Soil habitat consists of flat or slightly undulating terrain with compacted, gypsum-rich soils. These soils are highly saline, poorly drained, and often exhibit crusting on the surface, making them unsuitable for vegetation growth. The absence of vegetation in these areas reflects the harsh environmental conditions and limited availability of nutrients or moisture.

Figure 106: View of Takyr with Gypsiferous Soil.



4.7.4 Avifauna

The bird species diversity of the areas adjacent to the proposed OHTL route varies in relation to habitat types and seasons. The clay and stony desert habitat adjacent to the western section of the route is characterized by such desert species as Pallas's and Black-bellied Sandgrouse, Chukar and several species of larks, while clay and stony cliffs here provide nesting sites for Black Stork, Wallcreeper, Long-legged Buzzard and, potentially, Saker (IUCN EN). The narrow mountain gorge along the central section of route option 1 provides breeding and feeding sites for many species of scavengers and birds of prey, including Himalayan, Cinereous and Bearded Vulture, Golden Eagle, and Common Kestrel. The riverine forests along the Chu River (route option 1 and 2) support many species of passerines, including several species of warblers, tits, redstarts, and thrushes. Furthermore, the shallow waters of the western bay of Lake Issyk-Kul, (route option 1 and 2) as well as adjacent reedbeds and floodplain, provide important habitat to numerous species of waders, gulls, terns, and ducks, among others. This habitat is also used by thousands of migratory and wintering birds, including waders, ducks, geese, and swans. Peregrine Falcons use the area during winter to prey on waterbirds.

According to the IBAT report, 14 species of globally threatened birds (IUCN CR, VU, EN), which can potentially occur within a 50 km buffer around the route options. These are listed in Table 19. Results of the Priority Biodiversity Features and preliminary Critical Habitat Assessment are provided in Annex E.

Table 19: Potential globally threatened bird species within 50 km buffer around the 500 kV OHTL Kemin-Balykchy (source: IBAT report)

Scientific_name	common name	IUCN category	Kyrgyz Republic RDB
Vanellus gregarius	Sociable Lapwing	CR	CR
Oxyura leucocephala	White-headed Duck	EN	EN
Otis tarda	Great Bustard	EN	CR
Haliaeetus leucoryphus	Pallas's Fish-eagle	EN	VU
Neophron percnopterus	Egyptian Vulture	EN	VU
Aquila nipalensis	Steppe Eagle	EN	NT
Falco cherrug	Saker Falcon	EN	EN
Aythya ferina	Common Pochard	VU	N/A
Columba eversmanni	Yellow-eyed Pigeon	VU	VU
Streptopelia turtur	European Turtle-dove	VU	N/A
Clanga clanga	Greater Spotted Eagle	VU	VU
Aquila heliaca	Eastern Imperial Eagle	VU	NT
Podiceps auritus	Horned Grebe	VU	N/A
Chlamydotis macqueenii	Asian Houbara	VU	CR

Of the 14 species of birds listed in Table 19, most of the species are unlikely vagrants to the area. Of these, there are higher chances of encountering here White-headed Duck, Saker Falcon, Common Pochard, and Steppe Eagle, however, observations of these species are rare across the country, so the chance of encountering these species during short-term surveys is small.

During the spring and summer of 2024, bird surveys along route option 1 and the eastern section of Route option 1 and 2 were performed, including VP survey, Raptor Nesting Survey and Breeding Bird Survey. Further details on these surveys and key results are given below.

it is worth noting that, from the experience of the experts conducting the research, the abundance of recorded species was likely affected by unusually wet weather conditions, while waterbird numbers along the shore of the Lake Issyk-Kul were likely affected by recent fire, which burnt much of the reedbeds and dry vegetation of the surrounding meadows.

VP Surveys

Vantage Point (VP) bird surveys were conducted along route option 1 during March, April, and May 2024, aiming to monitor sensitive bird species within the survey area, gathering valuable data on their presence, behaviour, and abundance. Throughout the spring survey period, which extended from March 27 to May 10, 2024, eight 2.5-hour VP surveys were conducted at eight VPs in representative habitats (Figure 107). The points were located to cover the OHTL route (option 1) as completely as possible (Table 20). On an average day, one to four VP surveys were completed, resulting in a total of 20 survey hours per VP location, or 160 total hours of VP survey throughout the season.

Figure 107: Location of vantage points surveyed in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchy

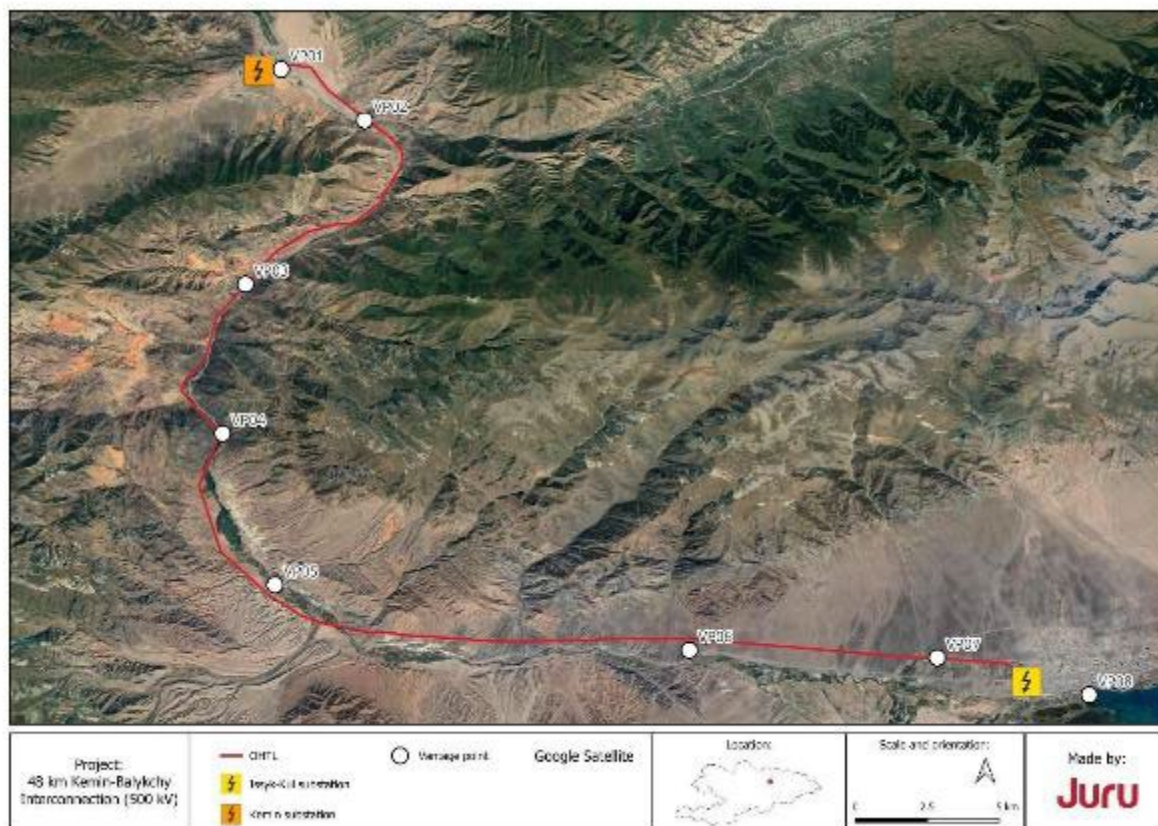


Table 20: Coordinates and description of vantage points surveyed in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchi.

Survey Points	Coordinates (dd)		Site description
	N	E	
VP01	42.713709°	75.843865°	Fallow land near the Chu River, less than 2 km away - agricultural fields
VP02	42.692218°	75.879070°	The beginning of the canyon with trees and shrubs along the banks of the Chu River
VP03	42.623138°	75.828866°	Scree slope with eastern exposure, devoid of vegetation
VP04	42.560278°	75.819167°	Mountain gorge and Chu River with signs of excavations
VP05	42.496796°	75.843678°	Left bank of the Chu River with sandy alluvial soils and shrub vegetation
VP06	42.469005°	76.015956°	Alluvial cone on the southern exposure of the ridge
VP07	42.465120°	76.126961°	The slope of the southern exposure of the ridge with fallow lands and young bushes

Survey Points	Coordinates (dd)		Site description
	N	E	
VP08	42.450126°	76.184493°	Gently sandy shore of Lake Issyk-Kul with grassy vegetation

As a result, 93 bird species were observed on Vantage Points, with no observations of globally-threatened species (IUCN CR, EN, VU); the six species listed in the Red Data Book of Kyrgyz Republic are presented in Table 21.

It is expected that this information is representative of the western section of Route option 2, but supplementary spring VP surveys (March/April 2025) along the northwestern section of Route option 2 are proposed during the ESIA phase to confirm species composition along this section as bird species and their behaviour along this section may differ from the previously surveyed route corridor, due to the difference in elevation and topography. Additional autumn VP surveys are not considered necessary for route option 2, as the area along the north-western section of route option 2 is not located along the main pass through the range and, based on desktop information, is not considered a migration bottleneck for raptors or waterfowl and therefore Autumn 2024 data only will be considered in the ESIA. A complete outline of the proposed methodology for the biodiversity survey work is provided in Annex C.

Table 21: Species observed within the project site during VP surveys in spring 2024 along the proposed 500 kV OHTL Kemin-Balykchy

Latin name	Common name	IUCN status	Kyrgyz RDB Status	Total number of individuals
<i>Pterocles orientalis</i>	Black-bellied sandgrouse	LC	NT	22
<i>Ciconia nigra</i>	Black stork	LC, MD	NT	3
<i>Gypaetus barbatus</i>	Bearded vulture	NT	NT	15
<i>Aegypius monachus</i>	Cinereous vulture	NT	NT	14
<i>Gyps himalayensis</i>	Himalayan vulture	NT	LC	51
<i>Aquila chrysaetos</i>	Golden eagle	LC	NT	11

Figure 108: Some of the species were observed during VP surveys along the proposed OHTL route between Kemin and Balykchi in spring 2024. a) golden eagle; b) black stork; c) bearded vulture; d) Himalayan vulture



a)



b)



c)



d)

Raptor nesting

Between May and late August 2024, 16 days of raptor/vulture survey were conducted by local experts, generally following the survey routes, as shown in Figure 109. The study of raptor nesting for route option 1 was conducted within a 5 km buffer zone along the proposed OHTL route, covering a total surveyed area of approximately 633 km². Most of the surveyed area consists of the foothills of the Kungey Alatau range, characterized by mountain semi-deserts. Along the banks of the Chu River, which the proposed OHTL follows, tugai riverine forest and typical floodplain communities are prevalent.

Nest searches were conducted during the day, both by observing the birds and their behaviour, and by directly looking for nests. The experts took care not to approach the nests to avoid

disturbing the birds. The survey effort was ground-based and limited to accessible areas. Furthermore, the nest search was focused on likely nesting substrates and habitats for raptors and vultures, such as cliffs (rock niches), escarpments, caves, trees, OHTL poles, abandoned buildings, and other human-made structures. To ensure more objective data, bird observations were carried out at different times of the day and under various weather conditions.

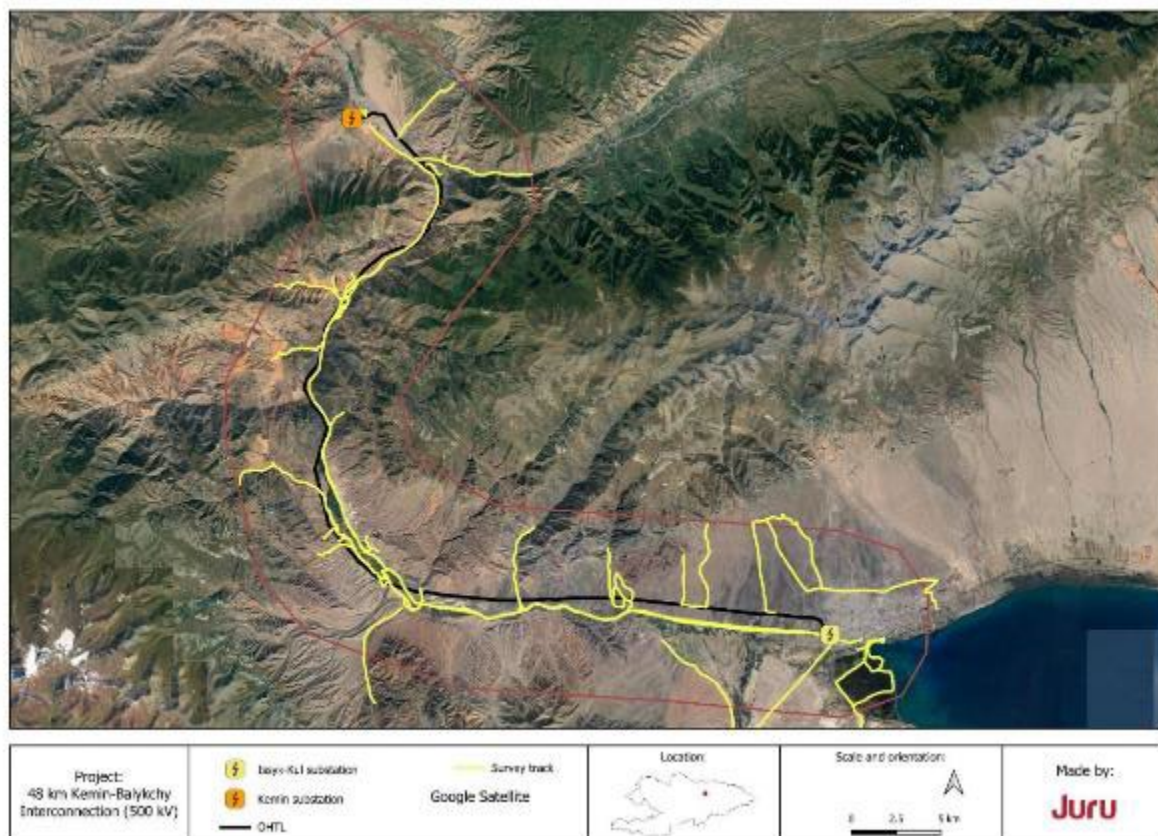
As a result of the study, six nests of the following species were found: *Gyps himalayensis* (1), *Buteo rufinus* (1), *Falco tinnunculus* (1), *Accipiter nisus* (3). Additionally, two nests occupied in previous years by *Ciconia nigra* and *Buteo buteo* (found in the area in previous years) were found inactive during the survey.

All nests, except for one of the nests of *Accipiter nisus*, were located within 660 meters of Route Option 1.

Additionally, species potentially nesting within the project territory were observed during this survey and the Spring VP survey. These include observations of *Gyps himalayensis* (IUCN: NT), *Gypaetus barbatus* (IUCN: NT, Kyrgyz RDB: NT), *Aegypius monachus* (IUCN: NT, Kyrgyz RDB: NT), *Aquila chrysaetos* (Kyrgyz RDB: NT), and *Ciconia nigra* (Kyrgyz RDB: NT). These species may potentially nest in the area but are challenging to locate due to their large home ranges, rugged, inaccessible terrain, and, in the case of *Gyps himalayensis*, early-season nesting. Although much of the observed area lacks suitable nesting sites for these species, there is no doubt that the landscape is attractive to many raptor and vulture species.

This information is expected to represent the western section of Route option 2, but further verification surveys in Spring 2025 are planned to confirm this. Refer to Annex C.

Figure 109: Tracks used during raptor nesting surveys along the proposed OHTL route between Kemin and Balykchy in spring 2024

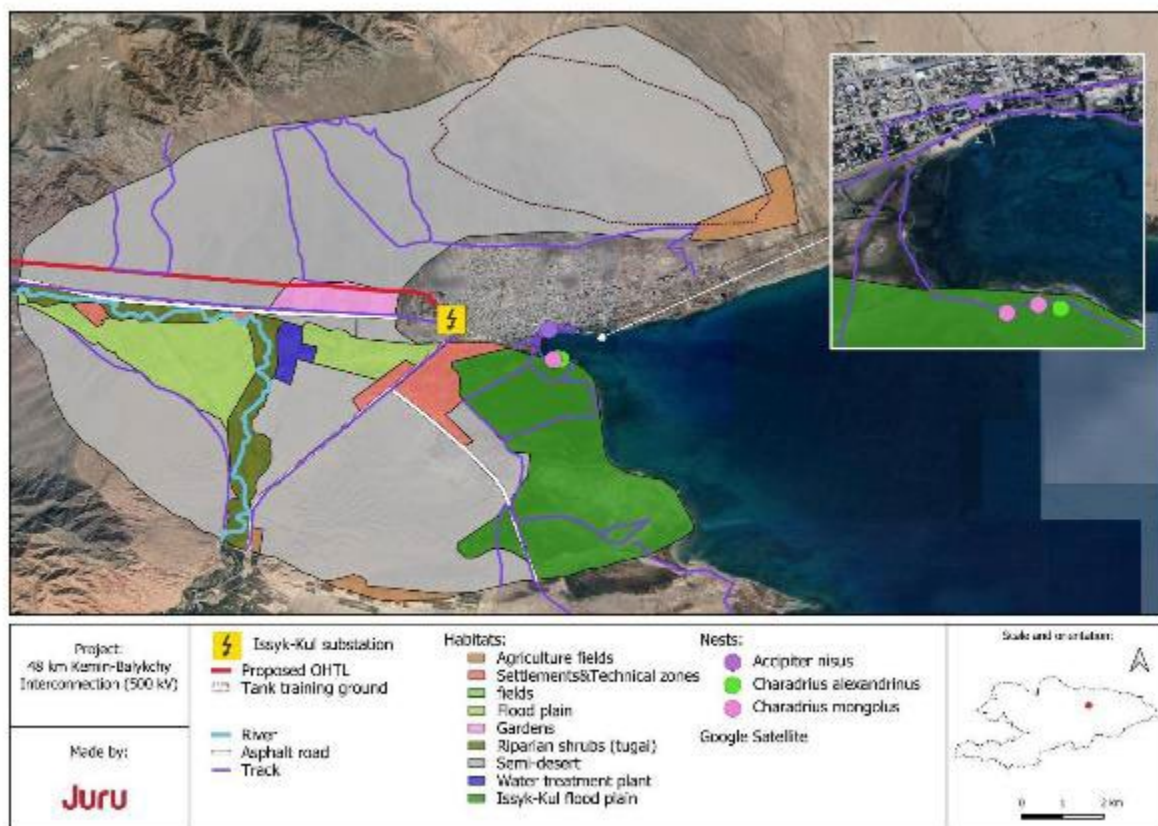


Breeding bird surveys

Surveys of breeding birds along walked transects in the area adjacent to the western shore of Lake Issyk-Kul were conducted in spring 2024, during 6 days between 26 April 2024 and 22 May 2024 (Figure 110). This area is potentially suitable for the breeding of desert and waterbird species, including Pallas's sandgrouse (*Syrhaptes paradoxus*), Asian short-toed lark (*Calandrella cheleensis*), and several species of waders.

As the result of the survey, four nests of three bird species were found: one nest of Kentish Plover *Charadrius alexandrinus*, one nest of Eurasian Sparrowhawk *Accipiter nisus* and two nests of Siberian Sandplover *Charadrius mongolus* (IUCN: EN). The plover nests were found close to the shore of the Lake Issyk-Kul, in close proximity to the Balykchy town, located 100-120 meters apart from each other. The nest of the sparrowhawk was found in a tree near a road in a populated area. During this survey, courtship activity of seven bird species was recorded in the area. Overall, 42 bird species were observed during the survey. In previous years, experts found nests of twenty species in the study area, including *Accipiter nisus*, *Falco subbuteo*, and *Aythya nyroca* (RDB: NT; IUCN: NT). A full list of potential CH, PBF's are provided in Annex E: Preliminary Priority Biodiversity Features and Critical Habitat assessment .

Figure 110: Territory covered by breeding bird surveys along the proposed OHTL route between Kemin and Balykchy in spring 2024



4.7.5 Reptiles and amphibians

Due to its physical and climatic conditions, the Kyrgyz Republic has limited herpetofauna diversity. The region is dominated by high mountains with harsh climate conditions, unfavourable for thermophilic amphibians and reptiles. The Reptile Database⁷⁶ documents 12,263 reptile species globally, with over 250 species in Central Asia and 37 in the Kyrgyz Republic. Only four species of amphibians have been documented in the Kyrgyz Republic. Despite this limited diversity, the Kyrgyz Republic harbours endemic and relict species threatened with extinction. Species which may be found along the OHTL routes, are listed in Table 22. A preliminary list of reptile and amphibian species that may potentially inhabit the .

During a field survey conducted from 20 to 23 September 2024, the status of reptiles along Route Option 1 and the eastern section of Route Option 2 was assessed. The survey aimed to document the species composition and density, territorial distribution, areas of potential concentration, and the overall likelihood of reptile habitats within the study area. It should be noted that the findings were derived from a combination of field surveys and desktop analysis.

⁷⁶ <http://www.reptile-database.org>

Table 22: A preliminary list of reptile and amphibian species that may potentially inhabit the OHTL route ROW's (to be confirmed during the ESIA stage)

No	Class	Family	Species	Common name	IUCN Red List	Kyrgyz Republic Red data book
1	Amphibia	Bufonidae	Bufotes viridis	European green toad	LC	VU
2		Ranidae	Rana asiatica	Asiatic Brown Frog	VU	VU
3	Reptilia	Anguidae	Pseudopus apodus	European Glass Lizard	LC	NT
4		Gekkonidae	Mediodactylus russowii	Transcaspian Bent-Toed Gecko	LC	Not listed
5		Lacertidae	Eremias arguta darevskii	Racerunner Darevskii	LC	Not listed
6		Lacertidae	Eremias velox borkini	Rapid racerunner	LC	Not listed
7		Lacertidae	Eremias stummeri	Tien-Shan Racerunner	LC	Not listed
8		Scincidae	Ablepharus desertii	Desert Lidless Skink	LC	Not listed
9		Colubridea	Elaphe dione	Steppes Ratsnakes	LC	Not listed
10			Hemorrhois ravergeri	Spotted Whip Snake	LC	Not listed
11			Psammophis lineolatus	Steppe ribbon racer	LC	Not listed
12			Natrix tessellata	Dice Snake	LC	Not listed
13		Vepiridae	Vipera renardi	Steppe Viper	NT	VU
14		Crotalidae	Gloydus caraganus	Karaganda pitviper	LC	Not listed

Four reptile species were recorded during the autumn herpetological survey, totalling 36 specimens. None of the four species are currently listed as protected under the IUCN Red List or the Kyrgyz Republic Red Data Book. The relatively low number of records can be explained by the end of the activity season with variable weather conditions and low night temperatures.

The most abundant species, *Eremias stummeri*, was documented across multiple habitats including gravel plains, loess cliffs, and Chu River floodplains. *Eremias arguta darevskii* likely maintains similar population densities and habitat preferences to *E. stummeri*. However, being more thermophilic,

E. arguta darevskii enters hibernation earlier, resulting in fewer observed specimens during the survey. Additionally, two snake species were recorded: *Gloydius caraganus* and *Hemorrhois ravergieri*.

Supplementary spring herpetological surveys are planned to account for the potential difference in species composition along the north-western half of Route option 2. Additionally, as the weather conditions during the 2024 autumn survey were relatively cold, some of the species were likely already less active, therefore a supplementary spring survey will enable other potential species to be identified.

4.7.6 Mammals

After conducting the scoping site visit, extensive literature research, analysis of open-source databases and consultations with local experts, the potential presence of around 70 mammal species is expected within the areas around the proposed route options. These include the Snow Leopard and Marbled Polecat, listed by IUCN as Vulnerable and 8 species listed in the Red Data Book of Kyrgyz Republic (Table 23).

According to the IBAT⁷⁷ report for the area, the potential presence of three globally threatened mammals is expected within 50 km buffer around the suggested OHTL route, namely Snow Leopard (IUCN VU, KG RDB CR), Marbled Polecat (IUCN VU, KG RDB CR) and Goitered Gazelle (IUCN VU, KG RDB CR). Of these, Goitered Gazelle can be excluded, as this species has been extinct in the Kyrgyz Republic since the 1970s, and only recently, a species re-introduction initiative has started, with the first few individuals currently kept in enclosures at a site along the southern shore of the Lake Issyk-Kul (Ilbirs Foundation, unpublished data).

Although there is a potentially suitable habitat for the Marbled Polecat around the Project ROW, the latest observations (last decades) of the species in the country are anecdotally limited to the western part of the Chu Valley and foothills of the Chatkal Mountain Range in the west of the country (Red Data Book of Kyrgyz Republic 2006).

The Snow Leopard is likely to be found at higher elevations within the mountain ranges on both route options; although the chances of the species crossing the proposed routes are small, there is anecdotal evidence that a snow leopard was seen crossing the EM11 road at night (Snow Leopard Foundation, unpublished data) and a Snow Leopard has been recorded on camera traps on both sides of the Boom Gorge, with the nearest confirmed record 25 km to the west of the OHTL route (Snow Leopard Foundation, unpublished data). Therefore, it is likely that some individuals cross the gorge, especially at night time in winter when road traffic is low and the water level in the Chu River is low. Camera traps will be placed along route option 1 and route option 2

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to try to confirm desktop review and unpublished data sets for the snow leopard and other mammal species, please refer to Annex C for detail.

Table 23: Species of mammals

Latin name	Common name	IUCN status	Kyrgyz Republic RDB Status
<i>Panthera uncia</i>	Snow Leopard	VU	CR
<i>Vormela peregusna</i>	Marbled Polecat	VU	CR
<i>Neomys fodiens</i>	Eurasian Water Shrew	LC	NT
<i>Tadarida teniotis</i>	European Free-tailed bat	LC	LC
<i>Martes foina</i>	Beech Marten	LC	LC
<i>Lynx lynx</i>	Eurasian Lynx	LC	NT
<i>Hystrix indica</i>	Indian Crested Porcupine	LC	LC
<i>Allactaga elater</i>	Small Five-toed Jerboa	LC	LC
<i>Allactaga sibirica</i>	Siberian Jerboa	LC	LC
<i>Allactaga severtzovi</i>	Severtzov's Jerboa	LC	LC

5 Identification of potential E&S impacts

Table 24 provides the outcomes of the scoping review for potential E&S risks and impacts for the Project's construction, operation, and decommissioning phases. Table 24 indicates the potential impact source relevant to nearby receptors (as determined during the scoping baseline review). It provides a scoping evaluation to identify those E&S issues that may give rise to significant impacts and require further assessment in the ESIA. Risks and impacts have been scoped in or out based on the current understanding of the Project, the baseline environment and other regional projects.

Where aspects are scoped in for further assessment, an outline of the requirements for further baseline studies and impact assessment are detailed. No further assessment is considered necessary in the ESIA for those issues scoped out. If new information becomes apparent during the ESIA process, issues scoped out may be scoped back in.

Table 24: ESIA Scoping outcomes and requirements

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
Air quality (C/D)	<p>There are moderate-high levels of traffic along the EM11 highway and even lower levels of traffic on gravel roads that run adjacent to sections of the line. In the scoping AOI there are only a few industrial and manufacturing facilities in the area of the line routes or substation locations.</p> <p>Current air quality (AQ) is expected to be of good quality.</p> <p>The largest source of AQ emissions from the construction of the OHTL will be fugitive dust generated by vehicle movements associated with the work and fugitive emission (NO_x, SO_x) from construction traffic, in particular on unpaved public and private roads and mobile diesel generators located at tower work, There is potential to impact the health of herders and workers and any sensitive ecological receptors in particular on unpaved roads.</p> <p>For sections of the OHTL that route along gravel roads, the biggest source of impact on air quality is increased volume of traffic generating increased dust levels (and associated fugitive emissions from</p>	✓	<p>The ESIA will include a high-level qualitative assessment of construction phase AQ impacts within 250m of the proposed OHTL route and substations to define GIP for managing construction dust and fugitive emissions in the ESMP.</p> <p>To support any future monitoring requirements, spot check monitoring at 6 locations at either end of the OHTL and up to four locations along the OHTL route (near to residential or industrial receptors) for the following parameters: Nitrogen dioxide (NO₂); Sulphur dioxide (SO₂); Carbon monoxide (CO), TSP (total suspended particles); PM2.5 and PM10 will be performed. These locations are shown in the ESIA TOR, section 7.3,</p> <p>Figure 114. Monitoring along Route option 1 has been completed in October 2024, and monitoring along the north section of route option 2 is planned for March 2025</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
	vehicles and mobile diesel generators at tower work fronts e.g. during stringing).			
Air quality, dust (O)	There will be no dust or fugitive gas emissions associated with the operation of the OHTL. Very minor fugitive emissions may be associated with vehicle movements during periodic maintenance works, however these are not considered significant enough to warrant further assessment in this ESIA and will be addressed in the operational ESMS required to be developed to support the Project.		✗	No further assessment proposed. Good practice GIP will be outlined in the operational ESMP for undertaking maintenance works.
Noise and Vibration (C/D)	Noise impact will arise from the use of plant, machinery and construction-related traffic at the substations and along the OHTL route. Noise-related impacts will generally dissipate more than 200 m from the source of the noise. The majority of the first section of the OHTL route does not have any noise-sensitive receptors located within 200m of the proposed route, however as the route moves closer to Balykchy the proximity of receptors is more relevant. Although impacts are expected to be short term (for the duration of the construction works at any particular Workfront) these impacts may be significant and require further assessment and management. There is also potential for noise impacts to workers at the existing substation a,	✓		<p>The ESIA will consider potential noise generating sources and impacts and perform a qualitative assessment of potential impacts to define GIP for construction noise management in the framework ESMP.</p> <p>To support future monitoring or investigation of grievances and potential cumulative noise impacts, the existing noise baseline at nearest sensitive receptors locations will be monitored day and night-time at six locations representing the nearest sensitive receptors: (Cholok and Kok-Moynok-2 villages, Balykchy city, new SS and two along northeastern section of route option 2). Monitoring along Route option 1 has been completed in October</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
	workers connected with the water pipeline and residents of the villages at either end a of the route. It is unlikely there will be any requirement for blasting; however, this is also a potential intermittent noise source. The management of short-term noise for community and worker safety may be required; therefore, the source of noise, impact assessment and mitigation measures should be defined.			2024, and monitoring along the north section of route option 2 is planned for March 2025.
Noise and Vibration (O)	Operational noise impacts are negligible and related to intermitted maintenance activity during normal operation (one or 2 times per year). Given the sparsely populated nature of the OHTL route, the short term and intermittent nature of these activities are not expected to be significant. Abnormal or emergency noise events will be short term and temporary. Noise impact during operation is not considered to be significant enough to warrant further assessment in this ESIA and any management requirements will be identified as part of the implementation of the operational ESMS required to be developed to support the Project.		✗	No further assessment proposed. Good practice GIP will be outlined in the operational ESMP.
Landscape and visual impact (C/D)	Construction activity may constitute a visible activity (presence of construction traffic, compound, plant and equipment), that may modify		✗	No further assessment proposed.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>the landscapes in which they are set, including the Monitoring along Route option 1 has been completed in October 2024, and monitoring along the north section of route option 2 is planned for March 2025. potential for localised light pollution. These will be temporary, short term (up to 2 to 4 weeks at each tower Workfront) and transient activities that will be reversible. OHTL are built sequentially, and therefore from any viewpoint, the opportunity to observe activities in connection with the OHTL construction may only be evident for a few weeks. Even construction site support buildings are unlikely to be present for more than a few weeks at any one location and it is expected these will be located in already developed areas (i.e existing Kemin SS or an already developed area for the Balychuk SS. Potential landscape and visual impacts from these sources are therefore regarded as negligible. This combined with the general absence of receptors in the project zone of visual influence indicates a negligible impact.</p>		
Landscape and visual impact (O)	<p>Permanent features include transmission towers and conductors. There are some receptors along the proposed route, and the receptors present may be considered sensitive to visual impacts from infrastructure of this kind (e.g. tourism natural attractions of Kok-Moinok and Konorchek</p>	✓	<p>No further assessment proposed of landscape character during operational phase is proposed.</p> <p>A Qualitative assessment of specific views and general visual amenity experienced by tourism locations and receptors along the route will be assessed. Key views and sensitive receptors that may</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>Canyons. There are also multiple other OHTL along the same alignment presenting an existing modified landscape into which the new OHTL will be placed which may result in cumulative visual impact. The OHTL will not create a permanent light emitting source.</p> <p>The landscape character of the mountain areas and developed areas up to Balykchy were considered during the scoping assessment and determined that there are no features of national or local value resulting in a finding of low landscape value.</p>		<p>be affected will be identified in the form of a photographic record of baseline views. Resultant impacts will be assigned a significance value and opportunities for mitigating long-term visual impacts explored. Specific focus will be placed on areas with some tourist potential.</p>
Geomorphology and geology (including flood risk) (C/D)	There is the potential to impact groundwater as a result of the subsurface works at the tower work fronts and substation locations.	✓	The ESIA will qualitatively assess the potential to impact groundwater at the substations and based on the hydrological study and geotechnical study to be performed by the feasibility consultant. The ESIA will outline mitigation measures (GIP and project-specific) in the ESMP.
Geomorphology and geology (including flood risk) (O)	During operation, impacts on existing hydrogeology will be negligible with the only ongoing works related to periodic maintenance works.	✓	<p>No further assessment of geotechnical risks will be performed. GIP for managing spills and other potentially contaminating activities will be outlined in the ESMP for future implementation under the operational ESMS.</p> <p>The ESIA will qualitatively assess the potential flood risk at the substation locations based on the</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
				hydrological study and geotechnical study to be performed by the feasibility consultant. This will also feed into the climate resilience assessment described below.
Waste (C/D)	Construction-related waste will be a mixture of inert material (soils), general/domestic construction waste and hazardous wastes (e.g. oils, paints, greases etc.) and some biomass resulting from the clearance of the ROW, excavation and site levelling, civil works, equipment installation (packaging, metals, paints, coatings), electrical cut-offs and domestic waste.	✓		The ESIA will identify waste generated during the Project construction phase and assess the availability of waste disposal and management infrastructure in the region that is aligned with GIP. The ESIA will define the requirements for a site waste management plan aligned with GIP in the framework ESMP.
Waste (O)	Operational phase waste is likely to be confined to maintenance works. It is anticipated that any wastes are removed from the site area by the engineers for offsite disposal, storage or decommissioning (in the case of old/obsolete equipment).		✗	The ESIA will define requirements for operational waste management (general waste, hazardous waste and decommissioning equipment) in the Operational ESMP.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
Climate change (all phases) - greenhouse gas (GHG) emissions	<p>The Project is not expected to generate significant GHG's from construction works such that it can be considered a significant contributor.</p> <p>There will be no significant change in land use that may contribute to increase in GHG emissions. .</p> <p>Indirect impacts on GHG levels during operation may arise, but these are expected to be intermittent and negligible. These include routine maintenance of the transmission lines and substations and some electricity losses during transmission. The need and subsequent safe storage and use of SF6 gas (a GHG contributor) will be determined in the ESIA.</p>		✗	No further assessment proposed.
Climate resilience (all phases)	The Project's location in multiple areas including arid ones and mountain landscapes susceptible to extremes of temperature, high winds means that the long-term effects of climate change may have adverse consequences on the Project.	✓		The baseline assessment will include overview of climate related factors and future predictions to enable an assessment of vulnerability and resilience of the project to changes in physical climate change parameters. The ESIA will include a climate risk screening and define relevant design and other mitigations to be included in the final design specification, and ESMP. These will be integrated into the ESIA impact assessment chapter, no stand-alone climate change risk assessment is currently identified as required at this time. The ESIA will identify, appraise and demonstrate physical climate

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
			risks ⁷⁸ , vulnerabilities and opportunities for the primary elements of the proposed development and its long-term climate resilience based on review of flood risk reports and seismic evaluations conducted by the feasibility consultant in order to identify levels of climate risk and vulnerability and identify appropriate adaptation responses for integration within the project management plans , including the ESMP and SEP. This also facilitates integration of climate resilience considerations into decision making early on in project design, and prioritization of resilience needs and budget.
Soils and land quality (erosion potential)	Eroded soils dominate within the gorge and desert soils dominate the eastern part of the Study area. These soils have a humus content of about 0.5% and nitrogen contents between 0.04% and 0.05%. Lacking both humus and nutrition elements, these soils are usually free of vegetation and thus are exposed to increased degradation and deflation. Given the susceptibility to erosion and degradation of the minimal humus layers, there is potential for the Project to exacerbate this during clearance and construction works.	✓	The ESIA will consider the erosion susceptibility of the soils at the substation and along the OHTL ROW to assess the soil structure (topsoil) to identify mitigation or enhancement measures to manage soil degradation. With reference to the primary baseline soil surveys the assessment will include an overview of the soil composition and assess potential for historical soil contamination levels to ensure adequate disposal (if required) and adequate protection of workers. . T The ESIA will define requirements for soils and erosion management

⁷⁸ For all projects, in all locations, when combined Scope 1 (direct) and Scope 2 (indirect electricity) emissions are expected to be more than 100,000 tonnes of CO2 equivalent annually. For these projects the CCRA is to include consideration of climate-related 'Transition Risks' (as defined by the TCFD). This project will not trigger an exceedance of this threshold.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
			aligned with GIP in the framework ESMP. GIP for site clearance and reinstatement of land will also be outlined in the framework ESMP.
Water resource use (C/D)	Overall water consumption requirements during construction are low and water availability in the AOI area is assumed to be moderate. However, the arid climate and uneven access to water for both drinking and irrigation purposes by the local population pose risks to its use. There is potential for negative impacts related to the competition for available water if this source is used for construction purposes (either directly or via the existing irrigation system). The Chu River is also a transboundary river so any abstraction may trigger transboundary considerations.	✓	The ESIA will define primary water resources available, the quantity and quality of that water in the ESIA in the form of a water needs assessment. The ESIA will assess water availability and impacts including competition for water resources for the construction phase especially in relation to the Chu River which is a transboundary water course (if relevant). The ESIA will define requirements for a water minimisation aligned with GIP in the ESMP.
Water quality	There are natural and manmade drainage ponds along the length of the OHTL ROW a that may be considered ecological oasis as well as by the local community (fish breeding).	✓	The ESIA will assess the potential impact of the construction and operational activities on the water bodies and outline measures for mitigation and management in the ESMP.
Water resource use (O)	Operational water use requirements will be negligible.		✗ No further assessment is proposed.
Socio-economic phases)	(all The low population density in the Project AOI suggests that adverse socioeconomic impacts will be focused on construction nuisance (such as dust and transportation impacts – discussed in other rows). The construction process could also	✓	Social economic studies in the form of qualitative and quantitative data collection will be carried out based on primary sources (samples surveys, interviews, focus groups discussions (FGDs) and questionnaires) and available secondary

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>potentially impact road users on the EM11 highway, roadside shops, the owners and employees of the manufacturing businesses along the EM11 highway, herders, and community members in villages along the eastern route and the EM11 highway and near to the two substations.</p> <p>The main positive impact will be the provision of electricity and stabilization of the power grid, which will impact all of Kyrgyz Republic. There will also be a small amount of employment generated and small knock-on impacts of provision of services to workers.</p>		<p>information. This will identify a social baseline to be included in the ESIA and used for future monitoring. It will also identify social impacts, vulnerable groups that may be disproportionately impacted by the Project and directly impacted project affected people relevant to the livelihood restoration framework.</p>
Labour and working conditions (including supply chain) (C/D)	<p>There is not expected to be a large labour force as OHTLs are generally constructed by small teams working sequentially along the line. However, there is still potential for risks related to working conditions, worker contracts and labour accommodation during construction.</p> <p>Supply chain workers may be at greater risk relating to occupational health and safety (OHS) and labour risks, as they may be located in countries with less strict legislation, or outside of the direct oversight of the project.</p>	✓	<p>The ESIA will outline requirements for human resources (HR) policies and labour monitoring to be undertaken during the construction and decommissioning phase. It will also include a requirement for a worker code of conduct and labour accommodation plan (including a requirement that any accommodation be inspected against requirements of the IFC/EBRD guidance on worker accommodation (2009)⁷⁹ and approved by the NEGK and EBRD before the workers are housed in the facility).</p>

⁷⁹ Workers' accommodation: processes and standards. EBRD and IFC (2009).

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	Employment is a possible benefit from the project during construction, but it will not be significant as the workforce will be small.		<p>In order to protect workers and increase project benefits a requirement will be included in the ESIA and ESMP for transparent recruitment procedures and a preference for local recruitment.</p> <p>An audit will be completed of Tier 1 supply chain companies prior to contract to identify any previous instances of child or forced labour or negligence related to OHS.</p>
Labour and working conditions (O)	Labour during the operations phase will only be in relation to maintenance works. It will be undertaken by trained specialists and will only be undertaken periodically.	✓	The ESIA will include requirements for human resources (HR) policies and labour monitoring to be undertaken during the operations phase.
Occupational Health and Safety (all phases)	The main OHS hazards specific to electric power transmission and distribution projects such as this one is live power lines, working at height, exposure to electric and magnetic fields, exposure to chemicals, and general construction-related hazards. In addition, there are potential impacts related to the location, including heat stress, snakes, and lone working. Temporary construction worker accommodation camps could expose workers to risks of illness.	✓	<p>The ESIA will define requirements for OHS plan aimed at preventing accidents, injuries and work-related diseases related to the works and the location and aligned with EHS Guidelines for Electric Power Transmission and Distribution.</p> <p>ESIA will define requirements for an Emergency preparedness and response plan (EPRP) as part of the ESMP.</p>
Electromagnetic field (EMF) and electrostatic impacts (operation)	Based on the magnitudes of EMF's produced by installations similar to the proposed Project, the magnitude of the fields in publicly accessible areas	✓	The ESIA will consider a qualitative assessment of EMF risk based on proximity of permanent receptors to the OHTL line route and set back zone and potential cumulative impacts with adjacent existing

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>would not be significantly different to those presently experienced near other overhead lines. Typical EMF levels reduce to background levels within 200 meters of high voltage OHTL and regulations has identified a setback of 30 m either side of the OHTL . Scoping has identified some receptors may be present within this set back, although it is not confirmed whether these are permanent receptors. The combined effect of both lines will induce voltages on all nearby metal objects (MV lines, pipelines, fences, and any metal objects running parallel to the lines).</p> <p>These induced voltages increase with distance, that the metal objects run parallel to the lines. The maximum induced voltage in the metal objects should not exceed 50V (non-lethal shock < 50mA).</p>		<p>OHTL. The ESIA will make recommendations for mitigating risks to acceptable levels in the ESMP. This may include minor route re-alignment. The ESIA will also consider combined effects of inducted voltages to ensure that all objects near the ROW do not have induced voltages exceeding 50V.</p>
Community, health, safety and security (communicable diseases, public access, GBV/H, safety etc.)	<p>The closest communities are located at ~150m from the proposed OHTL centre line. as such, there may be some impacts on the local community members as a result of the presence of a construction labour force. Given the small size of the expected workforce, in-migration of workforce is not expected to a great extent, but any increase in the number of people in such small communities will make an impact.</p>	✓	<p>The ESIA will consider the preparation of a worker code of conduct. It will also recommend a preference for local recruitment.</p> <p>Stakeholder engagement will be undertaken through a Stakeholder Engagement Plan. It will be recommended that a Community Liaison Officer is identified.</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>It is not expected that the Project will be able to make changes in community cohesion and livelihoods. However, this will need to be scoped out.</p> <p>The potential for project induced Gender-Based Violence and Harassment (GBVH) is also a risk.</p> <p>There will be a small risk of local community members entering construction sites, or conflicts between community members and security staff during construction.</p>		<p>The ESIA will included an assessment of the GBVH risks to the Project and whether a Gender and/or GBVH Policy and Grievance mechanism will be required.</p> <p>The ESIA will recommend that a Security Plan is prepared requiring that security guards are provided with training on interactions with communities and signage with pictures and in all relevant languages should be posted around construction and operations facilities.</p>
Human Rights	<p>Human Rights are described in international standards is aimed at securing dignity and equality for all. Every human being is entitled to enjoy their human rights without discrimination.</p> <p>Many of the relevant requirements for this project align with mitigation measures assessed elsewhere in the ESIA (e.g. working conditions),</p>		<p>A screening of human rights risks will be incorporated into the ESIA to guide the project to respect human rights within its area of influence and monitor that third party companies are respecting human rights too. This will include consideration of:</p> <ul style="list-style-type: none"> • The key human rights risks associated with the country of operation • The human rights risks of key business relationships, including associated facilities and third-party organizations • The human rights risks and impacts relating to the business activity itself

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
				<ul style="list-style-type: none"> • The range of stakeholders (potential and actual) that are directly or indirectly affected by the business activity • The nature and level of the risks and impacts, at different key stages of the project's lifecycle
Traffic and Transportation (C/D)	<p>The Project will require the delivery of equipment, materials and personnel to the substation sites and along the length of the OHTL. In certain locations the delivery route crosses existing roads and railways. These activities are likely to lead to increased vehicle traffic to and from the construction sites, possible increased congestion for other road users (particularly at either end of the OHTL near the substation locations) and possible travel delays. Increased traffic and transportation can also lead to impacts on biodiversity, air quality, noise and vibration. All impacts are expected to be temporary and reversible, but the delivery route should be identified and assessed to identify management and mitigation measures. No abnormal loads are anticipated.</p>	✓		<p>The ESIA will consider the main roads to be affected by the delivery of equipment and their suitability for the safe delivery of material and personnel to the work area, the safety of communities along the delivery route. The ESIA will also consider the impacts associated with the OHTL works that will directly impact local roads/railways. The ESIA will define requirements for traffic management aligned with GIP in the ESMP and SEP to address workers and community safety and transportation-related impacts.</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
Traffic and Transportation (O)	During operation, traffic-related activity will be negligible and confined to occasional maintenance vehicles.		✗	No further assessment proposed.
Security (all phases)	<p>It is likely that security guards will be required during the construction and decommissioning phases of the projects to protect equipment and workers on construction sites. The main security risks will be related to interactions between community members and the security guards.</p> <p>Trespassing and theft while a low risk will still need to be considered.</p>	✓		<p>A requirement for a security management plan will be included in the ESIA. The plan will need to cover at a minimum-security guard training, use of force and vetting of security guards.</p> <p>Where security guards are not present (such as during operations) signage (with pictures and in relevant languages) and fencing (around construction sites) will be used as security measures.</p>
Abnormal operating scenarios (emergency preparedness and response) (all phases)	<p>Potential abnormal and emergency conditions can arise as a result of the following activities:</p> <ul style="list-style-type: none"> ○ lightning strikes – this may cause the line to cease operating and may lead to bush fires; <ul style="list-style-type: none"> • cyclone risks – this may cause the line to break. The routing and design specification has taken into account the potential for cyclone risk; • extreme cold weather – this may cause ice to damage or break the line. ○ bush fires – this may cause the line to stop working 	✓		The ESIA will confirm potential abnormal and emergency scenarios and outline requirements for worker and community safety in the ESMP for the development of project emergency response plans.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<ul style="list-style-type: none"> induced voltage – people or animals can receive a shock by touching metal objects located near an OHL; and earthquakes – the area of the Project may be affected by earthquakes up to a magnitude 9 earthquake. 		
Land acquisition, land use and livelihoods (all phases)	It is likely that only the right of way or servitude will be required for the construction of the OHTL and therefore no physical displacement is expected. However, in line with EBRD PR5 requirements, any loss of livelihood by land users (even if they are not landowners) will need to be identified and mitigated or compensated. Some of the land in the Project AOI is understood to be Forestry Committee land. However, the remainder is used by the poultry farm, gardeners, herders and the owners of the closest OHTL settlements. Therefore, there is a risk of temporary or permanent loss of livelihood for these parties.	✓	<p>The ESIA will identify any losses to people who live or use the land in the AOI. Changes to the OHTL routing will be considered if significant livelihood impacts or physical displacement is identified in the AOI.</p> <p>As part of the ESIA documentation, a Land Acquisition and Resettlement Framework (LARF) will be prepared to identify resettlement principles and organizational arrangements and to provide a guide to provision of livelihood restoration, should any impacts be identified in the future. The LARF will include an entitlements matrix for all categories of livelihood impact.</p>
Protected Areas and Internationally Recognized Key Biodiversity Areas (Priority Biodiversity Features)	3 state protected areas, 2 areas with international importance and 2 KBAs were indicated in Study area	✓	The proximity of the Project to these protected area/IBA, and the potential risks of the Project impacting the birds and other biodiversity elements within these Priority Biodiversity Features will be addressed in the ESIA.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
Threatened Habitats	<p>Potential impacts will arise from the development of the new substation, clearance of OHTL tower area (expansion or improvement of access roads, clearance of areas for workers' camps and other support facilities, poaching, crossing of bird flight routes. Widespread vegetation clearance of the OHTL route (e.g. tree removal) is not anticipated), Overall, the habitats potentially impacted by the project have historically been utilized for low density livestock grazing and in an active anthropogenic use now and do not include highly restricted or threatened habitat types</p>	✓	<p>The ESIA will assess the impact on habitats, and potential habitat-related Critical Habitat triggers (e.g., based on CH criteria i, v, vi per EBRD PR6) will be addressed in the Critical Habitat assessment that will support the ESIA. The biodiversity impact assessment will also consider the relevant of ecosystem services. A vegetation/botanical baseline survey is proposed and outlined in section 7 and Annex C.</p>
Vulnerable, Endangered, or Critically Endangered Species	<p>CR species that potentially occur in the area may include:</p> <ul style="list-style-type: none"> • Sociable Lapwing <p>EN species that potentially occur in the area include</p> <ul style="list-style-type: none"> • White-headed Duck • Great Bustard • Pallas's Fish-eagle • Egyptian Vulture • Steppe Eagle • Saker Falcon 	✓	<p>The ESIA will assess the impact on Vulnerable, Endangered, or Critically Endangered Species including the requirement for a critical habitat assessment.</p> <p>Reconnaissance trip to the Study area to determine potential habitats for plants and animal species. After analysing the data from the reconnaissance trip, a map will be created with potential habitats of sensitive species in the Study area.</p> <p>Detailed assessments proposed as below and also outlined in section 7 and Annex C.</p>

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
	<p>VU species that potentially occur in the area include</p> <ul style="list-style-type: none"> • Seven River's Minnow • Balkhash Marinka • Ili Marinka • Asian Frog • Common Pochard • Yellow-eyed Pigeon • European Turtle-dove • Greater Spotted Eagle • Eastern Imperial Eagle • Horned Grebe • Asian Houbara • Marbled Polecat • Snow Leopard • Tulipa zenaidae 		<p>The preliminary Critical Habitat Assessment (Annex E) will be updated for IUCN CR and IUCN EN bird species that may trigger CH or PBFs.</p> <p>One-year Bird survey to characterise the baseline condition and risk levels for key bird species and species groups that are potentially affected by the line is ongoing for option 1 (under separate scope) and will be used to inform the ESIA. In addition, supplementary studies for north east section of route option 2 will be planned for the spring period of 2025, The methodology for the ongoing and planned bird surveys is provided in Annex C and includes vantage point surveys, surveys for Houbara Bustards and raptor/vulture nesting survey.</p> <ul style="list-style-type: none"> • Herpetological surveys.
Indigenous peoples	As per EBRD's definition of indigenous peoples in EBRD PR7, there are not expected to be indigenous peoples impacted by the Project and an impact on this group is scoped out of the ESIA.	✗	No further assessment proposed.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out		Requirements for ESIA / baseline data collection
Cultural heritage (C)	<p>The Project is located outside any area of significant cultural heritage (i.e. UNESCO world heritage sites). However, the Boom gorge is an area of importance for archaeology and the potential for unidentified and intangible cultural heritage of local significance cannot be ruled out.</p> <p>There were also a number of cultural heritage items that were identified during the site visit, which do not currently appear to be impacted, but will warrant further assessment.</p>	✓		<p>As part of the ESIA process, consultation with relevant state authorities to confirm the presence or absence of locations of cultural importance will be performed, including consultation with the Ministry of Culture, Information, Sports, and Youth Policy of the Kyrgyz Republic as well as local municipalities. Site observations (non-intrusive), engagement with NGOs or research institutes that deal with cultural heritage and meetings with local communities to identify objects that have cultural importance on a local level will also be held⁸⁰.</p> <p>Stakeholder consultation will be used to identify intangible heritage or local sites of cultural importance including graves, memorials. The ESIA will identify specific measures to address any local finds or intangible heritage (where relevant) and define a chance finds procedure for the construction phase works.</p>
Cultural Heritage (O/D)	Impacts are not expected due to the absence of sub-surface works not previously impacted during construction and the proximity to nearby cultural heritage features.	✗		No further assessment proposed.

⁸⁰ In addition, we will also send an official request to the Institute of History, Archaeology, and Ethnology under the Science Academy of the Kyrgyz Republic in order to get official confirmation regarding the absence/presence of archaeological and cultural heritage at the site and surrounding areas of project influence.

E&S Aspect: Construction (C), Decommissioning (D) / Operation (O)	Potential source of impact, receptors and scoping evaluation	Scoped In/Out	Requirements for ESIA / baseline data collection
Cumulative impacts (C/D)	The Project is located close to a number of projects including existing and planned OHTL, solar project, and manufacturing operations. There is potential for cumulative effects (where construction programmes may overlap), impacts arising from temporary labour influx, and spatial and temporary crowding, land use, social, community health and safety (traffic, noise, air quality).	✓	The ESIA will include a cumulative impact assessment for the construction phase impacts and visual impacts during operation which will consider the neighbouring and future planned projects as outlined in section 3.8.
Cumulative impacts (O)	During operation, there are limited activities connected with the projects and therefore cumulative impacts are not deemed relevant. However, there may be cumulative impacts in relation to avifauna and EMF/EMC and cumulative induced voltages.	✓	A cumulative impact assessment will be prepared for avifauna and EMF/EMC and for the operation phase and any permanent cumulative impacts associated with the nearby solar PV project and wind power project as described in section 3.8.
Transboundary Impacts	<p>The Project is located 13 km from the border with Kazakhstan.</p> <p>The Chu River is located along the Project route. Water resource options for the construction phase of the Project are not defined at this time, and if they include direct abstraction of water from the Chu. Other potential transboundary impacts are not considered applicable to this Project.</p>	To be confirmed	Confirm water resource options. If triggered, consultation with neighbouring countries may be required.

6 Scoping Stakeholder Engagement

6.1 Stakeholder engagement approach

Stakeholder engagement is the process of identifying, mapping and prioritising stakeholders that might be impacted due to Project activities, have a particular interest in the Project or have a decision-making status about the Project.

A Stakeholder Engagement Plan (SEP) has been prepared on behalf of NEGK to maintain and guide stakeholder engagement over the lifetime of the Project. The SEP currently focuses on engagement during the ESIA phase but will remain a live document and subject to further updates and guidance during the construction and operations phases.

Stakeholder engagement in the SEP has been planned according to Kyrgyz legislation for Category I projects and EBRD requirements for Category A projects. This section provides a summary of the content of the SEP.

6.2 SEP objectives

The main objectives of the SEP are as follows:

- Identifying and preparing a stakeholder matrix that includes all stakeholders that may be impacted by or interested in the Project. It also identifies key organisations and communities who need to be consulted to provide the Project with permissions related to the Project.
- Establishing relevant communication approaches to each stakeholder group to deliver Project information and conduct consultations.
- Recording feedback, concerns and views of stakeholders regarding the Project.
- Establishing proper/suitable means of communication, especially with vulnerable groups and women, to prevent any risks relating to Gender-Based Violence and Harassment (GBVH), including Sexual Exploitation and Abuse (SEA).
- Developing and maintaining a grievance mechanism.
- All stakeholder engagement will be carried out in a culturally appropriate manner, and in languages that stakeholders understand, these will include: Kyrgyz and Russian as relevant. Planning for engagement activities will consider cultural and economic elements to ensure the greatest number of stakeholders can attend (for example when women can attend, or when herders are at their houses and not out grazing their animals).

6.3 Stakeholder identification

Error! Reference source not found. provides the stakeholder engagement matrix consisting of individuals, communities, organisations, and Government agencies considered stakeholders of

the OHTL. By applying a systematic approach, the current stakeholder matrix has been classified into two main categories based on the type of interest.

- (A) Affected/impacted stakeholders (these can be directly or indirectly affected by the Project.
- (I/D) Interest-based stakeholders (those stakeholders that have a certain interest in the Project, i.e., the Project's beneficiaries, NGOs, civil society) or Decision-making stakeholders (groups/individuals/organisations that decide the Project, i.e., Project lenders, local regulators, etc

Table 25: Stakeholder engagement matrix (also provided in the SEP - and will be copied over once comments received)

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
Directly affected communities (local villages and land users)	Balykchy city	A/I: The closest communities to the planned OHTL route and substation, which might be affected by construction works, and potential adverse impacts from construction activity, such as increased dust level, noise and influx of people. Potential employment benefits from the Project.	Public meetings/telegram channel/phone calls / written correspondence/village walk-throughs / distribution of leaflets/focus group discussions.
	Cholok ayil		
	Kok-Moynok 1 ayil		
	Kok-Moynok 2 ayil		
	Kyz-Kiya ayil		
	Standalone households along the OHTL route (and the EM11 highway)		
Directly affected landowners and land users/businesses.	Individual landowners/land users	A/I/D: Possible loss of assets or livelihood due to land acquisition/provision of servitude rights.	Face-to-face meetings / public meetings / telegram channel / phone calls / written correspondence / focus group discussions.
	Herders		
	Gardeners near Balykchy		
	Poultry farmer		
	Fish farmer		
	Canteens/shops along the EM11 highway.	A/I/D: Food supplies could be impacted by traffic during equipment transportation. Workers may frequent canteens during construction works.	Face-to-face meetings / public meetings/telegram channel / public hearings/ phone calls.
	Animal Rescue centre	A/I/D: Possible loss of assets due to land acquisition/provision of servitude rights or	Face-to-face meetings / public meetings/telegram channel / public hearings/ phone calls.

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
	Industrial facilities (factories, warehouses, etc.)	A/I/D: Possible loss of assets due to land acquisition/provision of servitude rights.	Face-to-face meetings / public meetings/telegram channel / public hearings/ phone calls.
Owners of directly / indirectly affected infrastructure	Owners of the cement manufacturing facility	A/I/D: The infrastructure may require the Project to follow specific standards during construction to avoid any negative consequences/ emergencies resulting from construction. Possible temporary disruptions due to construction activities. The infrastructure may also have temporary or permanent workers impacted by construction. The infrastructure may be required to align their operating and Project standards.	Face-to-face meetings/ / phone calls / Telegram channel) / written correspondence / socioeconomic (LARF) survey.
	NEGK (owner of existing transmission lines)		
	Owners of irrigation channels near Kemin SS		
	JS “Kyrgyz Railways”		
	Seismicity measure station ‘Boom’		
	NABU Wildlife rehabilitation center		
Community leaders	Chairman of ‘Cholok’ village	A/I/D: Responsible for affected communities, and they can influence the information community members receive about the Project.	Face-to-face meetings / public meetings / telegram channel / phone calls / written correspondence.
	Town council of Balykchy city		
	Chairman of ‘Kok-Moynok-1’ Village		
	Chairman of ‘Kok-Moynok-2’ Village		
	Chairman of ‘Kyz-Kiya Village		

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
Vulnerable groups and women	Women	A: Women may not have equal access to Project information, may be disproportionately impacted by project impacts and may not have equal access to Project (including livelihood restoration) benefits where applicable.	Face-to-face meetings/ public meetings / telegram channel / village walk-throughs / phone calls / written correspondence / socioeconomic survey.
	Youth/children	A: Youth and children may be disproportionately impacted by the Project and may not have the same access to information as others.	
	Elderly and disabled	A. If impacted by the Project, these people may be unable to attend all public meetings and be part of Project planning.	Face-to-face meetings/ phone calls/telegram channel / written correspondence / socioeconomic survey.
	Illiterate or semi-literate	A. These people may not be able to understand all the information provided about the Project and will need assistance.	Face-to-face meetings/ public meetings/village walk-throughs / phone calls / socioeconomic survey.
Employees and labour	Herders’ employees	A: May lose their job if resettlement of herders grazing area is required.	Face-to-face meetings / public meetings / social media (telegram channel) / phone calls.
	Farmers who herders may rent animals from other farmers	A: May be impacted by the construction works, dust or traffic for example. They may lose the ability to herd animals if workers lose their jobs.	

Stakeholder Group		Stakeholder Entities	Relevance to Project: "impact-based" (A), interest-based or decision-maker (I/D)	Method of communication
		Directly affected infrastructure workers (such as manufacturing workers)	A: May be impacted by the construction works, dust or traffic for example. They may lose employment if their place of employment is impacted.	
National bodies	Government	JSC "Gazprom Kyrgyz Republic"	I/D: Should be consulted to get information on construction measures to avoid disturbance to gas pipelines.	Face-to-face meetings / public meetings/phone calls / written correspondence.
		State Enterprise "NC "Kyrgyz Temir Zholu"	I/D: Consulted to identify planned and existing telecommunication facilities (e.g., transmission cables) within the project-affected areas).	
		Kyrgyztelecom OJSC	I/D: Should be consulted to get information on construction measures to avoid disturbance to communication lines.	
		"NEGK" OJSC	I/D: Responsible for the development of the Project.	Face-to-face meetings / phone calls / written correspondence.
		JSC National Electric Grid of Kyrgyzstan (Regional departments: JSC Severelektro and OJSC Vostokelektro)	I/D: Review and approval of project design, land acquisition, operational off-take, and O&M of planned interconnection facilities post PPA term completion	Face-to-face meetings / phone calls / written correspondence
		Ministry of Energy	I/D: Review and approval of project design, land acquisition, operational off-take and O&M of planned power generation facilities post PPA term completion.	Face-to-face meetings / phone calls / written correspondence

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
	State Registration Service of the Cabinet of Ministers	I/D: Custodianship of land reserved for governmental, communal and private pastoral use.	Face-to-face meetings / phone calls / written correspondence
	Ministry of Water Resources, Agriculture and Processing Industry of the Kyrgyz Republic	I/D: Provision of information on planned and existing irrigational water supply facilities within the project-affected areas	Written correspondence.
	Department of Drinking Water Supply Development under the State Agency for Architecture, Construction and Housing and Communal Services	I/D: Provision of information on planned and existing irrigational water supply facilities within the project-affected areas,	Written correspondence.
	Ministry of Labour, Social Security, and Migration	I/D: Statutory consultees.	Written correspondence.
	Institute of Biology of the National Academy of Sciences	I/D: Provision of information on biodiversity and technical support on ad-hoc baseline surveys for specific faunal species and habitats.	Face-to-face meetings / phone calls / written correspondence.
	Ministry of Health (Department of Disease Prevention and State Sanitary-Epidemiological Supervision)	I/D: Statutory consultees. Also, responsible for the protection of employees and public safety. Responsible for the establishment of health and protection zones around the OHTL.	Written correspondence.
	Ministry of Transport and Communications	I/D: Provision of information on the transport infrastructure within the project-affected areas and execution of laws and	Face-to-face meetings / phone calls / written correspondence.

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
		regulations about the operation and maintenance of related infrastructure	
	Ministry of Emergency Situations	I/D: Emergency response to natural disasters and other contingencies and mobilisation of humanitarian aid.	Face-to-face meetings / phone calls / written correspondence.
	Forest Service under the Ministry of Emergency Situations	I/D: Provision of information on biodiversity and ecologically important water resources Conduct mandatory, pre-construction biodiversity surveys (to be determined through the ESIA and national EIA process). General monitoring of E&S compliance during the Project’s construction and operational phases.	Face-to-face meetings / phone calls / written correspondence.
	Ministry of Natural Resources, Ecology, and Technical Supervision	I/D: Statutory consultees. Control of national environmental policy and protection standards. Responsible for EIA approval.	Face-to-face meetings / phone calls / written correspondence.
	Kyrgyz Geological Service	I/D: Approves permits for specific activities carried out on site. Provision of information on planned and existing mineral exploration surveys	Face-to-face meetings / phone calls / written correspondence.

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
	The Institute of History, Archaeology and Ethnology, is named after B. Dzhamgerchinov of the National Academy of Sciences of Kyrgyz Republic.	I/D: To confirm the presence of objects or locations of archaeological significance.	Face-to-face meetings / phone calls / written correspondence.
	Ministry of Culture, Information, Sports, and Youth Policy	I/D: To confirm the presence of objects or locations of cultural significance.	Face-to-face meetings / phone calls / written correspondence.
Provincial / Municipal / Local Government Departments – all levels	Chui regional akimiyat	A/I/D: Will make decisions on land allocation and Project realisation.	Face-to-face meetings / phone calls / written correspondence.
	Kemin district akimiyat	A/I/D: Will make decisions on land allocation and Project realisation.	
	Kyzyl-Oktyabr ayil okmotu	A/I/D: Will make decisions on land allocation and Project realisation.	
	Issyk-Kul regional akimiyat	A/I/D: Will make decisions on land allocation and Project realisation.	
	Ton district akimiyat	A/I/D: Will make decisions on land allocation and Project realisation.	
	Kok-Moynok ayil okmotu	A/I/D: Will make decisions on land allocation and Project realisation.	
	Kemin Branch of the State Agency for Land Resources, Cadastre, Geodesy and Cartography	I/D Custodianship of land reserved for governmental, communal and private pasture use.	Face-to-face meetings / phone calls / written correspondence.

Stakeholder Group	Stakeholder Entities	Relevance to Project: “impact-based” (A), interest-based or decision-maker (I/D)	Method of communication
	Balykchy Branch of the State Agency for Land Resources, Cadastre, Geodesy and Cartography	I/D Custodianship of land reserved for governmental, communal and private pasture use.	Face to face meetings / phone calls / written correspondence.
	Department of Communications, Construction, and Transport of the Mayor’s Office of Balykchy city	I/D Custodianship of land reserved for governmental, communal and private pasture use.	Face to face meetings / phone calls / written correspondence.
Civil society, NGOs, research bodies	NGOs working in the regions, such as Kyrgyz Wildlife Conservation Society	I/D: Depending on the core purpose of the specified NGO.	Face-to-face meetings / phone calls / written correspondence / social media.
Media	Regional and local mass media (newspapers, radio, television as relevant)	I/D: Will need to be involved in disseminating information about the Project.	Written correspondence/phone calls.

Figure 111 summarises how stakeholder engagement may be undertaken up and until the completion of the ESIA.

Figure 111: Methods of stakeholder engagement during the ESIA process

Phase 1 - Preliminary Consultation	Phase 2 - Scoping	Phase 3 - ESIA Study
<ul style="list-style-type: none"> • Method: Face to face interview / literature review • One to one meeting with key stakeholders to present the Project (Local Municipalities, local community leaders, etc.) • Dissemination of the Project Information Leaflet • Identification of stakeholders to be involved in the consultation (inc. transboundary contacts) • Identification of partners or 	<ul style="list-style-type: none"> • Method: Face to face scoping meetings / Stakeholder Workshop with key stakeholders to present the Project to ayil okmutus and ayils • Presentation of the Scoping Report and ESIA TOR to key stakeholders (SC, NGO's) • Obtain primary baseline data • Identification of stakeholder concerns for OHTL • Response to Stakeholder concerns (via ESIA ToR) 	<ul style="list-style-type: none"> • Method: KIIs, Focus Groups / Public meetings • Interviews with relevant stakeholders in the target area, inc. PAC's and vulnerable groups. • Interview with relevant interest groups (e.g., biodiversity groups) • Focus Group Discussions (FGDs) • Disclosure of the NTS (English and Kyrgyz) • Public meetings (nation and EBRD PR10) to feedback the findings of the draft ESIA • EBRD Disclosure (120 days) • Answers to stakeholder concerns on findings of the ESIA report

6.4 Scoping engagement

Table 26 notes all engagement undertaken during the scoping site visit. Figure 112 provides an overview of the location of stakeholder engagement activities. Stakeholder engagement has been undertaken by Juru and Evidence CA. This information will be incorporated into the **Public Consultation and Participation Report** for the final ESIA submission.

Table 26: Stakeholder engagement for scoping phase (up to 30 November 2024)

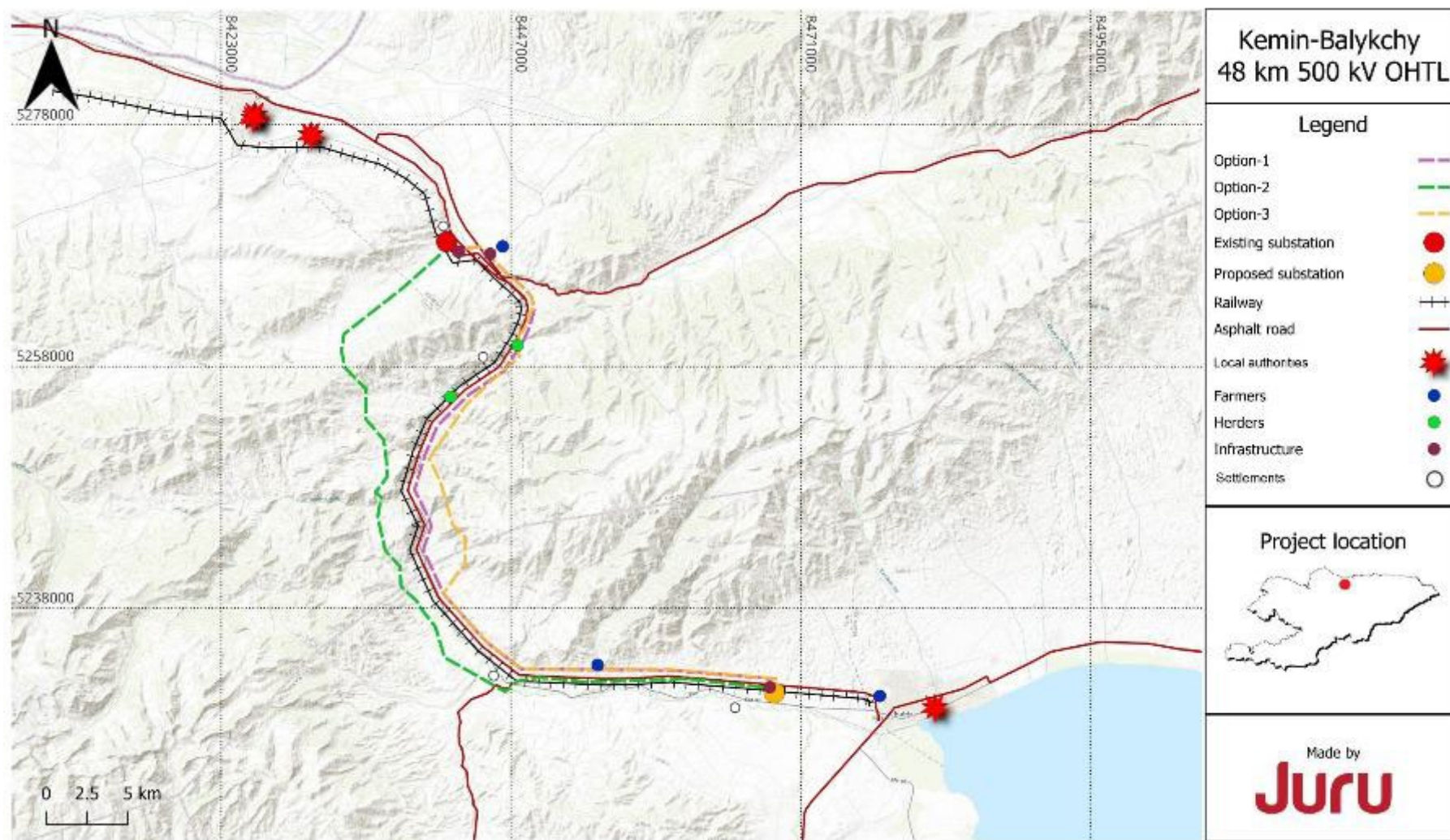
Date	Location of meeting (if relevant)	Title and organisation of receptor	Number of attendees	Type of engagement (face to face/ / telephone call/ social media)	Information disclosed (NTS/leaflet etc)	Notes	Summary of Discussion
November 12, 2024	Administrative building of LLC "Evidence CA"	LLC "Evidence CA"	1	Face-to-face meeting	Project leaflet	Local sub-contractor	Information about the Juru and project as well as a leaflet were given.
November 12, 2024	Administrative building of Ministry of Energy of the Kyrgyz Republic	Representatives of National electric grid of Kyrgyz Republic	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given. In addition, they provided answers to our questions.
November 13, 2024	Administrative building of Balykchy city akimiyat, Balykchy city council	1-Deputy Akim of Balykchy town council and Deputy Akim for economic issues	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given. In addition, they provided passport of Kok-Moynok ayil okmutu.
November 13, 2024	Administrative building of Cadastral department of Balykchy city	Representatives of Cadastral department of Balykchy city	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given. A request letter was written.
November 13, 2024	In the ayil Kok-moynok 2	Community leader of the ayil Kok-moynok 2	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.

Date	Location of meeting (if relevant)	Title and organisation of receptor	Number of attendees	Type of engagement (face to face/ / telephone call/ social media)	Information disclosed (NTS/leaflet etc)	Notes	Summary of Discussion
November 13, 2024	In the ayil Kok-moynok 2	Residents of the ayil	3	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 13, 2024	In the ayil Kok-moynok 2	Gardener	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 13, 2024	Administrative building of Kemin district Municipality	Akim of Kemin district Municipality and Deputy akim for economic issues	3	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given. In addition, they provided passport of Kemin district and annual report of Kyzyl-Oktyabr ayil okmutu.
November 13, 2024	Administrative building of Cadastral department of Kemin district	Head of Cadastral department and his assistant	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 13, 2024	Administrative building of Kyzyl-Oktyabr ayil okmutu	Representatives of Kyzyl-Oktyabr ayil okmutu	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.

Date	Location of meeting (if relevant)	Title and organisation of receptor	Number of attendees	Type of engagement (face to face/ / telephone call/ social media)	Information disclosed (NTS/leaflet etc)	Notes	Summary of Discussion
November 13, 2024	In the carriage house near to Kemin substation	Guard of cement manufacturer factory	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 13, 2024	In the ayil Kyz-Kiya	Son of community leader of the ayil Kyz-Kiya	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the poultry farm	Workers of poultry farm	4	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the commercial market	Sales assistant of the market. (Not resident of Study area)	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the commercial market	Sales assistant of the market. (Not resident of Study area)	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the northwest of the Balykchy city	Resident of Balykchy city	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the ayil Kok-Moynok 1	Community leader of Kok-Moynok 1	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.

Date	Location of meeting (if relevant)	Title and organisation of receptor	Number of attendees	Type of engagement (face to face/ / telephone call/ social media)	Information disclosed (NTS/leaflet etc)	Notes	Summary of Discussion
November 14, 2024	In the fish farmer's house	Fish farmer and resident	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the seismologist's house	Seismologist and head of station BOOM as well as resident	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the commercial market	Sales assistant of the market.	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the cement manufacturer factory near Kemin substation	Guard of the cement manufacturer factory	1	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.
November 14, 2024	In the herder's house	Herder and his worker	2	Face-to-face meeting	Project leaflet		Information about the project and a leaflet were given.

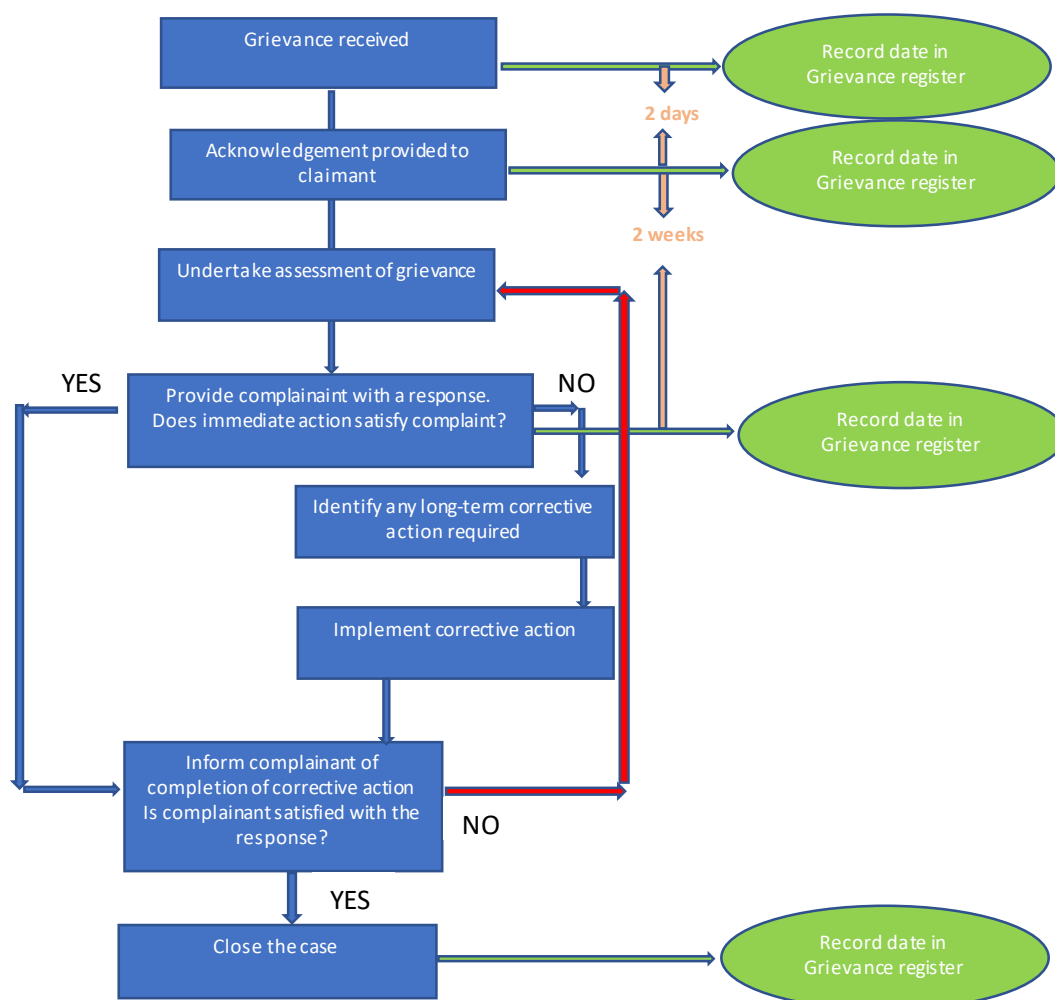
Figure 112: Location of Stakeholder Engagement Completed to Date (November 2024)



6.5 Grievance mechanism

Grievances relating to the Project can be raised during meetings, Project site visits, via phone calls and in written form (text messages, via e-mail, mobile applications, written requests etc.). Upon receiving a grievance by any means of communication, it will be entered into the grievance log. The grievance mechanisms will keep strict confidentiality of data, including the personal information of all applicants. Where preferred, complainants may submit their grievances anonymously. After receiving and registering a grievance, an applicant will receive a written notification within two days, including the proposed timeline for the investigation. A response to the complaint will be provided within two weeks of its submission. The approaches taken to resolve grievances will depend on the nature, frequency of occurrence and the number of grievances. *Figure 113* provides a flow chart of how a grievance can be filed by a stakeholder.

Figure 113: Grievance mechanism flow chart



It is expected that a Community Liaison Officer (CLO) will be identified by the Main Contractor or NEGK during construction and by NEGK during the operations phase. The current point of contact for NEGK is provided in Chapter 1. Annex B: Project Grievance Form contains a sample grievance

form. The grievance form will be made available in English, Russian and Kyrgyz. All grievances will be handled in the preferred language of the complainant and in a culturally appropriate manner.

7 ESIA Terms of Reference

The proposed terms of reference for the ESIA are outlined in the following subsections as follows:

7.1 Objectives

The ESIA aims to achieve the following objectives:

- Review applicable local environmental and social rules and regulations, and establish environmental and social requirements to be met by the Project;
- Establish an environmental and social baseline for the Project and the Area of Impact (Study area) based on the information available;
- Identify and assess potential environmental and social impacts of the Project;
- Conduct an impact assessment and determination of significance for Project environmental, social, health, and safety impacts during construction, operation, and decommissioning phases and describe mitigation measures;
- Develop a stakeholder engagement plan (SEP) and grievance mechanism aligned with national requirements and EBRD PR10; and
- Develop a framework Environmental and Social Management Plan (ESMP).

7.2 Structure of the ESIA

The ESIA report will contain the following volumes:

- Volume I: Non-Technical Summary (EN, RU, KG)
- Volume II: ESIA Main Report (EN, RU)
- Volume III: ESIA Technical Appendices and Supporting Documents, including baseline survey reports and CHA (originating language) .
- Volume IV: Framework Environmental and Social Management Plan (ESMP) (EN, RU)
- Volume V: Livelihood Acquisition and Livelihood Restoration Framework (LARF) (EN, RU, KG)
- Volume VI: Stakeholder Engagement Plan (SEP) with supporting Public Consultation and Participation Report (EN, RU, KG), supporting meeting records and ESIA disclosure meeting report

7.3 Baseline Surveys

These surveys will cover a variety of environmental and social parameters to establish existing conditions before the project commences. Baseline studies and location are defined below and shown in Figure 114 below.

- Air quality – 24 hours continuous monitoring at six locations (total across Route 1 and Route 2) including **Cholok** and **Kok-Moynok-2** villages, **Balykchy city**, one near new SS

and two along the updated part of OHTL route): Nitrogen dioxide (NO₂); Sulphur dioxide (SO₂); Carbon monoxide (CO), PM_{2.5} and PM₁₀⁸¹.

- Noise - day and night-time noise measurements for six locations (total across Route 1 and Route 2) representing the nearest sensitive receptors: (**Cholok** and **Kok-Moynok-2** villages, **Balykchy** city, new SS and two along northeastern section of route option 2) for 24 hours continuously each location for i) A-weighted equivalent continuous noise level in decibels - LAeq dB(A); ii) minimum and maximum A-weighted sound pressure level in decibels (Lmax (A), Lmin (A))⁸².
- Socio-economic surveys for preferred route option.
- Flora, avifauna (Juru to be provided with data from the stand-alone survey), reptile, mammals bat roost, fish surveys - the biological terms of reference and work plan are provided in Annex C: Biodiversity Survey Work Plan.
- Soil sampling (at 9 locations) corresponding to representative land use types. We will use the information to assess the soil structure (topsoil) and the soil composition to confirm contamination levels. Samples of soil from each location will be taken from the top 20cm. Analysis of soil will be performed for the following parameters: soil type, pH, Nitrate (as NO₃), Sodium (as Na, mg/kg), Potassium (as K mg/kg), Cadmium (as Cd, mg/kg), Chromium (as Cr, mg/kg), Copper (as Cu mg/kg), Lead (as Pb mg/kg), Manganese (as Mn, mg/kg), Mercury (as Hg, mg/kg), Nickel (as Ni, mg/kg), Iron as (Fe, mg/kg), Zinc (as Zn, mg/kg)⁸³.
- Surface water sampling taken from 2 locations from two existing water bodies surrounding the site and ground water from one location.
- A basic traffic count may be commissioned for the project ESIA at two (2) locations (one near new SS and one along the updated part of OHTL route), which will include: i) Traffic counts of various road vehicle categories during the morning (9 AM – 11 AM), afternoon (2 PM – 4 PM) and evening (6 PM – 8 PM) hours; ii) Two days at one location of traffic counts, spread between the working days and weekends. Results will be provided in table format which will include counts of vehicles by types (heavy goods vehicles (HGV), cars, vans, motorcycles) with photos.

The sampling locations are shown in

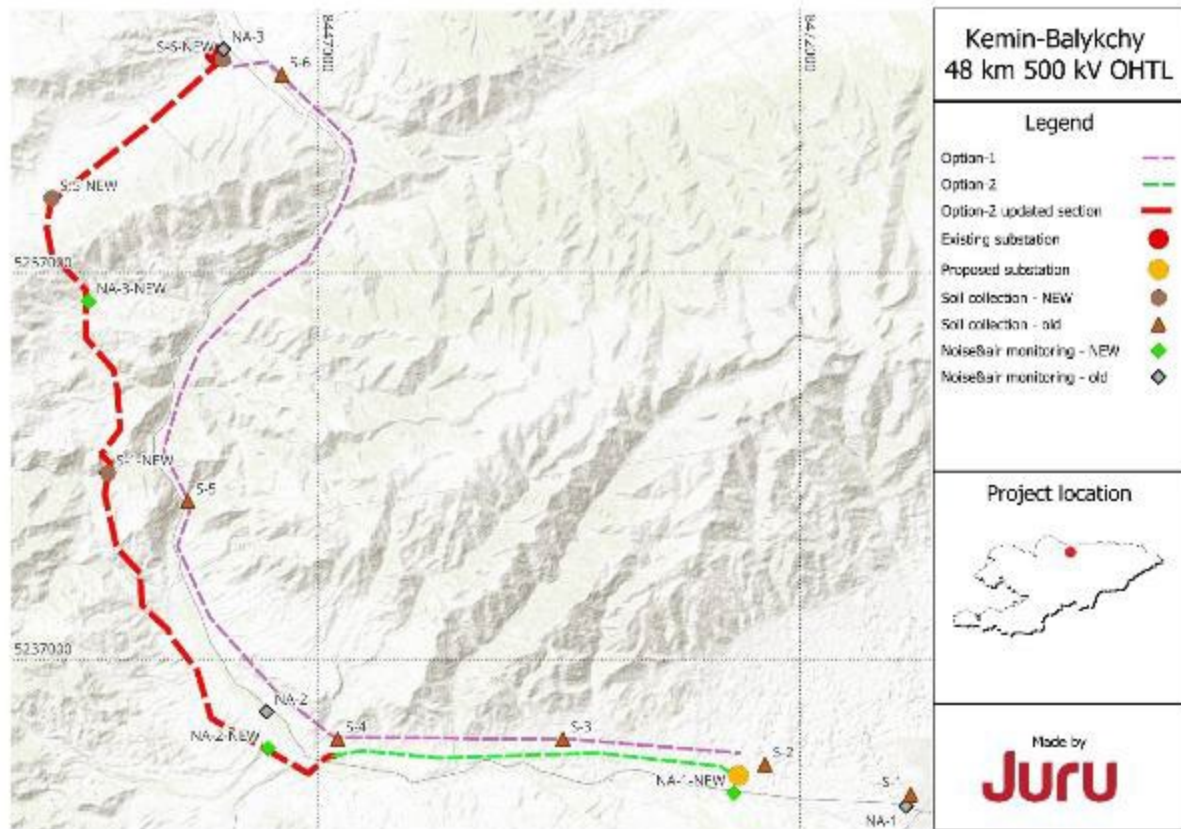
81 Those locations highlighted in bold were surveyed in October 2024. Those remaining will be done in March 2025 based on decision of final route option.

82 Those locations highlighted in bold were surveyed in October 2024. Those remaining will be done in March 2025 based on decision of final route option.

83 Those locations highlighted in bold were surveyed in October 2024. Those remaining will be done in March 2025 based on decision of final route option.

Figure 114, ensuring a comprehensive understanding of the baseline conditions across the OHTL Route.

Figure 114: Baseline Survey locations



7.4 Non-technical Summary

A non-technical summary (NTS) will be prepared in English (EN), Russian (RU) and Kyrgyz (KG). This will provide a high-level overview identifying the scope and nature of the Project and predicted environmental and social impacts. The NTS will be used as a tool to aid consultation and information disclosure. The NTS will include the following:

- Concise Project description and mapping
- Summary of the background to the Project
- Overview of the process undertaken
- Summary of environmental and social benefits, adverse impacts, mitigation and management
- Overview of the grievance mechanism and contact details

7.5 ESIA Report

The ESIA process will investigate relevant environmental and social aspects, as defined by the Scoping Report. The outcomes will be documented in an ESIA report as set out below.

Table 27: Proposed structure of ESIA report

Chapter	Description of Content
Introduction	Presents a brief overview of the Project, a description of the developer and a brief outline of contents of the report, etc.
Project Description	Describes the Project, including its main elements and activities for construction and operation.
Project Need and Analysis of Alternatives	Presents the purpose and rationale of the Project and examines alternatives to the proposed project site and generation technology including the no project alternative.
Policy, Legislative and Institutional Context	<p>Description of legislative and institutional context in Kyrgyz Republic including:</p> <ul style="list-style-type: none"> • Institutional Framework and National Regulators • National EIA process • Relevant laws, regulations and applicable guidance for each environmental and social topic contained in the ESIA • EU directives and International conventions <p>The chapter will also refer to the applicable EBRD standards and guidelines.</p>
Baseline Conditions	Comprehensive description of primary baseline data collection (as outlined in section 7.3 and desktop review covering environmental, social and biodiversity scope (including protected areas).
ESIA assessment methodology	Sets out the stages of the ESIA process. Robust criteria for determination of the significance of the anticipated impacts will be developed. Definitions of significance will be clearly defined and make reference as applicable to the magnitude, geographic extent, duration and frequency, irreversibility and ecological, social, and economic context.
Information Disclosure, Consultation and Participation (summary)	Provides an overview of the consultation processes as defined in the stakeholder engagement process and summarises results including specific reference to comments made during consultation and how they were addressed in the ESIA. This is a summary of the detailed content provided in the Public Consultation and Participation Report.
Topic-specific impact assessment	<p>With reference to this Scoping Report and the activities required to be undertaken as part of the construction and operation of the Plant. Each impact assessment chapter will contain the following sub-headings:</p> <ul style="list-style-type: none"> • Introduction • Methodology and assessment criteria (specific legislation, summary of relevant consultation comments, criteria for determining significance and associated limitations • Baseline summary

Chapter	Description of Content
	<ul style="list-style-type: none"> • Impact identification and assessment • Cumulative and transboundary impacts • Mitigation and enhancement measures • Residual impact summary
Conclusions	Conclusions
References	List of references cited in the report.

Following international lending requirements for environmental and social assessment, the scope of works for this ESIA will include:

- Environmental, social, labour, gender, health, safety, risks and impacts.
- The Project and related and associated facilities (where relevant).
- Risks and impacts that may arise for each project activity.
- Role and capacity of the relevant parties, including government, contractors and suppliers.
- Potential third-party impacts including supply chain considerations.

This ESIA will identify beneficial and adverse, direct and indirect, and cumulative impacts of the Project related to the biophysical and socio-economic environment.

With reference to Table 24, the following topics are scoped into the ESIA.

Table 28: Topics scoped into the ESIA

Environment and Health	Social	Labour
<ul style="list-style-type: none"> • Air quality (C/D); • Noise (C/D) • Waste (including hazardous waste) (C/O/D) • Climate resilience • Soil (C/D) • Water resources (C/D); • Hydrogeology (C/D) • Biodiversity (habitat loss, impact on critical habitat and PBF) • Cumulative impacts (C, O) 	<ul style="list-style-type: none"> • Community health and safety (C/O/D) • Traffic and Transportation (C/D) • Security (C/D) • Emergency preparedness and response (C/O/D) • Livelihood and land use (C) • Cultural heritage (C) • Human Rights (C/D) 	<ul style="list-style-type: none"> • Occupational Health and Safety (C/O/D) • Emergency preparedness and response (C/O/D) • Labour rights (C/O/D) • Employment (positive) (C/D) • Gender Based Violence and Harassment (GBVH) (C/D) • Human rights (C/O/D)

<ul style="list-style-type: none"> • EMF/EMC (O) <p>Transboundary impacts (to be confirmed based on water resource requirements)</p>		<ul style="list-style-type: none"> • Procurement/supply chain (C/O/D)
---	--	--

Scoped out:

Air quality (O)

Noise (O)

Soils (O)

Landscape and visual impact (C/D)

Radio and TV interference (C, O, D)

Traffic and transportation (O)

Greenhouse gases (O)

Cultural heritage (O)

Indigenous Peoples (C,O,D)

Security (O)

Note: C = Construction, O = Operations, D = Decommissioning

For a robust and transparent impact assessment process, each topic will consider the magnitude of the impact, and the sensitivity of the receiving environment to evaluate the overall significance of the impact. A framework for assigning magnitude, sensitivity and impact significance is described below. For each E&S aspect the potential mitigation and management measures are considered to give an overall residual impact significance conclusion.

Sensitivity criteria for receptors are categorised into high, medium, or low. Generic criteria used to determine the receptor sensitivity. Each topic specific chapter of the ESIA will define the relevant receptors and assigned a receptor sensitivity based on topic specific criteria.

Table 29: Generic criteria for the allocation of Receptor sensitivity – criteria for allocation

Sensitivity	Physical Receptor	Human Receptor	Biodiversity Receptor	Climate (physical)
High	Little or no capacity to absorb proposed changes and has national or	Receptors with high vulnerability and permanent presence within the direct or indirect AOI (e.g.,	Substantial loss of ecological functionality	Climate variability will threaten the sustainability of the project (e.g., work may be precluded from taking place

Sensitivity	Physical Receptor	Human Receptor	Biodiversity Receptor	Climate (physical)
	international value e.g., receptors where people or operations are particularly susceptible to noise or air quality changes)	school, poor or vulnerable household, hospital). No capacity to absorb project changes or no opportunity for mitigation.		during certain months of the year).
Medium	Moderate capacity to absorb proposed changes e.g., where it may cause some discomfort or distraction or disturbance	Receptors with moderate to high vulnerability and or somewhat affected by project impacts. Limited capacity to absorb changes. Potential opportunities for mitigation	Moderate but sustainable change which stabilises under constant presence of impact source, with ecological functionality maintained	Potential impacts that can be addressed through management actions (e.g., design, implementation management).
Low	Good capacity to absorb proposed changes and not protected or has low value e.g., receptors where the disturbance is minimal.	Receptors with low to moderate vulnerability or are located in the AOI infrequently. Good capacity to absorb changes with no lasting effects, or good access to mitigation measures.	Species community unaffected or marginally affected	Potential impact does not affect the sustainability of the Project.

The magnitude of the potential impact is determined based on the professional judgement of the specialist undertaking the assessment considering the five criteria provided in Table 30. Where impacts can also be quantified and compared against national or international standards these are also considered.

Table 30: Determination of magnitude – example criteria for allocation

Magnitude	Intensity Compliance	Duration	Spatial extent	Reversibility	Likelihood/Frequency
High	High intensity / non-compliant / large numbers of people affected/ very disruptive	Beyond the construction phase or permanent change	Direct AOI & Indirect AOI	Permanent impact	Continuous
Medium	Medium intensity/ actions need to be taken to become fully compliant / medium disruption or disruption to vulnerable groups or sectors of the community or workforce / Quality of life diminished due to change in character	> 3 months up to completion of the construction phase	Indirect AOI	Reversible, but requires mitigation and/or compensation	Intermittent
Low	Low intensity /compliant / small numbers of people / Non-intrusive or does not cause changes in quality of life	One off event or occurs for 3 months or less	Direct AOI	Reversible following end of phase under consideration	Infrequent / one-off event

Based on impact magnitude and receptor sensitivity as defined above the significance of the impact is classed as neutral, minor, moderate, major or critical as presented in Table 31. Those that are deemed moderate, major or critical are considered the main focus of the management and implementation framework going forward based on the following considerations:

- **Critical:** These effects represent key factors in the decision-making process. They are generally, but not exclusively, associated with impacts where mitigation is not practical or would be ineffective.
- **Major:** These effects are likely to be important considerations but where mitigation may be effectively employed such that resultant adverse effects are likely to have a Moderate or Slight significance.
- **Moderate:** These effects, if adverse, while important, are not likely to be key decision-making issues.
- **Minor:** These effects may be raised but are unlikely to be of importance in the decision-making process.
- **Neutral:** No effect, not significant, noise need not be considered as a determining factor in the decision-making process

Impacts are typically considered to be adverse, but it is also possible for positive impacts to be realised. Where positive impacts are identified in the sections below, these are assigned a degree of positive impact based on the sustainability (duration) and scale (number of receptors) of the positive outcomes.

Table 31: Significance evaluation

Significance		Magnitude					
		Negative			Positive		
		Low	Medium	High	Low	Medium	High
Receptor Sensitivity	Low	Neutral	Minor	Moderate	Neutral	Minor	Moderate
	Medium	Minor	Moderate	Major	Minor	Moderate	Major
	High	Moderate	Major	Critical	Moderate	Major	Critical

The temporal influence of the Project will be assessed by comparing the existing baseline conditions (environmental, socio-economic and biological) over the expected duration of the Project activities.

- The significance of impacts will be discussed before and after mitigation (i.e., residual impact) for each aspect. Based on the above approach, impacts identified as having major or moderate significance will be classified as significant impacts.

For each significant impact, the Consultant shall define mitigation and management actions and a management plan for implementing those actions in the form of a framework Environmental and Social Management Plan (ESMP) (see below). In general, the following hierarchy of mitigation measures will be applied to reduce, where possible, the significance of impacts to acceptable levels:

- Avoidance and reduce through design (embedded mitigation)
- Abate impacts at source or receptor
- Repair, restore or reinstate to address temporary construction effects
- Compensation for loss or damage, such as replacement planting elsewhere
- Once the application of mitigation and management measures has been defined, the residual significance will be determined.

Residual impacts are those significant impacts that remain after the application of mitigation and enhancement measures.

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitation will be considered and articulated in the final report.

The ESIA will make commitments concerning measures that should be put in place with monitoring and/or environmental or social management plans to deal with the uncertainty in the form of an Environmental and Social Action Plan (ESAP).

7.6 Critical Habitat Assessment / Appropriate Assessment

We will conduct a Critical Habitat Assessment (CHA) which will be based both of review of desktop-level information as well as the results of the biodiversity baseline surveys, and which will be incorporated into the biodiversity baseline section of the ESIA. This CHA will be conducted in a manner that is consistent with both IFC PS6 and EBRD PR6. While these two lender policy documents are largely aligned with respect to CHA methodologies, and criteria for triggering a CH determination, they are divergent with respect to the “second tier” of sensitive biodiversity receptors that trigger a “no net loss where feasible” mitigation requirement (Natural Habitat in the case of IFC; Priority Biodiversity Features in the case of EBRD). The CHA and ESIA will identify the biodiversity features that trigger a PBF determination, under the EBRD’s separate criteria for such (there is no analogue in IFC PS6), and while CH features will be subject to a “net positive gain” mitigation standard and other requirements (e.g. preparation of a BAP), PBF will be subject to a “no net loss where feasible” mitigation standard. By contrast, the IFC ascribes the “no net loss where feasible” mitigation standard to “Natural Habitat,” which is defined in IFC in a manner for which there is no analogue in EBRD PR6. Even though the concepts of PBF and Natural Habitat are not shared between IFC PS6 and PR6, they both trigger the “no net loss where feasible” mitigation requirement, according to the policies of one or the other of these lenders. Therefore, in order to be bankable to both of these lenders, the Project’s CHA will identify both CH features and PBFs, and the ESIA will need to identify the presence of both PBF and Natural Habitat, in addition to Critical Habitat features, and to include proposed mitigation and management measures for these resources, accordingly.

At this time the need for an Appropriate Assessment (AA) is not identified as necessary considering the proposed infrastructure does not cross sites such as Key Biodiversity Areas and Important Bird Areas. Following evaluation of impacts on birds the need for an AA will be confirmed.

7.7 Volume III: Technical Appendices

Supporting documentation for the ESIA will be provided in Volume III: Technical Appendices.

7.8 Volume IV: ESMP

The primary aim of the ESMP is to safeguard the environment, site staff and the local population against site activity which may cause harm or nuisance. The Consultant will develop a framework ESMP as part of the ESIA that will contain the following content:

- Project Description – this section provides an overview of the Project description.
- Applicable Regulatory Standards and Guidelines – this section provides the legal and other relevant standards and guidelines for the Project.
- Environmental and Social Management system – provides an overview of the Environmental and Social Management System including operational policies, management plans, management systems, programmes, procedures, practices and capital investments to be developed and deployed as part of the overall impact mitigation strategy
- Environmental and Social Management – provides the environmental and social aspects and impacts along with proposed outline mitigation measures for the construction and operational phases, supply chain management (as provided by NEGK), training, and management of change
- Performance indicators linked to significant environmental and social impacts as well as relevant elements of the EBRD PRs.
- Environmental and Social Monitoring – this section will outline the physical environmental and social monitoring and measurement activities for the construction and operational phases, including regulatory monitoring requirements.
- Separately a construction ESMP, operational ESMP and key will also be prepared.

7.9 Volume V: Livelihood Acquisition and Livelihood Restoration Framework

A Land acquisition and livelihood restoration framework (LARF) will be developed based on the following guiding principles:

- Land acquisition will be minimized or avoided where possible;
- All livelihood restoration activities will be managed through the LARF, and implementation will be documented and monitored;
- All Project affected persons (PAPs) will be meaningfully consulted and be active participants throughout the design and implementation of the LARF;
- PAPs will be assisted in their efforts to improve their livelihoods and standards of living, or at least to restore them to pre-Project levels.

It is expected that land acquisition will be primarily managed by government agencies and therefore the LALRF will spell out any extra measures that will need to be required to fill the gaps between Kyrgyz law and EBRD PR5. The LALRF will include:

- A description of the Project and the economic displacement impacts that are expected;
- A summary of the entitlements displaced persons will be entitled to under Kyrgyz law and EBRD PR5 (including those PAPs whose activities may be restricted, however small, by sanitary protection zones);
- The measures proposed to bridge any gaps between Kyrgyz law and EBRD PR5;
- The livelihood restoration activities to be undertaken;

- The Project budget for livelihood restoration (if known); and
- Financial and implementation responsibilities.

7.10 Volume VI: SEP

A stakeholder engagement plan (SEP) will be developed to coordinate the public participation process following national and EBRD PR10 requirements. The SEP scope will:

- Identify all affected people (i.e., by construction activities or during operation) and facilitate the spread of information to relevant authorities and interested and affected parties (IAPs).
- Consult with relevant NGOs, government departments, and agencies that may have a stake in the Project and its impacts.
- Include a stakeholder consultation plan that provides an opportunity for relevant authorities and IAPs to voice concerns and issues related to the project and allow for the identification of additional alternatives or recommendations. The stakeholder consultation plan will also describe a schedule for public consultation with the relevant groups, including the frequency and method of communication (i.e., media announcements, town hall meetings, questionnaires, etc.).

A separate **Public Consultation And Participation Report** will be generated to capture the findings of the consultation and engagement process and an evaluation and summary of the outputs, which will be updated at key stages of the ESIA process:

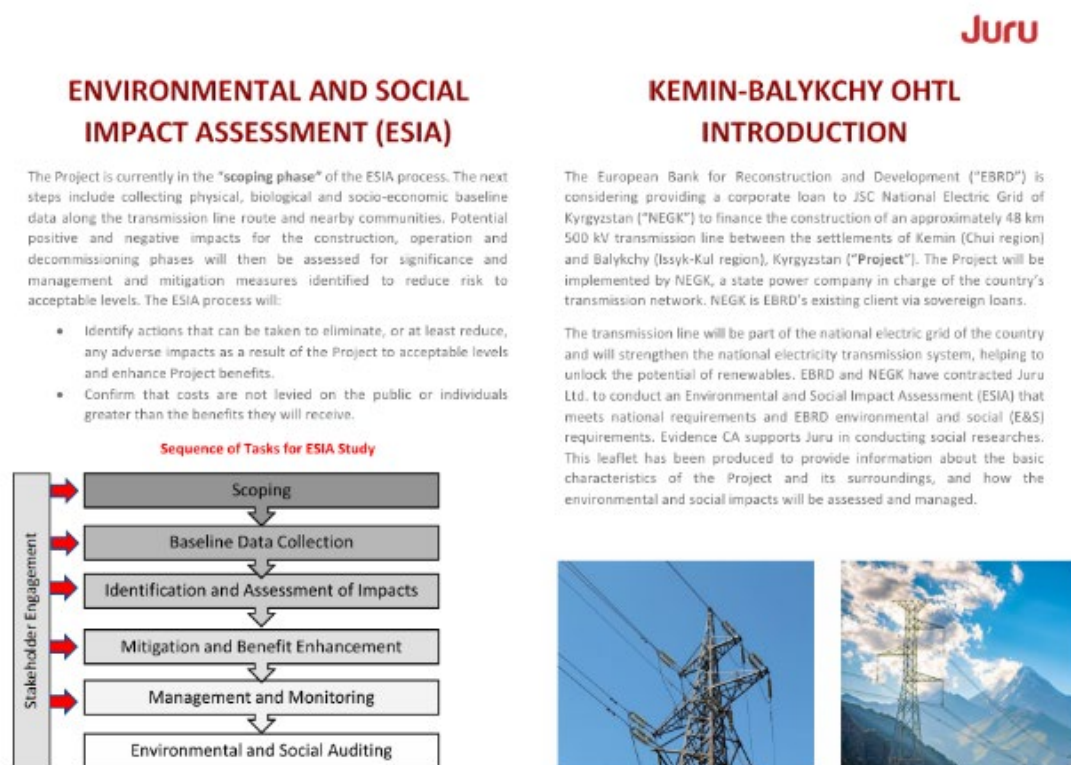
- Figures on participants consulted/engaged disaggregated by gender, vulnerability etc.
- Summary of questions received and key issues raised
- Details on retroaction to consulted stakeholders concerning Project impacts and mitigation measures
- consultation outcomes
- Records of minutes of meetings and attendance records

This information will also be summarized in the main body of the ESIA report.

7.11 Work Plan

[illegible]

Annex A: Scoping Notification Leaflet



PROJECT DESCRIPTION AND LOCATION

Currently, there are 3 Route options. The OHTL is proposed to start at the existing Kemin substation located close to Cholok village (Chui region) to the planned Balykchy substation (Issyk-Kul region), which is located 6 km west of Balykchy city. The route options pass the Boom gorge or gorges to the northeast along existing OHTLs. The closest settlements to the routes are Kyz-Kiya village (Chui region) and Kok-Moynok-Birinchi, Kok-Moynok-Ekinchi, villages (Issyk-Kul region). The OHTL options route through two regions and three districts:

- Chui region (Kemin district)
- Issyk-Kul region (Tong district)
- Issyk-Kul region (Balykchy city (optionally) - city under regional jurisdiction)

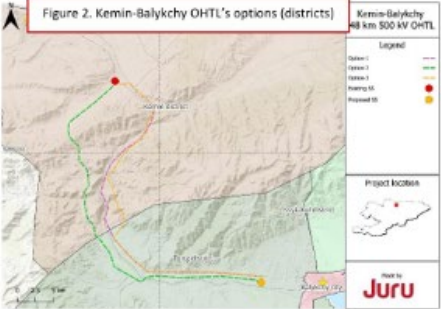
The route right-of-way is accessible from the EM11 highway. The landscape is predominantly a mountain gorge with a river valley.



Figure 1. Kemin-Balykchy OHTL's options (regional)

- Grounding, foundations and tower installation;
- Insulators and aluminium steel conductor installation;
- Modification of internal access roads and maintenance paths.

Construction of the Project will consist of the following essential infrastructure components and activities:



The preliminary route and layout are presented in Figures 1&2. Stakeholder engagement shall be undertaken during the preparation of the scoping report and ESIA in accordance with national regulations and good practice. Stakeholder engagement activities will include Project Affected Persons ("PAP") and communities concerned by the Project e.g., local and traditional leaders, representatives of the communities, land users, ecological groups and potential vulnerable groups such as youth and women.

CONTACT DETAILS

All complaints, comments or queries relating to the ESIA for the Kemin-Balykchy 48 km 500 kV OHTL Project should be sent to:

Evidence CA	NEGK
Name: Bermet Alieva	Department: Department of External Relations and Project Implementation
Address: Bishkek, 133 Akhunbaev Street	
Email: Bermet.alieva@gmail.com	E-mail: 1piunegk@gmail.com
Phone: +996 551 99 99 84	Phone: +996 312 67 03 19

Annex B: Project Grievance Form

Ref № 1		
1	Name (indicate if compliant preferred to be anonymous)	Full name (if applicable): Gender: Age: Address: Occupation: I wish my identity not to be disclosed:
2	Contact information (Need to specify the way to get back to compliant)	Mob phone: Fax: Email: Other (specify):
3	How compliance/feedback/request was received and by whom	Phone call: Verbal communication: Email: Receiver:
4	Purpose of contact	Make a compliance: Give feedback: Request an information: Other (specify):
	Date of application receipt	Date:
5	Text of message	

6	1 st Response message	
7	2 nd Response	

The message was addressed by

Date/Month/Year:

The response was delivered by

Date/Month/Year:

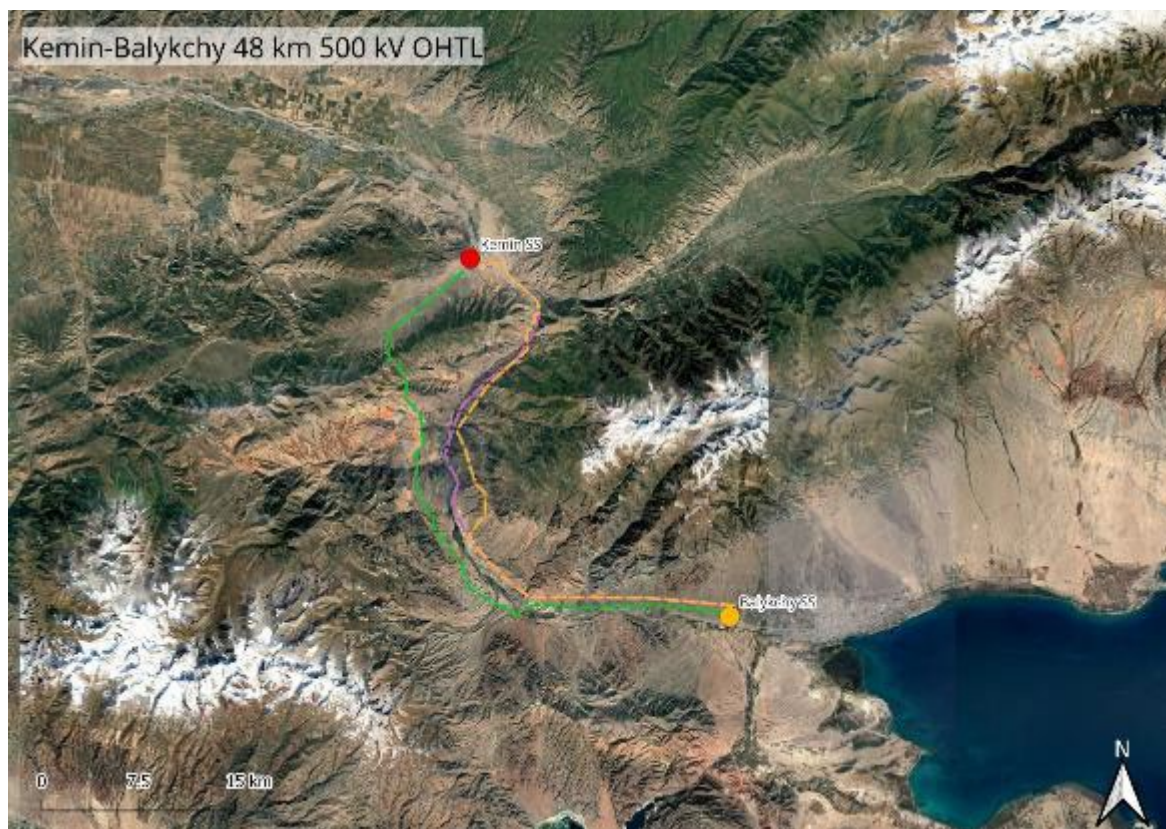
Annex C: Biodiversity Survey Work Plan

Biodiversity survey work plan

a. Introduction

The Kemin-Balykchy 500kV transmission line is planned between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built in Balykchy or at a new location just outside. The final substation location will be determined by parallel and ongoing feasibility studies. The OHTL ROW is located close to Issyk Kul Lake, which is designated Ramsar site, additionally western part of Issyk Kul Lake was designated as IBA “Western Issyk Kul Lake” in 2006. The IBA hosts 267 bird species, and is important as breeding territory of Pallas’s sandgrouse (*Syrhaptes paradoxus*), Saker falcon (*Falco cherrug*), and wintering waterbird species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*), as well as wintering waterbird aggregation site. According to historical data every year from 25 to 80 thousand individuals of 30 bird species winter in this area. Foothill zone of the surrounding mountains hosts Saker falcon, Golden eagle, Egyptian vulture and other vultures.

Figure 1: Project setting



b. Biodiversity baseline surveys

i. Habitat assessment

The Habitat assessment will be based on recommendations of the EBRD Performance Requirement 6 (PR6) and International Finance Corporation (IFC) Performance Standard 6 (PS6). For the purposes of implementation of IFC PS6, habitats are divided into modified, natural, and critical.

As defined by the EBRD PR6 and IFC PS6, critical habitats are areas with high biodiversity value which meet at least one following criteria:

- Criterion 1. Habitat of significant importance to Critically Endangered and/or Endangered species;
- Criterion 2. Habitat of significant importance to endemic and/or restricted-range species;
- Criterion 3. Habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- Criterion 4. Highly threatened and/or unique ecosystems;
- Criterion 5. Areas associated with key evolutionary processes.

Numerical thresholds have been defined for the first four critical habitat criteria, based on these published by IUCN in “A Global Standard for the Identification of Key Biodiversity Areas” (2016) and “IUCN Red List Categories and Criteria” (2012). Assessment parameters are: i) number of mature individuals, ii) area of occupancy, iii) extent of suitable habitat, iv) range, v) number of localities, vi) distinct genetic diversity. QGIS 3.18 free software was used for mapping of habitats and vegetation. The vegetation map was compiled in QGIS by visual interpretation of the satellite image using the field data and a topographical map (1:100.000) of the region

ii. Botanical survey

Prior to the field surveys, a secondary data review will be conducted by a local botanist to compile a botanical checklist of potentially present plant species in the Project area. Detailed botanical field surveys will be completed to register plant species, including those of conservation concern within the Area of Influence (Study area).

The field survey of the Study area will be conducted using the traditional methods of botanical survey commonly used for sampling and mapping of native vegetation, recognition of floristic composition and spatial patterns of plant communities.

Vegetation structure and species composition will be described from 50x50 m geobotanical sample plots (squares) chosen in an area with homogeneous vegetation. Sample plots (squares) will be located away from roads and boundaries between different vegetation communities (coordinates of these boundaries observed during the survey were recorded separately). For each square, photographs of the landscape and vegetation were taken using a digital camera, and following data will be recorded: location and physical environment (including GPS coordinates,

elevation, topography, and soil), state of vegetation and disturbance factors (grazing, etc.), plant association, canopy cover (%), canopy height, all plant species present at the plot, their cover and abundance, phenological stage and height. Microcomplexes (e.g., along dry riverbeds) will be described separately. Coordinates of populations of endemic, redlisted or alien species, number of individuals and area occupied by population also will be recorded.

Species cover and abundance will be determined using the Braun-Blanquet cover-abundance scale (1965) widely used in geobotanical and ecological studies as rapid visual assessment technique, but robust and highly repeatable, minimizing among-observer differences.

Esri ArcGIS 10.1 software will be used for vegetation/habitat mapping. The vegetation map will be compiled in ArcGIS by visual interpretation of the satellite image using the field data, a top map (1:100,000) and a soil map of the region.

A report will be written detailing the methods and results including details of habitat types present, basic habitat maps and any status of particular protected plant species (IUCN and national Red Data Book) and EU Habitats Directive.

iii. Reptile survey

The aim of the field herpetological survey is to assess the status of reptiles and amphibians on the Project site (list of the species and quantitative composition, territorial distribution, including places of concentration, the state of habitats).

The main tasks of herpetological survey are following:

- field herpetological survey and processing of field data;
- analysis of any previous herpetological surveys and other available data (publications, reports, etc.) compared with the results of the survey;
- compilation of the check-list of species recorded within the project site (in particular, threatened species included in the National Red Data Book and/or the IUCN Red List).

Field studies will be carried out on the project territory of the preferred route option according to generally accepted zoological methods for identifying species composition. Distance sampling will be used to assess species composition, density, and distribution. The field research methodology reflects the following aspects: species composition in the study area, distribution across habitats, and daily and seasonal changes in activity.

iv. Mammal and photo trapping survey

The **Mammal survey** aims to study terrestrial mammal species, their status, and distribution within the project territory and Study area. The following steps will be taken:

- Conducting ground transect survey on mammal species in Study area (scoping phase);

- Collecting questionnaire data from local people (if present) on mammal species presence/absence, status and threats (scoping phase) ;
- Analysis of the preliminary field data including species number and distribution (scoping and ESIA phase);
- Making a mammal species list based on field data, questionnaire data and data from literature sources, including endangered and non-endangered species scoping and ESIA phase).

During the field research, non-invasive methodology will be used, not related to the capture and killing of wild animals, including:

- visual observation of mammals both by eye and using 10x binoculars and telescope x60;
- registration of tracks of the vital activity of wild mammals, including animal tracks (paw foot prints on the ground), faeces, digging, burrows, dead animals, etc.
- taking photo of the animals, their tracks and traces of their vital activity, typical habitats.

The studied area will be recalculated by multiplying the length of the traversed route by the width of the surveyed transect, which is determined taking into account visibility, landscape, vegetation, particular species and the maximum distance at which different mammalian species and their burrows can be effectively identified.

The **photo trapping survey** for terrestrial mammals (excluding bats) aims to confirm the presence/absence of mammal species and numbers on sensitive species within the project territory and its surrounding areas. In order to accomplish this the following steps will be taken:

- Conducting camera trapping survey and installing 10 trail cameras for the period from September to November 2024 in the most suitable locations to get information about mammal species presence, distribution, seasonal dynamic and behaviour. The photo traps cover route option 1 and route option 2 (along the north-western section)
- Analysis of the photo trapping data including number of species and distribution;

Compiling a mammal species list based on field data, including endangered and non-endangered species.

v. Fish survey

A detailed fish survey will be performed to obtain proper data on fish population, inhabiting species and their abundances and distribution among the river that will be crossed by the Project infrastructure.

Fish sampling is going to be performed by using conventional techniques involving nets. This is a valid approach for gathering data on fish populations, and it's often practical for local experts who are familiar with the area and have experience in conducting fish sampling. Using nets is a traditional and widely used method for capturing fish in various aquatic environments. It allows for the collection of fish specimens. All specimen will be released after measuring.

Morphometric measurements and calculations of fish samples will be carried out using the measuring scale proposed by I.F. Pravdin (1976) for the fish family.

vi. Bat roost survey

The aims of the Roost Search will be to identify and assess any potential bat roost sites within or immediately adjacent to the preferred OHTL towers and determine the risks of roost site destruction during the construction phase and other project impact. The survey area of the Roost Search is defined as the area within and up to 500 m from project facilities. All structures suitable for use by bats (roofs of buildings/other structures) will be searched. The Roost Search will be undertaken in late Spring 2025.

vii. Bird survey

Bird monitoring and specific additional surveys for Route option 1 are ongoing since Spring 2025 under a separate EBRD project "Bird surveys for 48 km Kemin-Balykchy Interconnection (500 kV) Project". The scope of this work is summarised below. To supplement the ongoing work, the ESIA team will conduct supplementary bird surveys along the north western section of Route option 2 (Spring 2025) should Route option 2 be selected. The data collected for Route option 1 along the southeast section of the line will be valid for the southern part of route option 2 (if selected).

- Spring and Autumn Migration Vantage Point (VP) surveys

Vantage Point (VP) surveys are considered the most suitable and standard survey methodology for characterising the use of airspace by some of the key bird groups that can be impacted by powerlines, including raptors, vultures, migrating waterbirds, and others. An initial design for the VP survey will include 8 survey points on Kemin-Balykchy 500kV OHTL, surveyed during Spring and Autumn migration seasons, as illustrated in the map figure, below. These points were selected following the SNH (2017) guidance for bird surveys on power line projects, which advises concentration of survey points near bird-attractive features, and which indicates that low-risk portions of the line do not require as comprehensive sampling as is required for wind farm bird studies.

VP surveys will be conducted at each of these points during the spring (March – May) and autumn (September – November) 2024 seasons. Because the analysis of collision risk based on the VP data will be qualitative rather than follow a quantitative modelling approach (per SNH 2017), the VP

effort level will also be slightly reduced in relation to wind farm VP surveys, with 20 total hours of VP survey conducted per point, per season, instead of 36, as required to support Band collision risk modelling for wind farm bird risk assessments. 3 or 4 VP will be covered per day (maximum 8 hours of survey per day per observer) depending on the road conditions between VPs. VP surveys will be conducted by qualified Kyrgyz ornithologists, who will present the results in two seasonal reports. These reports will be reviewed by the international ornithologist, who will provide on-going guidance to the national ornithologists. International Environmental expert will be responsible for the final QC/QA.

Figure 2: 8 VP locations for Kemin-Balykchy 500kV OHTL

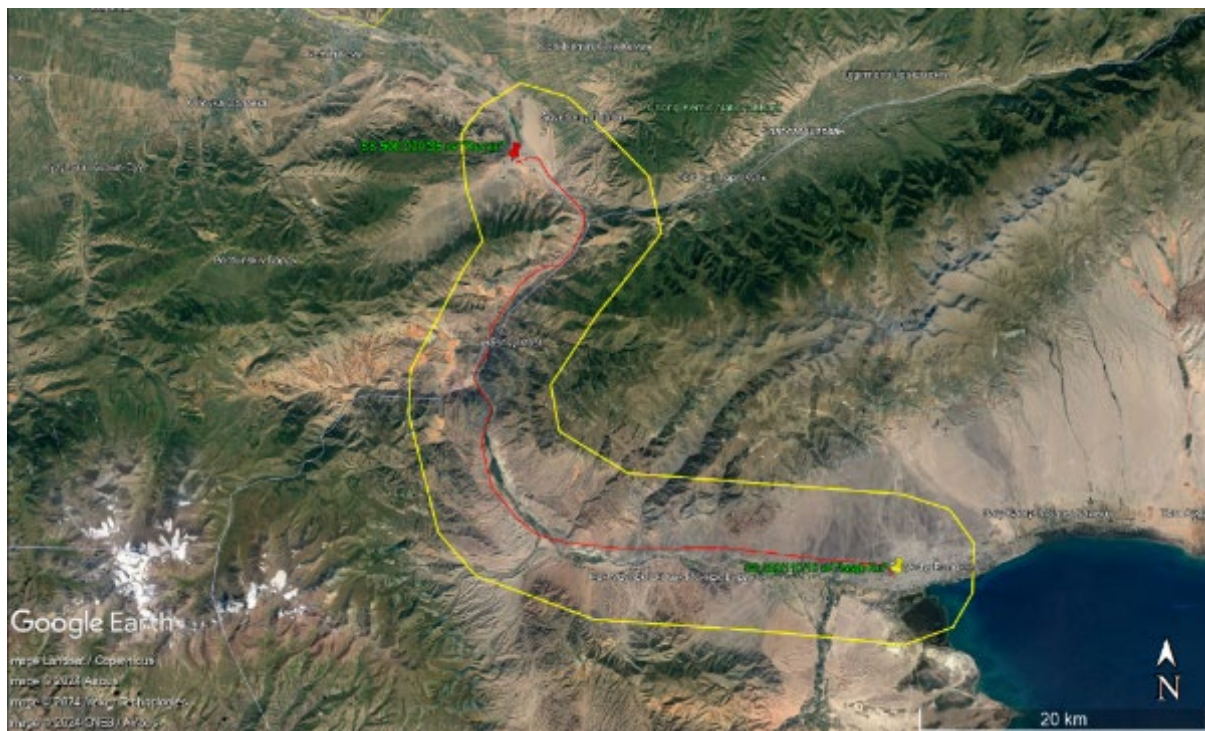


Survey Points	Coordinates (dd)	
	N	E
VP01	42.713709°	75.843865°
VP02	42.690571°	75.884568°
VP03	42.623138°	75.828866°
VP04	42.577462°	75.802566°
VP05	42.496796°	75.843678°
VP06	42.469005°	76.015956°
VP07	42.465120°	76.126961°
VP08	42.449183°	76.183739°

- Raptor nesting survey (third party scope)

There is suitable landscape for raptor nesting along Kemin-Balykchy 500kV OHTL. The third party scope includes raptor nesting surveys in a 5 km buffer in mountain area.

Figure 3: Preliminary raptor survey area - 5 km buffer



The potential list of breeding raptors in this area is as follows:

- Saker Falcon (*Falco cherrug*) (IUCN: EN)
- Egyptian vulture (*Neophron percnopterus*) (IUCN: EN)
- Common Kestrel (*Falco tinnunculus*)
- Lesser Kestrel (*Falco naumanni*)
- Golden Eagle (*Aquila chrysaetos*)
- Long-legged buzzard (*Buteo rufinus*)
- Booted eagle (*Hieraaetus pennatus*)
- The Black stork (*Ciconia nigra*) also breed in this area.

The breeding season of these species starts in March and continues up to August. Typical nesting substrates for most of these species include cliffs or bluffs, karst sinkholes or caves, OHTL poles, or abandoned buildings or other human structures. The cliffs and OHTL poles are most significant for breeding of rare species.

The nest survey will be performed from May to June and will be based on the field transect surveys methodology. Transect surveys will be conducted selectively and opportunistically within the

survey area, focusing on microhabitats and substrates potentially suitable for vulture and raptor nesting (e.g. cliffs, powerlines, trees).

The area will be observed with the telescopes x60, the nest registration will include GPS locations, photo and special forms.

During the raptor nest search effort, the focus of the effort will be on comprehensive searching to discover all active nest locations.

- Breeding bird survey near Issyk Kul

The plain area located between Issyk Kul Lake (near the Issyk-Kul substation) potentially serves as a nesting site for steppe bird species, including the Pallas's sandgrouse (*Syrrhaptes paradoxus*), Asian short-toed lark (*Calandrella cheleensis*). There are suitable nesting sites along the shore for Mute swan (*Cygnus olor*). This area was surveyed in April-May 2024 and is applicable to Route option 1 and Route option 2.

Figure 4. Preliminary breeding bird survey near Issyk Kul (optional)



- Supplementary bird studies (north section of Route option 2)

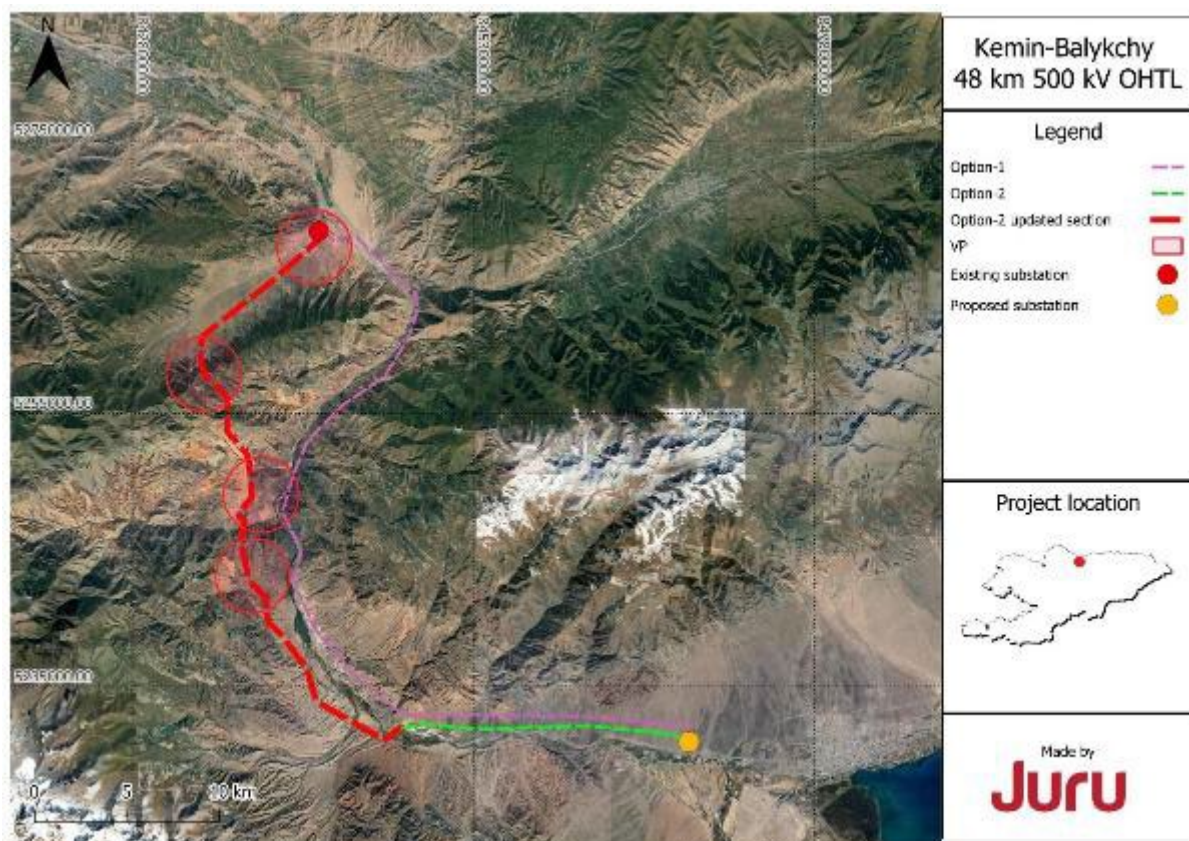
The following surveys are proposed:

- Spring VP surveys at 4 points along the north western section of route option 2 (see . These points were selected following the SNH (2016) guidance for bird surveys on power line

projects, which advises concentration of survey points near bird-attractive features, and which indicates that low-risk portions of the line do not require as comprehensive sampling as is required for wind farm bird studies. The survey approach will align with that outlined above (20 hours per VP)

- Raptor nesting surveys along the north western section of route option 2. The potential list of breeding raptors in this area is as follows:
 - Saker Falcon *Falco cherrug* (IUCN EN)
 - Egyptian vulture *Neophron percnopterus* (IUCN EN)
 - Common Kestrel *Falco tinnunculus*
 - Lesser Kestrel *Falco naumanni*
 - Golden Eagle *Aquila chrysaetus*
 - Long-legged buzzard *Buteo rufinus*
 - Booted eagle *Hieraaetus pennatus*

Figure 115: Supplementary VP surveys Spring 2025



viii. Waterbird winter survey

Given the importance of Issyk Kul for wintering waterbirds, the third party consultation will conduct waterbird counts from December 2024 to February 2025 along the shores of Issyk Kul,

particularly in areas overlapping with the 10 km buffer zone of the OHTL (route option 1 and route option 2 and the closest substation location). Point counts survey will be repeated once a month during the winter to document changes in species composition among wintering waterbirds.

Figure 5. Preliminary waterbird winter survey (optional)



Annex D Protected areas and Key Biodiversity areas within the 50 km buffer zone

Area name	Distance to the project site	IUCN Category	Status	Designation	Recommendation
Issyk-Kul	2.5 km	Ia	Designated	State Nature Reserve (Ia Category) ¹	Assess for critical habitat
State Nature Sanctuary 'Karakonuz Tract' (Kazakhstan)	33 km	IV	Designated	Zakaznik (IV Category)	Assess for critical habitat
Kochkor	12.5 km	IV	Designated	Wildlife Refuge (IV Category)	Assess for biodiversity risk
Issyk Kul	2.5 km	Not Applicable	Designated	UNESCO-MAB Biosphere Reserve	Assess for biodiversity risk
Isyk-Kul State Reserve with the Lake Isyk-Kul	2.5 km	Not Reported	Designated	Ramsar Site, Wetland of International Importance	Assess for biodiversity risk
Western Issyk Kul Lake	1 km	Not Applicable	NA	KBA	Assess for critical habitat
Tokmak Pheasant Reserve	44 km to Option 2 and 48.3 km to Options 1 and 3	Not Applicable	NA	KBA	Assess for critical habitat

State Nature Sanctuary "Karakonuz Tract" (botanical)⁵⁻⁶

WDPA ID 16247

Area: 30.7 km²

Country: Kazakhstan

IUCN Management Category IV

The area is situated in the western spurs of the Zailiysky Alatau range, encompassing the foothill and mountainous parts of the Karakunuzka River, 65 km from the village of Korday, the district center. Zhambyl Region, Korday District.

Purpose of Establishment: The goal is to protect rare species and relict plants within a designated territory. The area is managed by the Committee of Forestry and Wildlife of the Ministry of Ecology, Geology, and Natural Resources of the Republic of Kazakhstan.

Flora: the reserve spans a picturesque valley of the Karakunuz River, featuring diverse woody and shrub vegetation with up to 520 species, including: European crab apple (*Malus sylvestris*), cherry plum (*Prunus cerasifera*), Virginia creeper (*Parthenocissus quinquefolia*), Turkestan shrub maple (*Acer semenovii*), oak (*Quercus robur*), aspen (*Populus tremula*), walnut (*Juglans regia*), mulberry (*Morus alba*), European feather grass (*Stipa pennata*), anabasis (*Anabasis salsa*), Volga fescue (*Festuca valesiaca*), white acacia (*Acacia albida*), among others. According to literature, the reserve is home to plant species listed in the Red Book of Kazakhstan: Kazakhstan apple (*Malus sieversii*), common grape vine (*Vitis vinifera*), and Caucasian hackberry (*Celtis caucasica*). Protected species within the reserve include Tianshan cherry (*Cerasus tianshanica*), Sogdian cherry and cherry plum (*Prunus sogdiana*), Turkestan shrub maple (*Acer semenovii*), white mulberry (*Morus alba*), walnut (*Juglans regia*), common oak (*Quercus robur*), and aspen (*Populus tremula*).

Fauna: protected species within the reserve include: wild boar (*Sus scrofa*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), European badger (*Meles meles*), Siberian roe deer (*Capreolus pygargus*), gray marmot (*Marmota baibacina*), Eurasian sparrowhawk (*Accipiter nisus*), common quail (*Coturnix coturnix*), mallard duck (*Anas platyrhynchos*), chukar partridge (*Alectoris chukar*), and common pheasant (*Phasianus colchicus*). According to literature, two animal species in the Karakunuz Area Reserve are listed in the Red Book of Kazakhstan: Indian crested porcupine (*Hystrix indica*) and golden eagle (*Aquila chrysaetos*).

Kochkor Wildlife Refuge⁷

WDPA ID 167103

Area: 23.3 km²

Country: Kyrgyzstan

IUCN Management Category IV

Issyk-Kul State Nature Reserve⁸

Year of nomination 2001

Country: Kyrgyzstan

Area: 631158 ha

The central Tien-Shan mountain region around the Issyk-Kul lake is an area one of the last harmonic cultural landscapes in Central Asia preserving natural habitats in combination with traditional culture. The mountain area of the central Tien-Shan region with the Issyl-Kul Lake in its center is home to many ecosystems of global importance and has a wide variety of endemic species of wild fauna and flora. The Issyk-Kul Lake with its 180 km length and 60 km width is the second largest high mountain lake in the world. Because of its depth of 700 meters, its low salinity and because of warm water sources it even in the winter never freezes. Starting from the lake shore all significant landscapes from the sub-tropical to tundra can be found in an azonal order. The fauna of the reserve is characterized by high species diversity and unequal distribution on different landscapes. There are 335 species of animals: Amphibia – 3 species; Reptiles- 11 species; Mammalia- 54 species; Birds- 267 species. 39 species are included in the Red Book of Kyrgyzstan. The main objective of the government is the development of ecologically sound land use practices and economic activities in this area.

The Issyk-kul State Nature Reserve with the Issyk-kul Lake⁹

Site number: 1231

Country: Kyrgyzstan

Area: 626,439 ha

Issyk-Kul State Nature Reserve with the Issyk-Kul Lake. 12/11/02; Issyk Kul Province; 626,439 ha; 42°25'00"N 077°15'00"E. (First designated for the Ramsar List by the Soviet Union in 1976, added to the Montreux Record, 4 July 1990.) UNESCO Biosphere Reserve. The second largest saline lake in the world, Isyk-Kul is fed by over 80 streams and minor channels, but has no outflow. The name means "hot lake" because, despite its high altitude (1609m), the lake itself never freezes over – the average water temperature is 22° C. The site is of primary importance as a wintering site for migratory waterbirds (up to 70,000 birds recorded annually). Notable waterbird species include the endangered White-headed Duck (*Oxyura leucocephala*). The lake is home to 28 fish species of which 7 are found nowhere else in the world. The silt from the lake and the hot springs at Aksu

are thought to have medicinal properties, which has led to the development and expansion of health resorts along its shore. Ramsar site no. 1231 (formerly Ramsar site no. 109). Most recent RIS information: 2013.

Western Issyk Kul Lake¹⁰

IBA criteria met: A1, A4i, A4iii (2010)

Country: Kyrgyzstan

Area: 2,700 ha

Site description (2006 baseline): The territory includes dry steppes and semi-deserts, part of the Issyk-Kul Lake, and foothill-adyr areas. Vertical differentiation of relief and heterogeneity of soil conditions create various landscapes of dry-steppes and stony-deserts. The territory is close to the Balykchy city.

Key biodiversity: Criterion A1 is applied to the site because of Pallas's sandgrouse (*Syrrhaptes paradoxys*), Saker falcon (*Falko cherrug*), and wintering species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*). Criterion A4iii is applied because of a high number of wintering waterfowl and waterbirds: Anseriformes, Podicipedidae, Laridae and waders during the passage. According to winter counts every year from 25 to 80 thousand individuals of 30 species winter here. The site hosts 267 bird species. Shallows and inlets are used by birds in wintertime. Coot (*Fulica atra*) and Mallard breed here. IBA is the wintering ground for Whooper swan (*Cygnus cygnus*), Gadwall, and Garganey. During migration Northern Pintail, Common Teal and waders are found here. Stony desert areas are home to the Pallas's sandgrouse, Lesser short-toed lark, Oenanthe spp. The Foothill zone hosts Saker, Golden eagle, Egyptian and other vulture species.

Non-bird biodiversity: Mammals dominating in steppe areas are: the European suslik, jerboa, vole, and Tolai hare, as well as Long-eared hedgehog; predators - wolf, fox, manul and weasel. Reptiles are presented with 2 species: Steppe runner and Multi-Ocellated Racerunner. Plants are ephedra, nitaria, Thermopsis genus and sea buckthorn. Lake Issyk-Kul hosts 28 species of fish and 8 of them are endemics such as Naked Osman, Balkhash Marinka and others.

Tokmak Pheasant Reserve¹¹

IBA criteria met: A1, A4i (2010)

Country: Kyrgyzstan

Area: 3,000 ha

Site description (2006 baseline): the IBA is located in Chu region of Chu Province, 5 km to the west of Tokmok city. This territory is situated in the middle of Chu valley and is the most preserved wetland area in this valley. It stretches from the Boom gorge in the east and the Muyunkum desert in the west. This is a relatively flat area with altitudinal differences from 420 to 440 m above sea level. It is confined by the ancient river bed Chu in the south and flood flows of modern River Chu in the north. There are 4 artificial ponds in the northern part of IBA totalling 5 ha. Rivers, springs, their numerous outflows and river-formed lakes don't freeze during the winter time. In cold winters ponds cover in ice sheets for several days, but melt once it gets warmer. The main part of the IBA (about 70%) is covered with reed beds, and sea buckthorn with patches of willow, poplar and elm trees. Farmlands used as pastures are in the eastern part of IBA. In the 1960s this territory belonged to the State reserve to conserve and reintroduce Common pheasant and since 1997 has been used as a hunting area.

Key biodiversity: Criterion A4i is applied to this site because it is a stopover for hundreds of thousands of birds during the spring and autumn migration. This is the only place for dozens of species of waterfowl, waterbirds, raptors and passerine birds to have a rest and feed after crossing high mountains. This is also a wintering place for raptors, waterfowl and local mountain passerine birds. The abundance of reedbeds, the good food supply of berries, wetlands and shallows provide

high diversity and congregation of birds during all seasons, especially during spring and autumn migration, when reedbeds host tens of thousands of birds.

Non-bird biodiversity: This is the only place in the lower part of the Chu Valley supporting a population of roe deer (about 80 individuals), a relatively high number of foxes, common voles, muskrats and jackals. Central Asian frog is also found here. Endemic Orchidaceae species are found here as well.

Annex E: Preliminary Priority Biodiversity Features and Critical Habitat assessment

Preliminary screening for any triggers of a CH or PBF determination was conducted following the most recent guidance for such issued by IFC and EBRD. The Project area does not have any highly unique or threatened ecosystem types or distinctive evolutionary processes that could result in a CH determination under IFC CH criteria 4 or 5 (roughly equivalent to EBRD CH criteria 1 and 5, respectively), hence the CH/PBF screening was then accordingly limited to species, and multi-species groupings of biological taxa.

A master list of potential CH/PBF trigger species was first compiled by reviewing the IBAT report, the IUCN red list of threatened species, the eBird database, and the national redlist. From this master list, species falling into the following categories were considered to have negligible likelihood of being affected by the Project, and were eliminated: species that are extinct from the country/region; species that occur in Kyrgyzstan only as extreme rarities (i.e. vagrants or accidentals); species with no geographic and/or ecological overlap with the Project area.

This produced a list of species that were considered possible CH/PBF triggers, and subjected to additional screening against the IFC and EBRD CH/PBF criteria. For the purpose of this preliminary and desk-based analysis, three simplified and conservative Ecologically Appropriate Areas of Analysis (EAAA) were used for all potential CH trigger species. The EAAA that was used for each screened receptor is indicated in Table 1, and the EAAA are described in more detail in Table 2 and illustrated in Figures A1-A3.

The list of possible trigger species, and the results of the preliminary CH/PBF classifications of them, based on the screening analysis, are presented in Table 1. Additional textual description regarding the potential for the project to impact these receptors is presented below. This screening was conducted exclusively on the basis of desktop-available resources, including the IBAT report, the IUCN redlist of threatened species, the national red list of Kyrgyzstan, and the eBird database, hence the list of potential CH/PBF trigger species, and the conclusions regarding CH and PBF determinations should be regarded as preliminary, subject to finalization on the basis of the analysis of site-specific field data on biodiversity, to be presented within the final ESIA.

Table A1: Results of preliminary Critical Habitat and Priority Biodiversity Feature Preliminary Screening

Feature ⁸⁴	Higher taxon (CLASS)	IUCN global status ⁸⁵	Kyrgyz RDB status ⁸⁶	Applicable CH/PBF criterion ⁸⁷			EAAA	IUCN minimum global population estimate ⁸⁸	Determination ⁸⁹	Rationale
				Threatened/Vulnerable Species	Range- restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Plain Thicklip Loach <i>Triplophysa labiata</i>	ACTINOPTERYGII	VU	NA	X			2	N/A	PBF	Project not likely to result in species' up- listing to globally CR/EN.
Issyk-Kul Dace Leuciscus bergi	ACTINOPTERYGII	VU	NA	X	X		2	N/A	PBF	Project not likely to result in species' up- listing to globally CR/EN, and EAAA not likely to contain at least 10% of global population
Schmidt's Dace Leuciscus schmidtii	ACTINOPTERYGII	VU	NA	X	X		2	N/A	PBF	Project not likely to result in species' up- listing to globally CR/EN, and EAAA not likely to contain at least 10% of global population

84 The ecosystems and habitats potentially affected by the Project did not meet any of the criteria for “priority ecosystems,” including “threatened ecosystems,” “highly threatened or unique ecosystems” (IFC CH criterion 4 = EBRD CH criterion i), “areas associated with key evolutionary processes” (CH criterion v), or “threatened habitats” (PBF criterion i) as defined in EBRD PR6 and the associated Guidance Note 6. Neither were the criteria met for any “significant biodiversity features identified by a broad set of stakeholders or governments” (PBF criterion iii), or “ecological structure and functions needed to maintain the viability of priority biodiversity features” (PBF criterion iv), hence the only biodiversity features included in this table are species (and their habitats) that met one or more of the species-specific CH or PBF criteria/thresholds, as described in the table.

85 <https://www.iucnredlist.org/> accessed 28 November 2024

86 Red Data Book of Kyrgyzstan, latest edition published in 2006.

87 Kyrgyzstan is neither a member of the EU, nor a Bern Convention signatory, hence the specific CH/PBF criteria relating to habitats and species that receive special protection under EU nature legislation are not considered applicable, per EBRD GN6.

88 <https://www.iucnredlist.org/> accessed 28 November 2024

89 PBF = Priority Biodiversity Feature, per EBRD PR6

Feature ⁸⁴	Higher taxon (CLASS)	IUCN global status ⁸⁵	Kyrgyz RDB status ⁸⁶	Applicable CH/PBF criterion ⁸⁷			EAAA	IUCN minimum global population estimate ⁸⁸	Determination ⁸⁹	Rationale
				Threatened/Vulnerable Species	Range- restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Ili Marinka Schizothorax pseudobalsaiensis	ACTINOPTERYGII	VU	EN	X	X		2	N/A	PBF	EAAA not likely to contain at least 0.5% of global population
Asian Frog Rana asiatica	AMPHIBIA	VU	VU	X			3	N/A	PBF	Project not likely to result in species' up- listing to globally CR/EN
Common Pochard <i>Aythya ferina</i>	AVES	VU	NA	X		X	2	760,000- 790,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
White-headed Duck Oxyura leucocephala	AVES	EN	EN	X		X	2	5,300-8,700	PBF	EAAA not likely to contain at least 0.5% of global population
Yellow-eyed Pigeon Columba eversmanni	AVES	VU	VU	X			1	10,000- 19,999	PBF	Project not likely to result in species' up- listing to globally CR/EN
European Turtle-dove Streptopelia turtur	AVES	VU	NA	X		X	1	12,800,000- 47,600,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
Demoiselle Crane Anthropoides virgo	AVES	LC	NT			X	1	230,000- 261,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Common Crane Grus grus	AVES	LC	NA			X	1	491,000- 503,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle

Feature ⁸⁴	Higher taxon (CLASS)	IUCN global status ⁸⁵	Kyrgyz RDB status ⁸⁶	Applicable CH/PBF criterion ⁸⁷			EAAA	IUCN minimum global population estimate ⁸⁸	Determination ⁸⁹	Rationale
				Threatened/Vulnerable Species	Range- restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Sociable Lapwing <i>Vanellus gregarius</i>	AVES	CR	CR	X		X	2	11,200	PBF	EAAA not likely to contain at least 0.5% of global population
Horned Grebe <i>Podiceps auritus</i>	AVES	VU	NA	X		X	2	N/A	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
Arctic Loon <i>Gavia arctica</i>	AVES	LC	CR	X		X	2	N/A	PBF	EAAA does not support a nationally important concentration
Great White Pelican <i>Pelecanus onocrotalus</i>	AVES	LC	NT			X	2	265,000- 295,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Dalmatian Pelican <i>Pelecanus crispus</i>	AVES	NT	VU			X	2	11,400- 13,400	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Bearded Vulture <i>Gypaetus barbatus</i>	AVES	NT	NT			X	1	1,675-6,700	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Egyptian Vulture <i>Neophron percnopterus</i>	AVES	EN	VU	X		X	1	12,400- 36,000	PBF	EAAA not likely to contain at least 0.5% of global population
Cinereous Vulture <i>Aegypius monachus</i>	AVES	NT	NT			X	1	16,800 – 22,800	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle

Feature ⁸⁴	Higher taxon (CLASS)	IUCN global status ⁸⁵	Kyrgyz RDB status ⁸⁶	Applicable CH/PBF criterion ⁸⁷			EAAA	IUCN minimum global population estimate ⁸⁸	Determination ⁸⁹	Rationale
				Threatened/Vulnerable Species	Range- restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Himalayan Griffon <i>Gyps himalayensis</i>	AVES	NT	LC			X	1	66,000-334,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle
Greater Spotted Eagle <i>Clanga clanga</i>	AVES	VU	NT	X		X	1	3,900-10,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
Steppe Eagle <i>Aquila nipalensis</i>	AVES	EN	NT	X		X	11	50,000-75,000	PBF	EAAA not likely to contain at least 0.5% of global population
Imperial Eagle <i>Aquila heliaca</i>	AVES	VU	VU	X		X	1	2,500-9,999	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
Golden Eagle <i>Aquila chysaetos</i>	AVES	LC	NT			X	1	85,000-160,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle.
Saker Falcon <i>Falco cherrug</i>	AVES	EN	EN	X		X		12,200-29,800	PBF	EAAA not likely to contain at least 0.5% of global population
Marbled Polecat <i>Vormela peregusna</i>	MAMMALIA	VU	CR	X			1	N/A	PBF	Project not likely to result in species' up-listing to globally CR/EN, and EAAA not likely to contain a nationally important concentration

Feature ⁸⁴	Higher taxon (CLASS)	IUCN global status ⁸⁵	Kyrgyz RDB status ⁸⁶	Applicable CH/PBF criterion ⁸⁷			EAAA	IUCN minimum global population estimate ⁸⁸	Determination ⁸⁹	Rationale
				Threatened/Vulnerable Species	Range- restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Snow Leopard <i>Panthera uncia</i>	MAMMALIA	VU	CR	X			1	2,710-3,386	PBF	EAAA not likely to contain a nationally important concentration
<i>Tulipa zenzaidae</i>	LILIOPSIDA	VU	VU	x	x		3	Over 10,000	PBF	Project not likely to result in species' up-listing to globally CR/EN
<i>Tulipa greigii</i>	LILIOPSIDA	LC	EN	x			3	N/A	PBF	EAAA not likely to contain a nationally important concentration
<i>Chesneya villosa</i>	FABACEAE	-	EN	x			3	N/A	PBF	EAAA not likely to contain a nationally important concentration

Table A2. Description of the Ecologically Appropriate Areas of Analysis (EAAA) used for different taxa in the CH/PBF screening

EAAA #	Applicable species	Description	Rationale
1	<i>Birds:</i> Saker Falcon, Bearded Vulture, Egyptian Vulture, Cinereous Vulture, Himalayan Griffon, Imperial Eagle, Greater Spotted Eagle, Steppe Eagle, Golden Eagle, Yellow-eyed Pigeon, European Turtle Dove <i>Mammals:</i> Snow Leopard, Marbled Polecat	10 km buffer around the OHTL route (Figure A1).	Potential use of the Project site by breeding, wintering and migrating raptors and vultures, and other species of migratory birds and mammals which can easily disperse
2	<i>Birds:</i> Sociable Lapwing, White-headed Duck, Common Pochard, Horned Grebe, Arctic Loon, Dalmatian Pelican, Great White Pelican <i>Fish:</i> Severtsov's Loach, Plain Thicklip Loach, Issyk-Kul Dace, Schmidt's Dace, Ili Marinka.	5 km around the easternmost 5 km section of the OHTL route (Figure A2).	Used for water birds and fish, and focused on potential area of impact for biodiversity receptors that are highly associated with Lake Issyk-Kul
3	<i>Amphibians:</i> Asian Frog Plants: Tulipa zenaidae, Tulipa greigii, Chesneya villosa	1 km buffer around OHTL route (Figure A3).	Used for sessile species (plants), insects, fungi, and reptiles/amphibians.

Figure A1: Ecologically Appropriate Areas of Analysis #1 – OHTL route and 10 km buffer (Option 1)

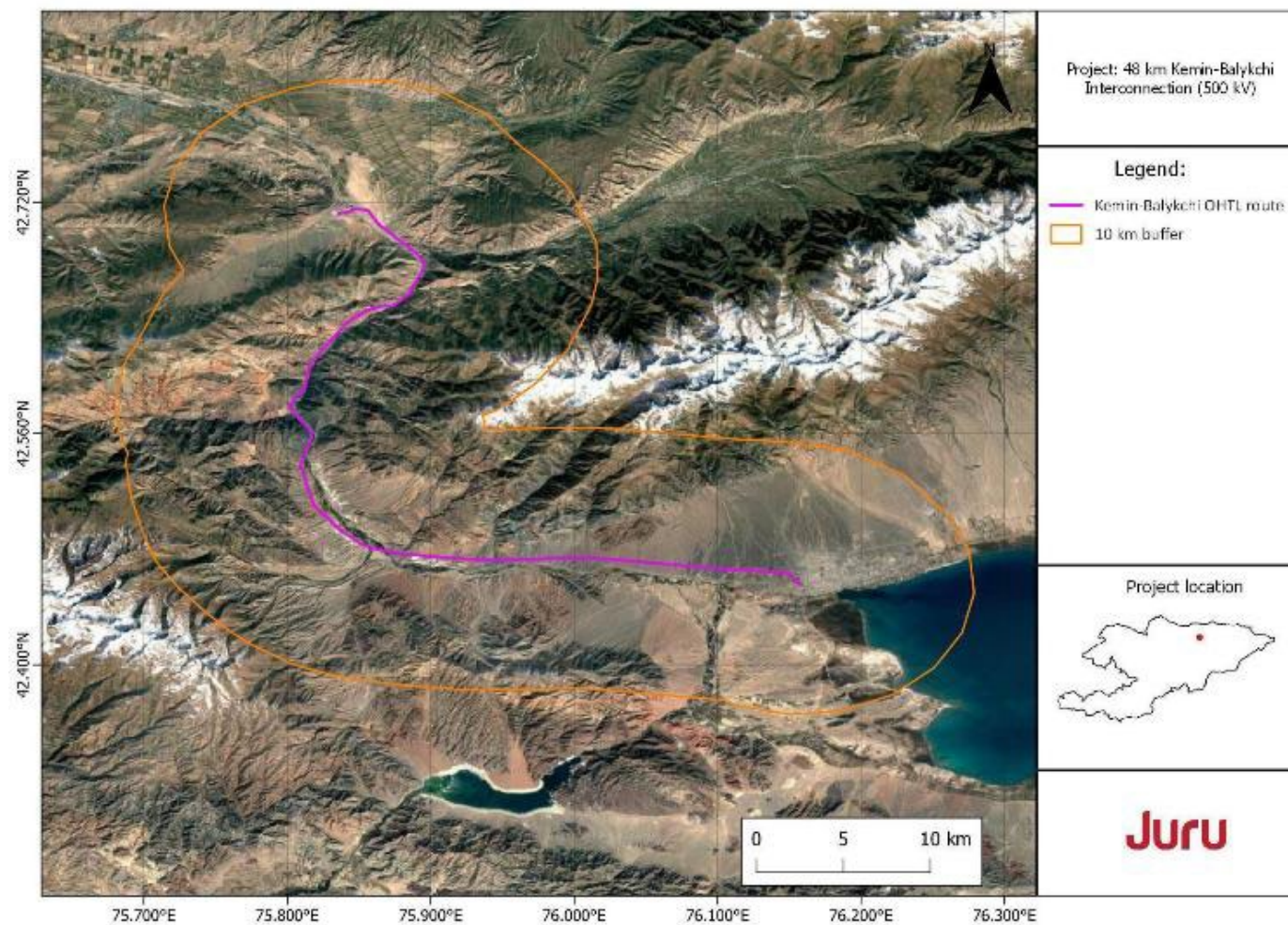


Figure A2: Ecologically Appropriate Areas of Analysis #1 – OHTL route and 10 km buffer (Option 2)

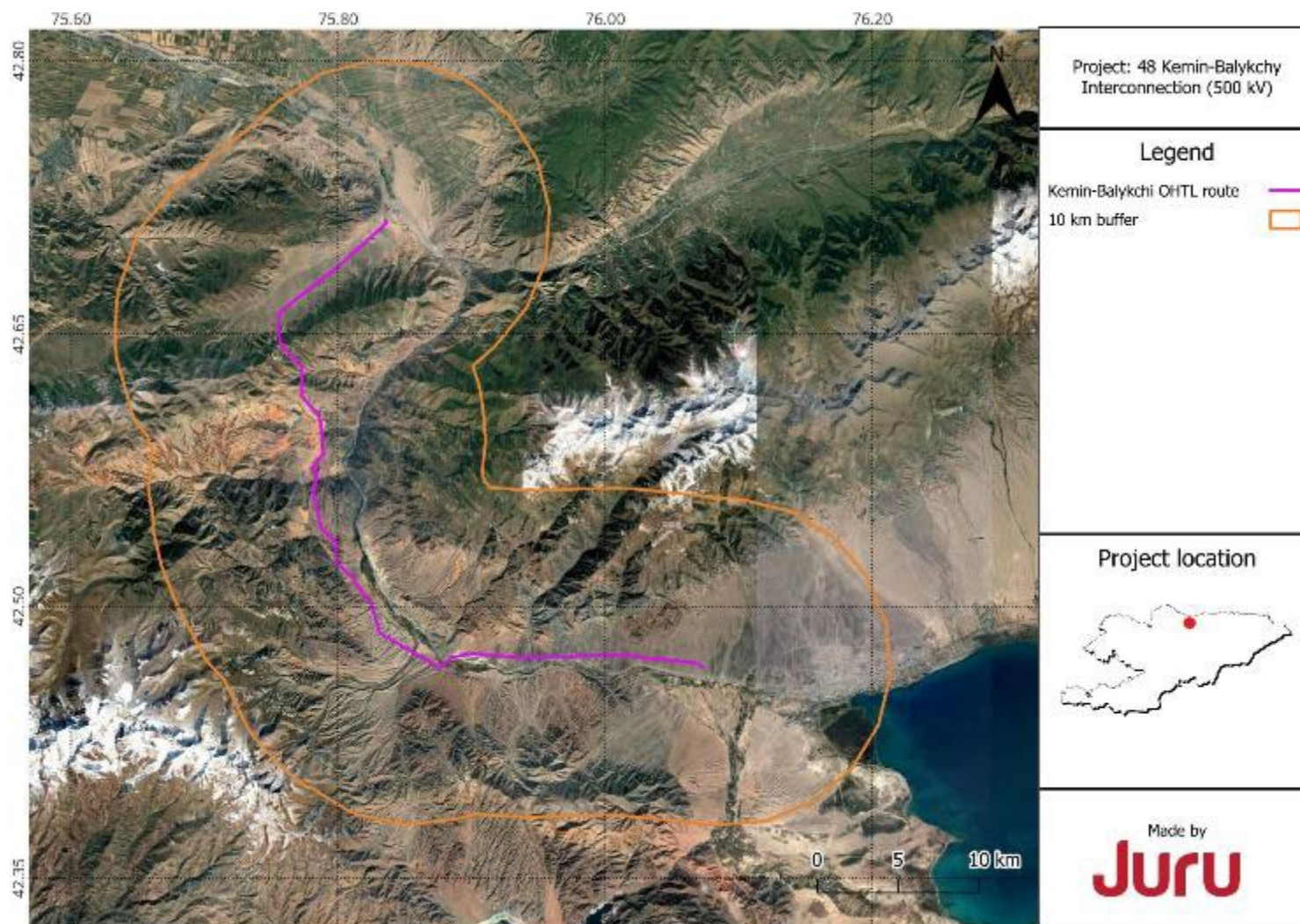


Figure A3: Ecologically Appropriate Areas of Analysis #2 – OHTL route and 10 km buffer around the easternmost 5 km section (Option 1)

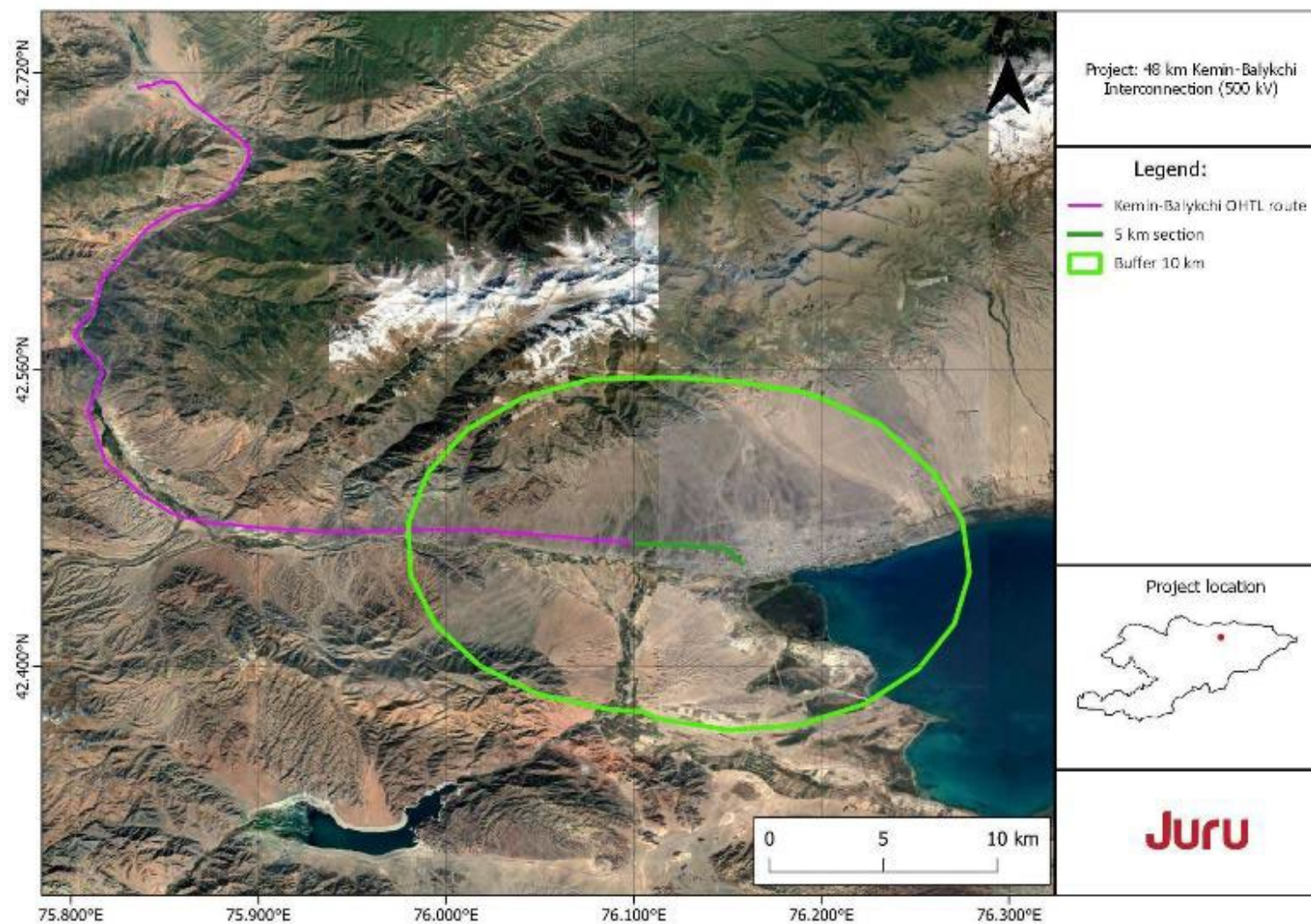


Figure A4: Ecologically Appropriate Areas of Analysis #2 – OHTL route and 10 km buffer around the easternmost 5 km section (Option 2)

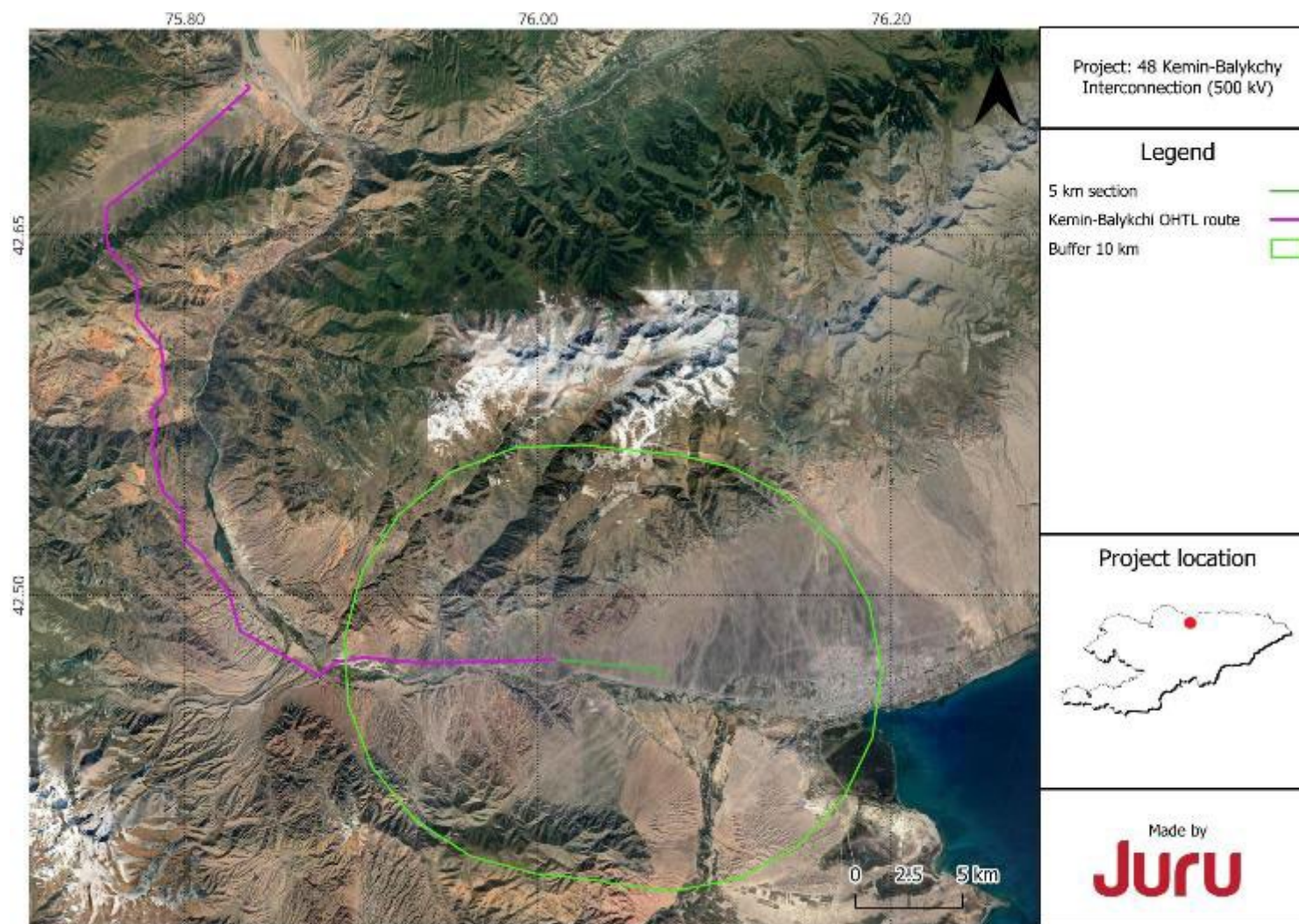


Figure A5: Ecologically Appropriate Areas of Analysis #3 – OHTL route and 1 km buffer (Option 1)

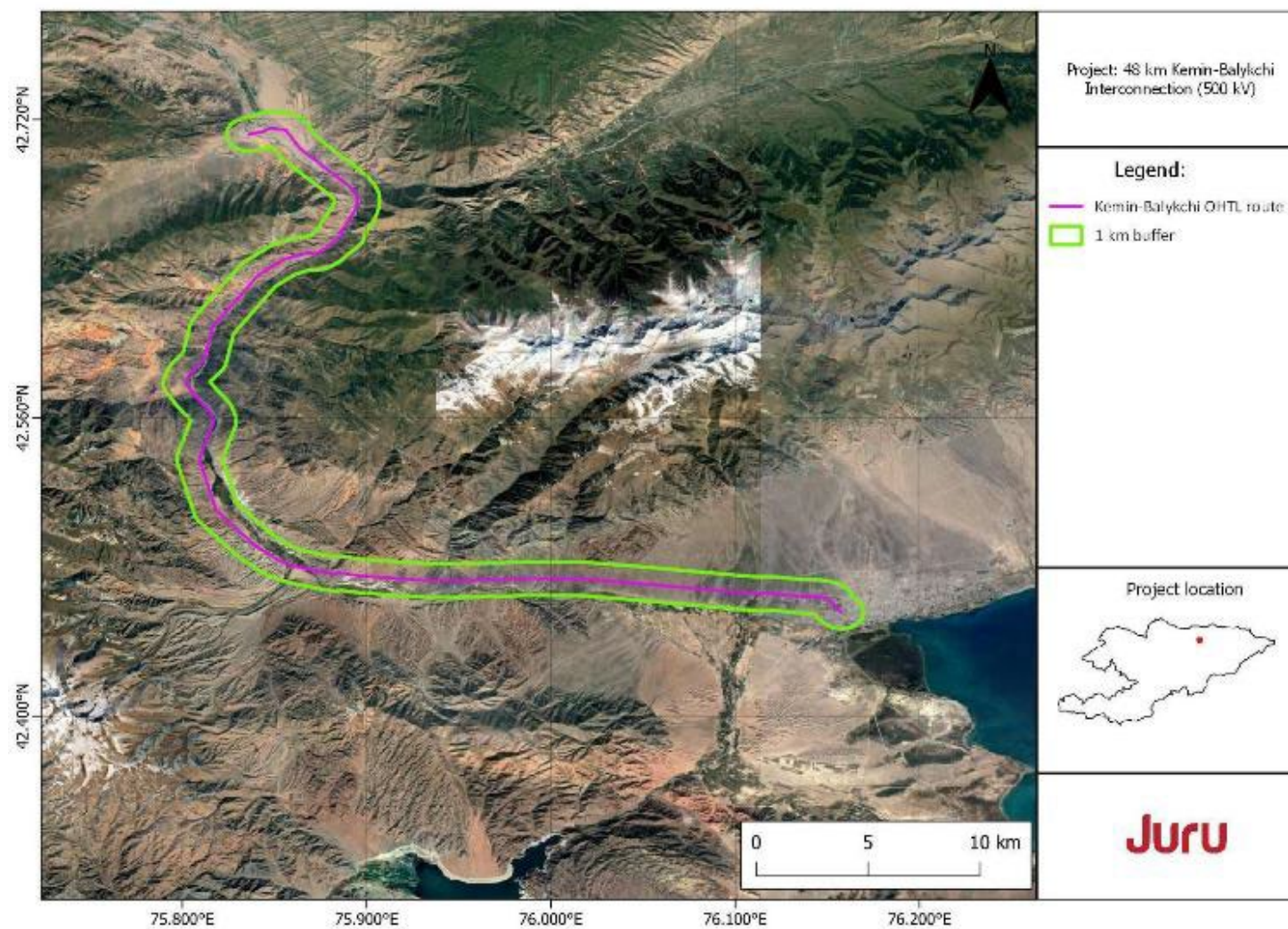
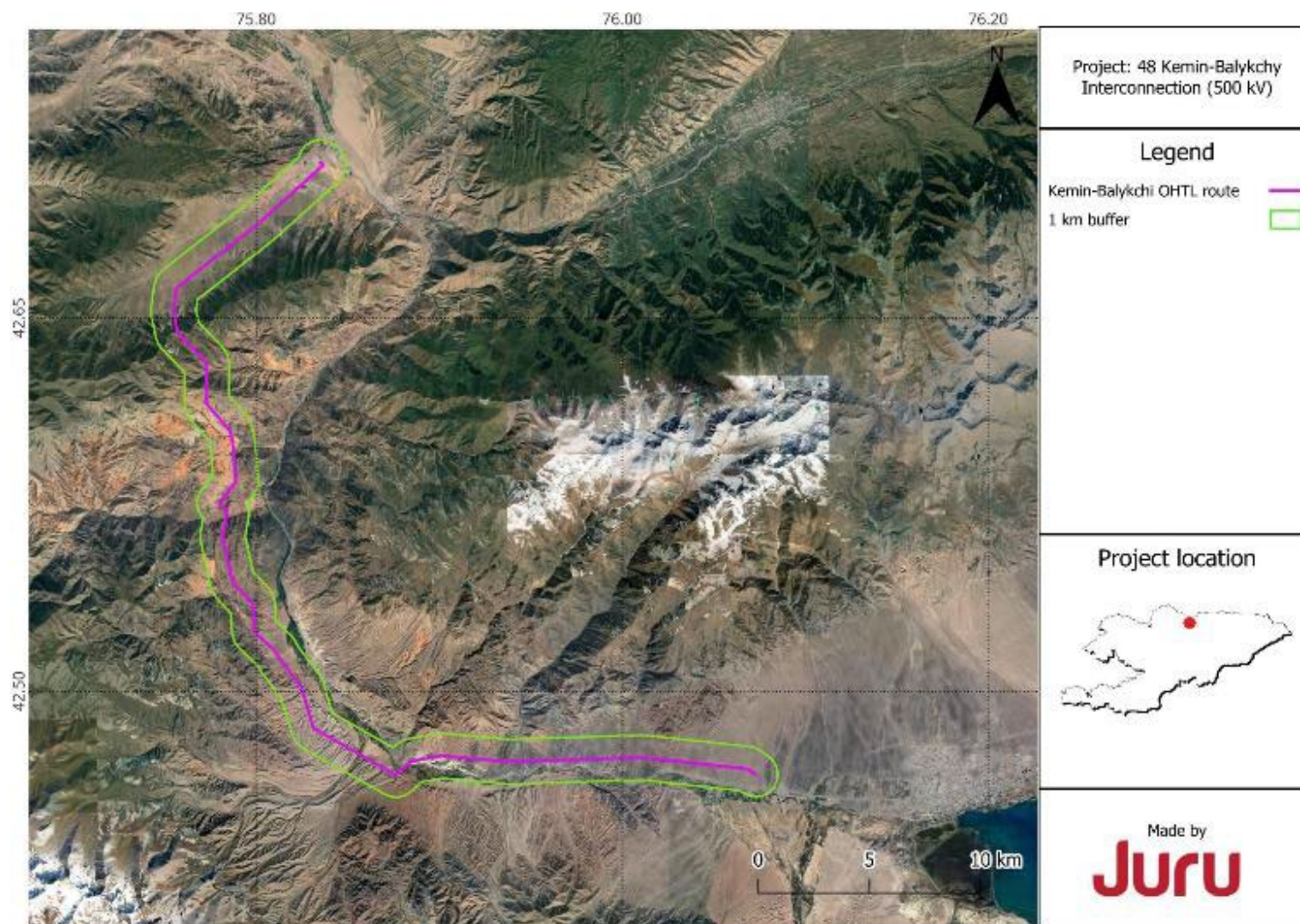


Figure A6: Ecologically Appropriate Areas of Analysis #3 – OHTL route and 1 km buffer (Option 1)



Regional status and ecology of PBF/CH trigger species**Plain Thicklip Loach**

Occurs in rivers flowing into Issyk-Kul Lake from the north-east, no recent confirmed occurrence in the vicinity to the project site. It inhabits middle sections of rivers, as well as lakes, and prefers sites covered with plants, feeding mostly on aquatic invertebrates.

Issyk-Kul Dace

This species is endemic to Issyk-Kul Lake, where it was and still is a major target of fisheries. It strongly declined until the 1990s but the population seems to have stabilised since at a low level. The species is very vulnerable to future alien species introductions and these could push the species to becoming Critically Endangered or Extinct in a very short time period. Therefore, this species is assessed as Vulnerable. Prefers more fresh areas of the lake - bays, pre-mouth areas of rivers flowing into Issyk-Kul. In wintertime they sink to depths of 140-150 metres.

Plain Thicklip Loach

Occurs in rivers flowing into Issyk-Kul Lake from the north-east, no recent confirmed occurrence in the vicinity to the project site. It inhabits middle sections of rivers, as well as lakes, and prefers sites covered with plants, feeding mostly on aquatic invertebrates.

Schmidt's Dace

This species is endemic to Issyk-Kul Lake. The population declined significantly at the end of the 1970s due to alien fish introduction and continued to decline strongly until the 1990s due to intensive fisheries. Since the 1990s, the population is thought to have stabilised at a low level, although the data to support this are poor. The commercial fishery in the lake was stopped between 2008 to 2018. However, indigenous fish stocks are still declining slowly due to illegal fisheries. The recent decline (over the past three generations) is not thought to be of high enough magnitude to list this species as threatened or Near Threatened. However, the species is very vulnerable to future alien species introductions and these could push the species to becoming Critically Endangered or Extinct in a very short time period. Therefore, this species is assessed as Vulnerable. Further research and monitoring are recommended. Prefers more fresh areas of the lake. In wintertime they sink to depths of 50-60 metres.

Ili Marinka

This species is currently found in the Lake Balkhash, Chu River and Issyk-Kul basins, with a restricted area of occupancy (AOO) of 300 km². Historically, it was more widespread but it has been extirpated from a number of lakes due to fishing pressure and the introduction of invasive species. This has caused a decline in the AOO, which is thought likely to continue into the future. There are six locations based on the primary threat of fishing. The majority of its populations are currently thought to be stable, but the threat of overfishing is thought significant enough that it

could push the species to becoming Critically Endangered or Extinct in a very short time period. It is therefore assessed as Vulnerable. It inhabits Lake Issyk-Kul, as well as rivers. Very little data available on ecology.

Asian Frog

Listed as Vulnerable because of an estimated population decline, suspected to be more than 30% over the past 12–15 years (which represents three generation lengths), inferred from the impact of habitat loss and degradation, as well as exploitation. The population reduction is thought to be greater than 30% for the whole range (and up to 50% for the Chinese subpopulations; L. Shi pers. comm. June 2019) but further population declines estimates could not be made for Kazakhstan and Kyrgyzstan at this time. It is a conservative estimate of decline for the species, and its population is continuing to decline and monitoring is required. Primarily inhabits wooded areas in river valleys, steppes, and deserts at elevations ranging from 350 to 3000 m above sea level. In the Chu-Issyk-Kul basin, it prefers natural, unpolluted semi-aquatic habitats in zones of groundwater emergence. Spends most of its life on land, active during the day and evening. Hibernation ends between March and May, depending on habitat conditions, with spawning occurring from May to June.

Common Pochard

Widespread, relatively common breeding and migratory species.

White-headed Duck

Rare wintering bird (based on expert review).

Yellow-eyed Pigeon

In the last century, it was reported as a nesting species in the Chuy Valley on river cliffs along the Chu and Ak-Su rivers. No recent records exist from anywhere in Kyrgyzstan.

European Turtle-dove

A rare breeding migrant.

Demoiselle Crane

A migratory species passing through the Issyk-Kul province during spring and autumn migrations. Stops in the area to rest at shorelines and floodplains and is often observed feeding on adjacent agricultural land.

Common Crane

A migratory species, passing through during spring and autumn migrations. Often seen in small groups or together with flocks of Demoiselle Cranes.

Sociable Lapwing

A migratory species, passing through during spring and autumn migrations.

Horned Grebe

An uncommon breeding species.

Arctic Loon

A rare winter visitor.

Great White Pelican

A very rare vagrant winter visitor. Uses water bodies for stopovers during migration.

Dalmatian Pelican

A migratory species, rare vagrant visitor. Uses water bodies for stopovers during migration.

Bearded Vulture

A resident mountain species. Usually found nesting and feeding in narrow gorges and along rocky mountain slopes.

Egyptian Vulture

A rare visitor, does not occur every year.

Cinereous Vulture

A regularly observed around Lake Issyk-Kul, inhabiting the mountainous and steppe areas surrounding the lake, where it finds food and nesting sites.

Himalayan Griffon

A resident species frequenting the surrounding mountainous areas, where it scavenges and occasionally nests.

Greater Spotted Eagle

It could be observed around Lake Issyk-Kul, primarily during migration periods, using the wetlands and surrounding habitats as stopover sites.

Steppe Eagle

A migratory species that utilizes open steppe and semi-desert habitats as stopover sites.

Imperial Eagle

A rare winter visitor and passage migrant.

Golden Eagle

A relatively common breeding species.

Saker Falcon

A rare migrant and wintering bird, recent breeding has not been confirmed. Feeds on rodents and birds.

Marbled Polecat

In Kyrgyzstan, it formerly inhabited areas surrounding water reservoirs in the Issyk-Kul basin. No recent records exist from the area.

Snow Leopard

Potentially present during local seasonal migrations and dispersal (based on expert opinion).

Tulipa zenzuoides

Potentially present only around the westernmost part of the project site.

Tulipa greigii

Potentially present only around the westernmost part of the project site.

Chesneya villosa

One of three very rare species of this genus in Kyrgyzstan.

Annex F: Baseline noise, air quality and soil surveys (interim reports for surveys conducted in 2024).



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Noise and Air quality report

Consulting Firm:

Juru

Juru Ltd

Suite 1, One George Yard, London,
United Kingdom, EC3V 9DF

www.juru.org

Prepared for:



**Joint-Stock «National Electric Grid of
Kyrgyzstan» (NEGK)**

Principal office: Zhibek Zholu Avenue, 326, Bishkek
Kyrgyz Republic, 720070

www.nesk.kg

Table of Contents

1.	Introduction.....	3
1.1.	Overview.....	3
1.2.	Sampling overview	3
2.	Measurement methodology.....	4
2.1.	Noise	4
2.2.	Air quality	4
3.	Measurement equipment.....	5
4.	Applicable standards.....	6
5.	Monitoring results and standards	8
5.1.	Summary tables noise and air.....	8
5.2.	Summary graph results.....	11
6.	Conclusion.....	17
6.1.	Noise	17
6.2.	Air quality	17
	Annex 1: Pictures of Air and Noise monitoring	18
	Annex 2: Certificates of equipment	24
	Certificate of calibration	24
	Certificate of calibrated air monitoring system.....	26
	Annex 3: Raw data	27

Table of Figures

Figure 1: Noise and air monitoring locations	4
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Table of Tables

Table 1: Location of nearest sensitive receptors	4
Table 2: Locations of the planned noise and air monitoring	5
Table 3: The measurement equipment used for noise monitoring	5
Table 4: The measurement equipment used for air monitoring	5
Table 5: National noise limits	6
Table 6: WBG General EHS Guidelines: Environmental Noise Management (Table 1.7.1).....	6
Table 7: National Air quality standards.....	7
Table 8: WHO Ambient Air Quality Guidelines	7
Table 9: Summary of average noise values for 24 hr measurement per location, dBA	9
Table 10: 15-minute average concentrations for 24 hr measurement per location (in $\mu\text{g}/\text{m}^3$) (red cells indicate exceedance of the daily (24-hour) average MPC)	10

1. Introduction

1.1. Overview

The Project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. Three route options for the OHTL are under consideration. Two routes (Options 1 and 3) run parallel to the course of the transboundary Chu River on its right bank and cross the Boom Gorge. Route Option 2 deviates southwest from the River valley and crosses the eastern part of the Kyrgyz Range.

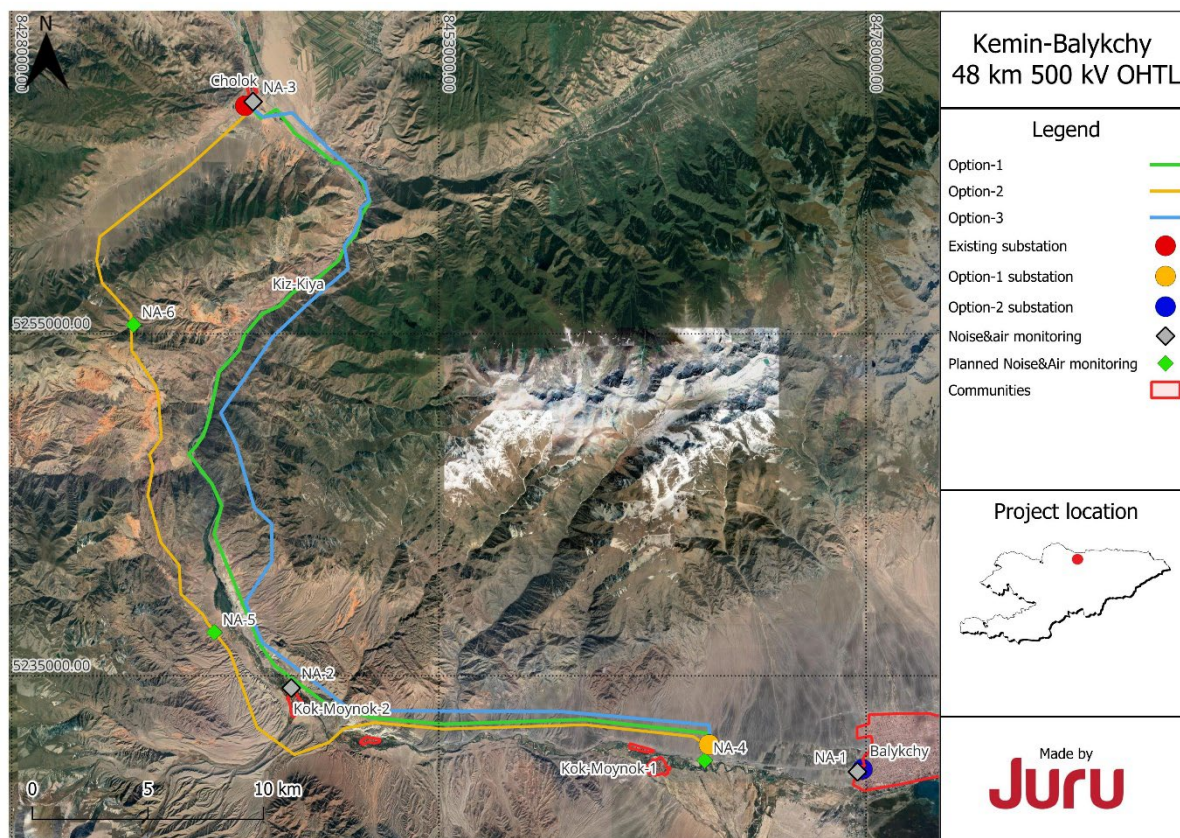
1.2. Sampling overview

In order to characterise the sound and air profile of the area of the proposed development to support future monitoring obligations or noise grievances, a continuous environmental noise and air quality (AQ) monitoring was carried out between 16 - 20 November 2024 at 3 nearest sensitive receptors (NSRs) for daytime and night-time noise (24hr). In addition, wind speed and direction, were also measured.

Three monitoring locations were chosen based on proximity to the proposed OHTL area and to provide representative conditions for the NSR that may be affected by the Project. AQ and noise monitoring locations were at the same places (Figure 1). The sampling coordinates are provided in Table 2

Since the first round of sampling was conducted to study Options 1 and 3, additional soil sampling is planned to reflect the baseline conditions of Option 2. The preliminary coordinates for the second round of sampling are provided in Table 2.

Figure 1: Noise and air monitoring locations



2. Measurement methodology

2.1. Noise

For the noise measurement an unattended noise meter Class 1 (Type 1) per IEC 61672-1. It was placed in the vicinity of NSR's, at 1.7 m above the ground level with no nearby reflective surfaces in minimum 5 m distance. The following parameters were recorded: L_{Aeq} , L_{Amax} , L_{Amin} , L_{A10} , L_{A90} . The L_{Aeq} level is the equivalent continuous sound pressure level over at the measurement period 10 minutes. L_{Amax} is an indicator of the highest sound level during the measurement period; the L_{Amin} is the lowest level during the measurement period; L_{A90} is used as a descriptor of background noise levels and L_{A10} is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.

2.2. Air quality

For the air measurement AQ Mesh was used. It was placed in the vicinity of NSR's, at 2.5 m above the ground level with no nearby reflective surfaces in minimum 15 m distance. The following parameters were recorded: carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particular matter (PM_{2.5}, PM₁₀). The characteristics of the NSR's are described in Table 1. The locations for additional monitoring along the Route option 2 are provided in Table 2.

Table 1: Location of nearest sensitive receptors

Location	Description	Coordinates Latitude	Coordinates Longitude
NA-1	EM-11 road on the western outskirts of the city of Balykchy	42.45508	76.15465
NA-2	EM-11 road near the Kok-Moynok-2 community	42.48752	75.85699
NA-3	M-036 road near Cholok community	42.71428	75.83692

Table 2: Locations of the planned noise and air monitoring

Location	Description	Coordinates Latitude	Coordinates Longitude
NA-4	EM-11 road near planned substation location and Kok-Moynok-1 community	42.45951	76.07443
NA-5	The Kok-Moynok canyon (tourist site)	42.50912	75.81656
NA-6	Ground road near the NABU Wildlife Rehabilitation Centre	42.62813	75.77407

3. Measurement equipment

The following equipment was use for the monitoring exercise.

Table 3: The measurement equipment used for noise monitoring

Item	Meter Model	Serial Number
Sound Level Meter	Rion NL 52	00410151
Calibrator	Calibrator Rion NL 75	34313059
Microphone	All-weather windscreen WS-15	Does not have SN

Table 4: The measurement equipment used for air monitoring

Item	Meter Model
Air quality monitoring system	AQ Mesh
Accumulator	Solar panel pack
Anemometer	Scarlet Tech anemometer

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤ 0.5 dBA. Sound meter fitted with a protective windshield for the entire measurements period. UKAS certificates are attached in Annex 1.

4. Applicable standards

National noise standards are set out by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Sanitary Rules and Standards “Noise in Workplaces, Residential and Public Buildings, and Residential Areas” according to Appendix 14). The Table 5 presents the national Noise level standards.

Table 5: National noise limits

Receptor	L _{Aeq} (dBA)			
	Daytime 07.00-23.00		Night-time 23.00 – 07.00	
	Average	Max	Average	Max
Areas directly adjacent to residential buildings, polyclinics, dispensaries, rest homes, boarding houses, libraries, schools, etc.	55	70	45	60
Areas directly adjacent to hospitals and sanatoriums	45	60	35	50
Areas directly adjacent to hotels and dormitories	60	75	50	65
Recreational zones near hospitals and sanatoriums	35	50	35	50
Recreational zones in residential micro-districts, construction of cottages, rest homes, sanatoriums, schools, retirement homes, etc.	45	60	45	60
Industrial; commercial	70	-	70	-

The international standards for noise are presented by the WBG EHS Guidelines. The reference values are provided in Table 6.

Table 6: WBG General EHS Guidelines: Environmental Noise Management (Table 1.7.1)¹

Receptor	One-hour L _{Aeq} (dBA)	
	Daytime 07.00-22.00	Night-time 22.00 – 07.00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

¹ Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

National Ambient Air Quality Standards, or Maximum Permissible Concentrations (MPCs), are established by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Approximate Safe Levels of Pollutant Exposure in the Atmospheric Air of Populated Areas" according to Appendix 17). The standard is provided in Table 7

Table 7: National Air quality standards

Pollutant	MPC (µg/m³)		
	One-time	24 hours	Working zone
Nitrogen Dioxide (NO ₂)	85	40	5000
Sulphur Dioxide (SO ₂)	500	50	10000
PM ₁₀	300	300	-
PM _{2.5}	160	160	-
Carbon Monoxide (CO)	5000	3000	20000

International standards are presented by the WHO Ambient Air Quality Guidelines. The standards are shown at Table 8.

Table 8: WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Concentration
PM _{2.5}	24 hours	15 µg/m³
PM _{2.5}	Annual	5 µg/m³
PM ₁₀	24 Hour	45 µg/m³
PM ₁₀	Annual	15 µg/m³
NO ₂	Hourly	200 µg/m³
NO ₂	Annual	10 µg/m³
NO ₂	24 hours	25 µg/m³
SO ₂	24 hours	40 µg/m³
CO	Maximum daily 8-hour mean	10 mg/m³

5. Monitoring results and standards

5.1. Summary tables noise and air

The data provided in Table 9 outlines the summary of noise measurements obtained from three different locations during specific time periods. The measurements are categorized by two distinct time intervals: daytime (from 07:00 to 23:00) and night-time (from 23:00 to 07:00).

The data provided in Table 10 summarises the average and maximum concentrations at NA-1, NA-2, NA-3 for each parameter CO, SO₂, NO₂, PM_{2.5}, PM₁₀. measured in µg/m³ over a 24 hour period at 15-minute intervals and displayed for daytime and night-time (07:00-23:00 and 23:00-07:00).

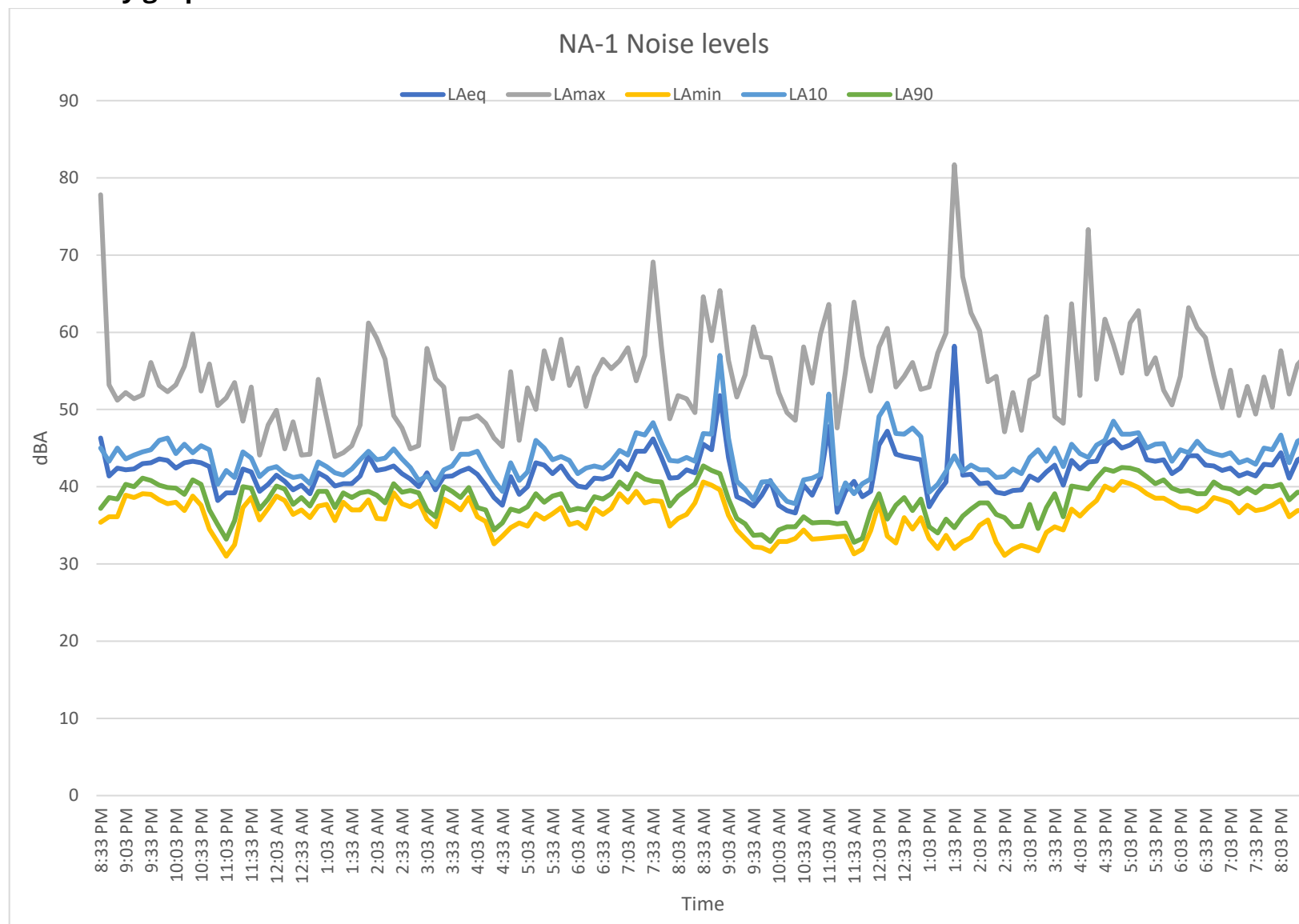
Table 9: Summary of average noise values for 24 hr measurement per location, dBA

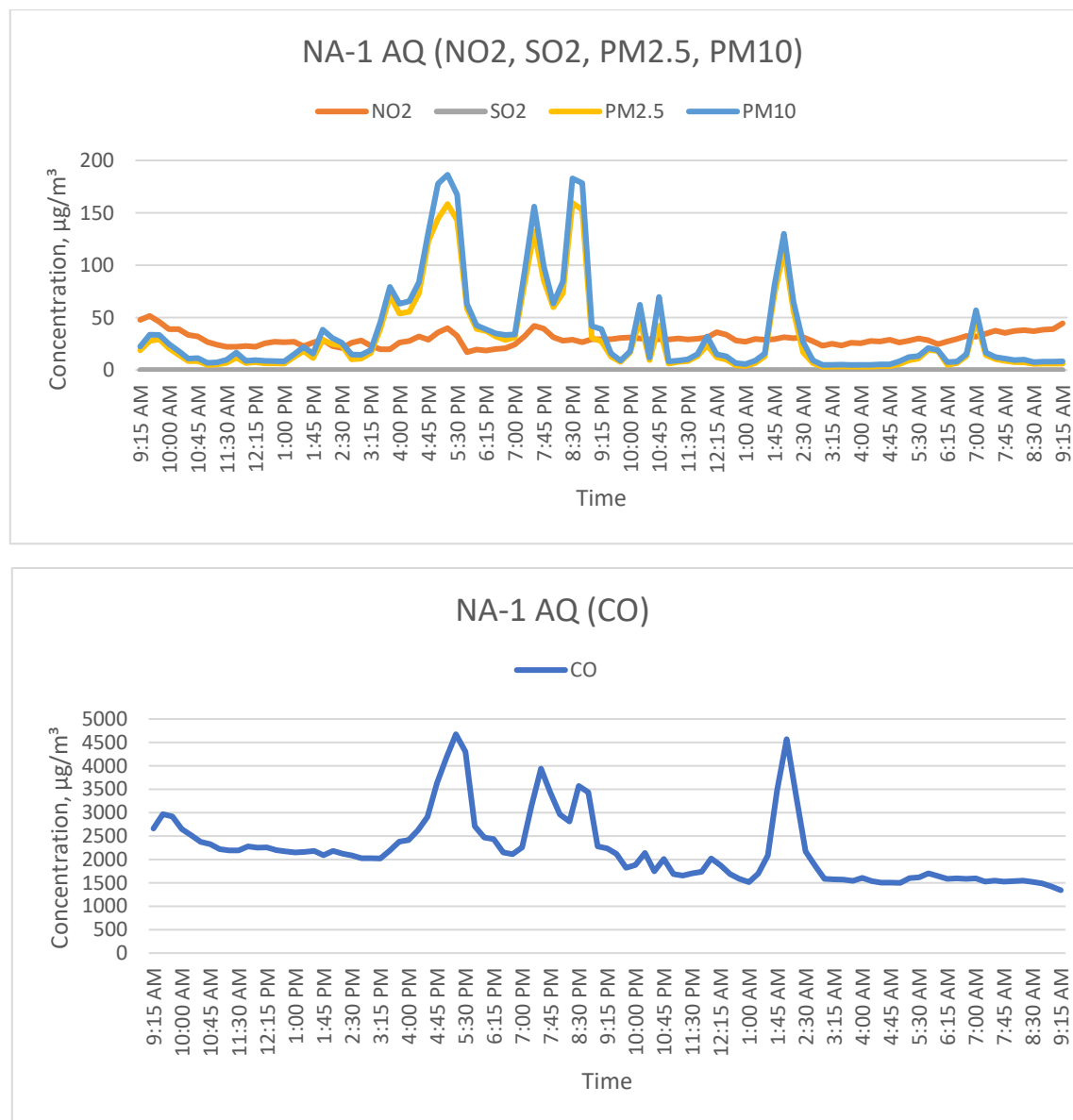
Location	Date	daytime	Time Period	L _{Aeq} , avg	L _{Amax} avg	L _{Amin} avg	L _{A10} , min	L _{A10} , avg	L _{A10} , max	L _{A90} , min	L _{A90} , avg	L _{A90} , max
		night-time	Interval									
NA-1	November, 2024 19-20	07:00-23:00	10 min	42.4	56.1	36.0	37.8	44.1	57.0	32.8	38.3	42.7
		23:00-07:00		41.0	50.6	36.5	39.4	42.7	46.0	33.2	38.2	40.6
NA-2	November, 2024 17-18	07:00-23:00	10 min	44.7	61.1	33.0	34.1	46.8	57.7	27.5	37.3	43.2
		23:00-07:00		45.6	58.7	32.4	40.8	48.9	58.9	29.0	36.0	42.7
NA-3	November, 2024 18-19	07:00-23:00	10 min	41.1	55.4	32.8	36.8	43.5	66.6	30.6	35.3	39.2
		23:00-07:00		38.4	52.1	31.7	34.7	40.4	66.6	31.4	33.5	36.4

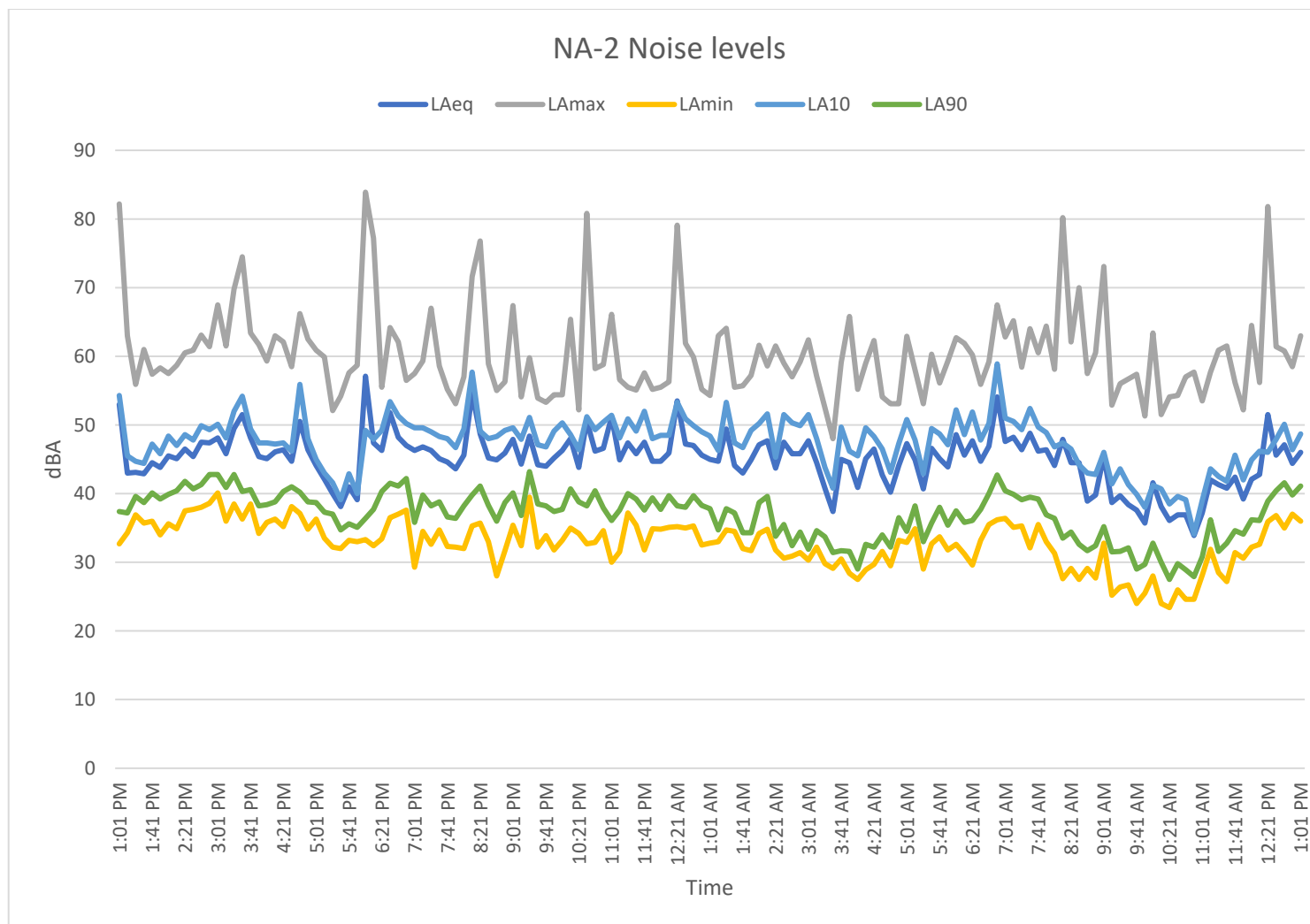
Table 10: 15-minute average concentrations for 24 hr measurement per location (in $\mu\text{g}/\text{m}^3$) (red cells indicate exceedance of the daily (24-hour) average MPC)

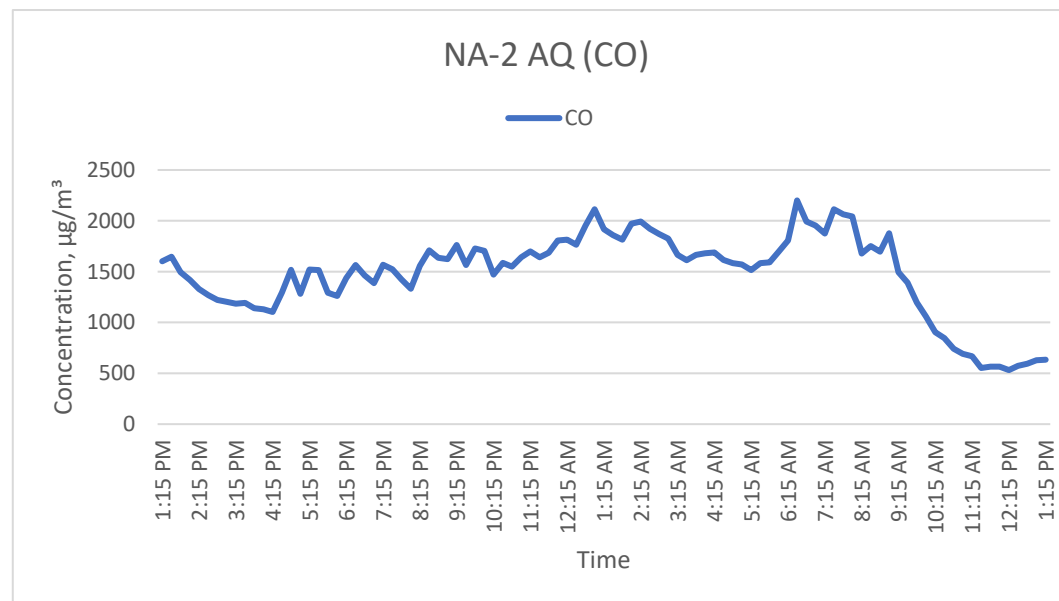
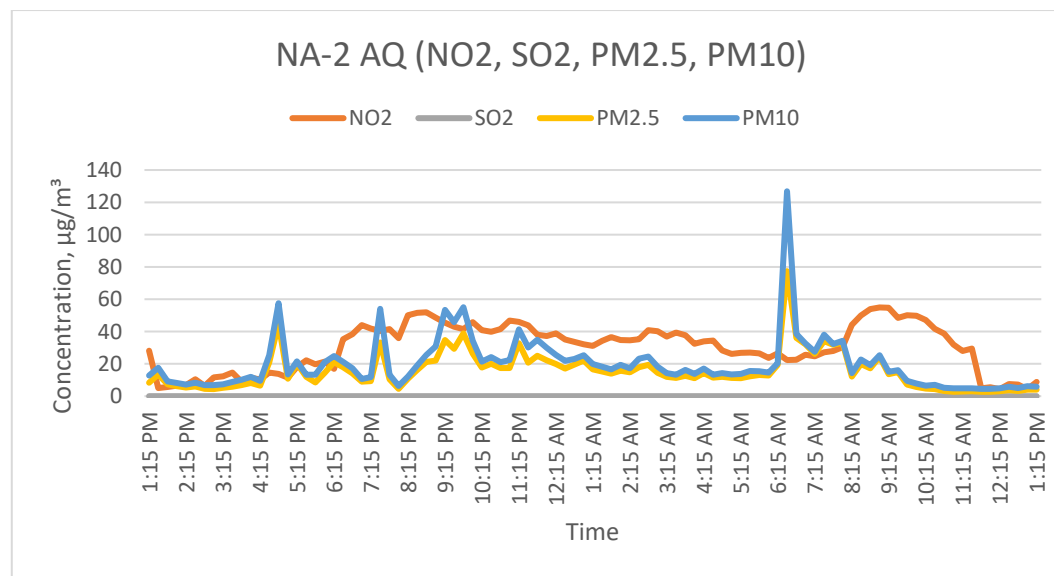
Location	Date	daytime	Time Period	CO		NO ₂		SO ₂		PM _{2.5}		PM ₁₀	
				avg	max	avg	max	avg	max	avg	max	avg	max
		night-time		Daily MPC – 3000 24hour (WHO) – 10,000		Daily MPC – 40 24hour (WHO) – 25		Daily MPC-50 24hour (WHO) – 40		Daily MPC- 160 24hour (WHO) - 15		Daily MPC – 300 24hour (WHO) - 45	
NA-1	November, 2024 16-17	07:00- 23:00	15 min	2388.4	4674.1	30.1	51.6	0.0	0.0	38.4	159.5	45.5	186.3
		23:00- 07:00		1873.3	4569.0	28.6	36.1	0.0	0.0	15.3	114.6	18.6	130.1
NA-2	November, 2024 17-18	07:00- 23:00	15 min	1336.9	2114.6	28.5	54.9	0.0	0.0	14.0	44.8	17.8	57.5
		23:00- 07:00		1773.7	2200.6	33.9	46.9	0.0	0.0	18.8	77.4	24.1	126.8
NA-3	November, 2024 18-19	07:00- 23:00	15 min	722.2	1575.2	25.9	40.8	0.0	0.0	7.6	28.3	10.4	33.9
		23:00- 07:00		699.4	1038.2	31.3	47.5	0.0	0.0	5.4	50.1	7.4	55.0

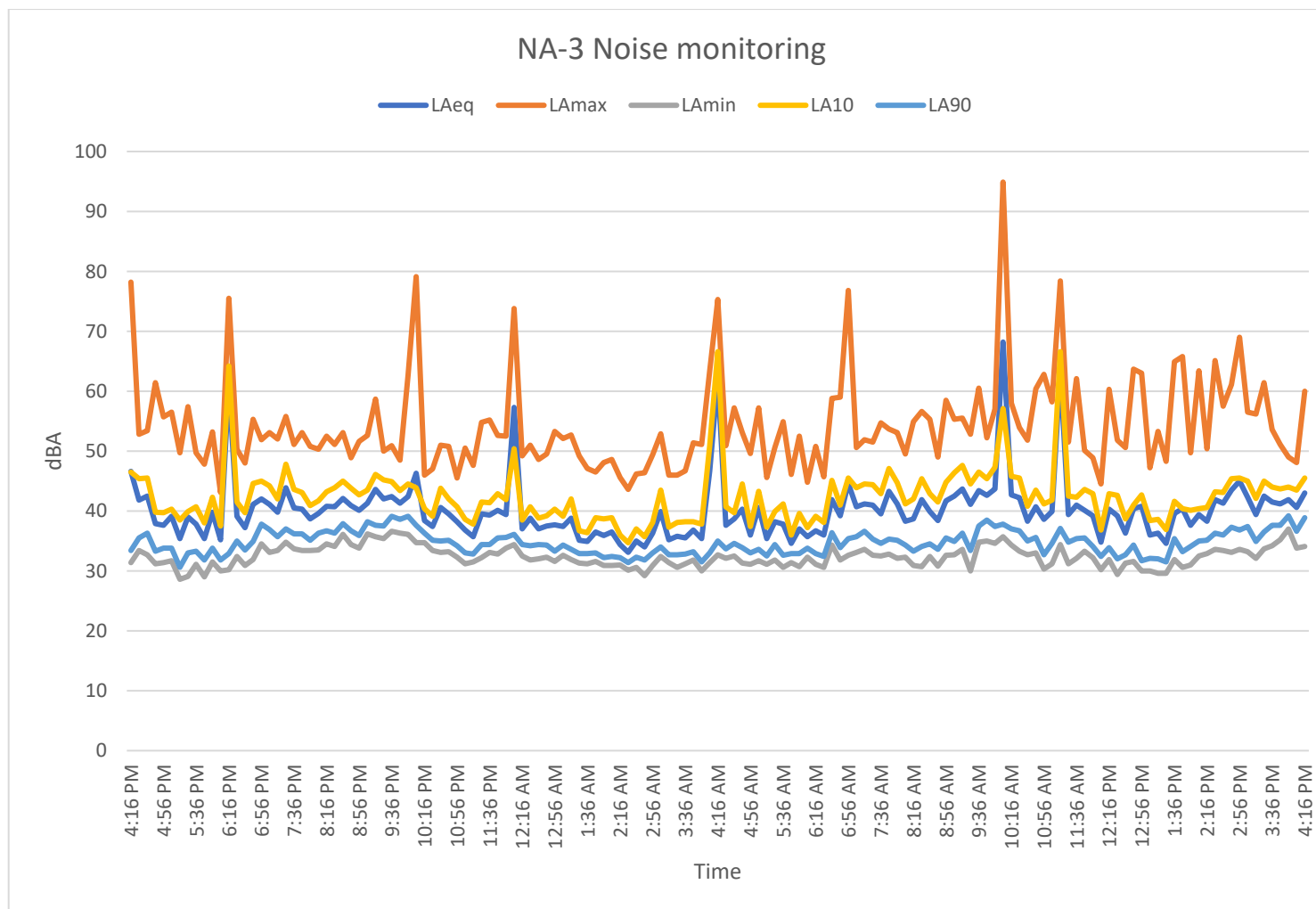
5.2. Summary graph results

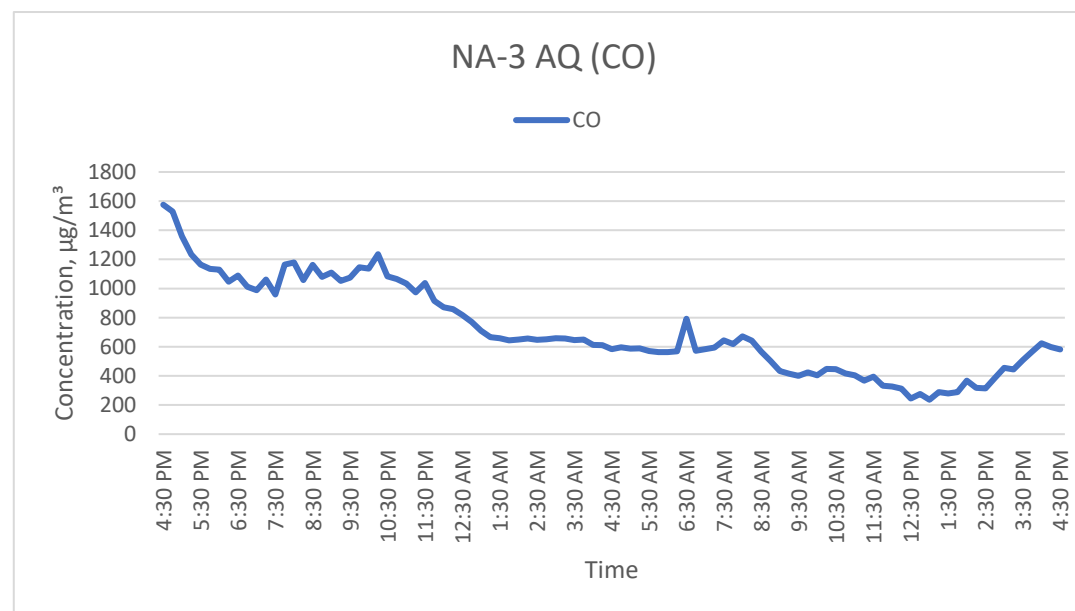
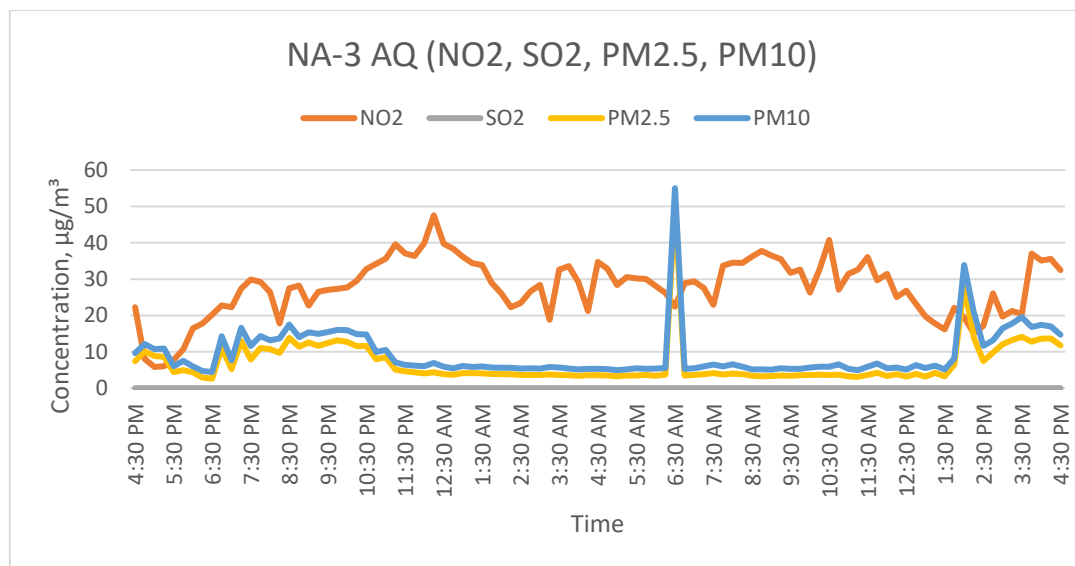












6. Conclusion

6.1. Noise

The average noise load (L_{Aeq} , avg.) at all three points during the day is quite low, not exceeding 44.7 dBA at the noisiest location. At point NA-1, there are two short-term increases in noise levels during the day – in the morning, from 7 to 9, and during lunchtime, from 12:30 to 14:00. At point NA-2, only the morning peak stands out at the same time, while at point NA-3, the noise load remains consistent throughout the day. National and international standards of 55 dBA are not exceeded. The average maximum noise level (L_{Amax} , avg.) varied between 61.1 and 55.4 dBA.

The average noise load (L_{Aeq} , avg.) at night is almost the same as during the day – around 40 dBA. However, at point NA-2, the average noise load at night (23:00 – 7:00) is even higher than during the day, reaching 45.6 dBA, which exceeds the established night-time standard of 45 dBA. This is due to a peak noise load between 6am and 7am in the morning. In all surveyed locations, the noise level at night is uniform and starts to rise in the early morning, around 6am. The most favorable location in terms of noise at night is point NA-3, with an average L_{Aeq} of 38.4 dBA. Most likely, this is because this community is not located on the main road EM-11, like the other points, but on its branch M-036, which has lower traffic, as confirmed by a corresponding study. The average maximum noise level (L_{Amax} , avg.) varied between 58.7dBA and 50.6 dBA.

Thus, the study area can be characterized as quite homogeneous in terms of noise load, with almost no difference between day and night. The main reason is the community's location on an international highway connecting the Kyrgyz capital with neighbouring regions and China, resulting in consistently high traffic. Nevertheless, the daytime situation is quite favourable, whereas at night, the noise levels reach the upper permissible limit or exceed it.

6.2. Air quality

When comparing air quality with the current regulations for a more detailed assessment, the daytime and nighttime average values were compared to the daily standard. The EM-11 highway is the defining factor for air quality in the study area. At points NA-1 and NA-2, air quality is moderate – average value of NO_2 slightly exceeds WHO standards, and $PM_{2.5}$ exceed the established international standard for average daily concentration by approximately 1.5-2 times. PM_{10} slightly exceeds international standards only at point NA-1 for daytime. The main contributing factor to these results is undoubtedly traffic, but the use of combustion for heating and proximity to the desert also play a role. At point NA-3, which is located off the main highway on the bypass road M-036, concentrations of all parameters are lower, with no exceedances for $PM_{2.5}$ and PM_{10} . SO_2 was not detected at any of the locations.

It is important to note that national standards are less strict than international ones, and according to them, all indicators remain within the permissible limits.

Thus, near the city of Balykchy and the village of Kok-Moynok-2 (NA-1 and NA-2), air quality is moderate, with particularly high concentrations of carbon monoxide. Near the Cholok community, air quality is better but still remains unsatisfactory.

Annex 1: Pictures of Air and Noise monitoring

Noise levels monitoring at NA-1



Air quality monitoring at NA-1



Noise levels monitoring at NA-2



Air quality monitoring at NA-2



Noise levels monitoring at NA-3



Air quality monitoring at NA-3



Annex 2: Certificates of equipment

Certificate of calibration



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 21 February 2023

Certificate Number: UCRT23/1245

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory
K. Mistry

Customer Juru Energy Ltd
Suite 1
One George Yard
London
United Kingdom
EC3V 9DF

Order No. JE1
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00410151
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	10591
Rion	Microphone	UC-59	19220
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 10. SLM 61672-3:2013
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2013 Yes
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013
Date Received 20 February 2023 **ANV Job No.** UKAS23/02116
Date Calibrated 21 February 2023

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	Dated	Certificate No.	Laboratory
	29 June 2021	UCRT21/1801	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION				Certificate Number UCRT23/1245	
UKAS Accredited Calibration Laboratory No. 0653				Page 2 of 2 Pages	

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title NL-52/NL-42 Description for IEC 61672-1					
SLM instruction manual ref / issue		No. 56034 21-03		Source Rion	
Date provided or internet download date		19 March 2021			
	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections		
Uncertainties provided	Yes	Yes	Yes		
Total expanded uncertainties within the requirements of IEC 61672-1:2013					YES
Specified or equivalent Calibrator		Specified			
Customer or Lab Calibrator		Lab Calibrator			
Calibrator adaptor type if applicable		NC-74-002			
Calibrator cal. date		16 February 2023			
Calibrator cert. number		UCRT23/1227			
Calibrator cal cert issued by Lab		0653			
Calibrator SPL @ STP		94.04	dB	Calibration reference sound pressure level	
Calibrator frequency		1001.97	Hz	Calibration check frequency	
Reference level range		Single	dB		
Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15					
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.					
Environmental conditions during tests		Start	End		
	Temperature	23.64	22.59	± 0.30 °C	
	Humidity	39.9	40.0	± 3.00 %RH	
	Ambient Pressure	100.84	100.84	± 0.03 kPa	
Indication at the Calibration Check Frequency					
Initial indicated level		94.0	dB	Adjusted indicated level 94.0 dB	
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±				0.10 dB	
Self Generated Noise					
Microphone installed -		Less Than	16.9	dB	A Weighting
Microphone replaced with electrical input device -				UR = Under Range indicated	
Weighting		A		C	
		11.9	dB	UR	15.8 dB UR
					21.4 dB UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

Certificate of calibrated air monitoring system



Tel. +44 (0)1789 207459
Email. info@aqmesh.com
www.aqmesh.com



Certificate of calibration

This is to certify that the sensors:

NO: 160410106

NO2: 202761658

CO2: 0330FF15

SO2: 164041109

CO: 162941352

AQMesh pod 2450963 have been calibrated against certified reference equipment for the following measurements:

NO, NO2	Thermo Scientific 42i
CO2	Comparison to AQMesh Gold pod, created via co-location with Licor CO2 analyser
SO2	Thermo Scientific 43i
CO	Ecotech Serinus 30

This is to certify that the AQMesh pod 2450963 has passed end of line testing for the following measurements:

PM 10, PM 2.5, PM 1, Particle count Fidas 200

Date of manufacture: 25th August 2022

A handwritten signature in black ink, appearing to read "Richard Handy".

Richard Handy
Operations Manager

Annex 3: Raw data

Annex 3: Raw data

NA-1 Noise load

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/19/2024	8:33 PM	46.3	77.8	35.4	45	37.2
11/19/2024	8:43 PM	41.4	53.2	36.1	43.3	38.6
11/19/2024	8:53 PM	42.4	51.2	36.1	45	38.4
11/19/2024	9:03 PM	42.2	52.2	38.9	43.6	40.3
11/19/2024	9:13 PM	42.3	51.4	38.6	44.1	40
11/19/2024	9:23 PM	43	51.9	39.1	44.5	41.1
11/19/2024	9:33 PM	43.1	56.1	39	44.8	40.8
11/19/2024	9:43 PM	43.6	53.1	38.3	46	40.2
11/19/2024	9:53 PM	43.4	52.3	37.8	46.3	39.9
11/19/2024	10:03 PM	42.4	53.2	38	44.3	39.8
11/19/2024	10:13 PM	43.1	55.6	36.9	45.5	39
11/19/2024	10:23 PM	43.3	59.8	38.8	44.4	40.9
11/19/2024	10:33 PM	43.1	52.4	37.6	45.3	40.3
11/19/2024	10:43 PM	42.6	55.9	34.5	44.8	37
11/19/2024	10:53 PM	38.2	50.5	32.8	40.3	35.1
11/19/2024	11:03 PM	39.2	51.5	31	42.1	33.2
11/19/2024	11:13 PM	39.2	53.5	32.5	41.2	35.6
11/19/2024	11:23 PM	42.3	48.5	37.3	44.5	40
11/19/2024	11:33 PM	41.9	52.9	38.6	43.7	39.8
11/19/2024	11:43 PM	39.4	44.1	35.7	41.3	37.1
11/19/2024	11:53 PM	40.3	48	37.2	42.3	38.4
11/20/2024	12:03 AM	41.5	49.9	38.8	42.6	40.1
11/20/2024	12:13 AM	40.7	44.9	38.2	41.7	39.7
11/20/2024	12:23 AM	39.6	48.4	36.4	41.2	37.7
11/20/2024	12:33 AM	40.2	44.1	37	41.4	38.6
11/20/2024	12:43 AM	39.1	44.2	36	40.4	37.5
11/20/2024	12:53 AM	41.8	53.9	37.5	43.2	39.4
11/20/2024	1:03 AM	41.2	48.9	37.7	42.6	39.4
11/20/2024	1:13 AM	40.1	43.9	35.6	41.8	37.3
11/20/2024	1:23 AM	40.4	44.4	38	41.5	39.2
11/20/2024	1:33 AM	40.4	45.3	37	42.3	38.6
11/20/2024	1:43 AM	41.4	48	37	43.5	39.2
11/20/2024	1:53 AM	44	61.2	38.3	44.6	39.4
11/20/2024	2:03 AM	42.1	59.2	35.9	43.5	38.9
11/20/2024	2:13 AM	42.3	56.5	35.8	43.7	37.9
11/20/2024	2:23 AM	42.7	49.2	39.2	44.9	40.4
11/20/2024	2:33 AM	41.7	47.6	37.8	43.6	39.3
11/20/2024	2:43 AM	41	44.9	37.4	42.5	39.5
11/20/2024	2:53 AM	40	45.3	38.1	40.8	39.2
11/20/2024	3:03 AM	41.8	57.9	35.8	41.4	37

Date	Time	LAeq	LAmay	LAmay	LA10	LA90
11/20/2024	3:13 AM	39.6	54	34.8	40.3	36.1
11/20/2024	3:23 AM	41.3	52.9	38.4	42.2	40
11/20/2024	3:33 AM	41.4	44.9	37.8	42.7	39.4
11/20/2024	3:43 AM	42	48.8	37	44.2	38.6
11/20/2024	3:53 AM	42.4	48.8	38.6	44.2	39.9
11/20/2024	4:03 AM	41.6	49.2	36.1	44.6	37.3
11/20/2024	4:13 AM	40.2	48.2	35.5	42.6	37
11/20/2024	4:23 AM	38.6	46.3	32.6	40.8	34.4
11/20/2024	4:33 AM	37.6	45.2	33.6	39.4	35.3
11/20/2024	4:43 AM	41.3	54.9	34.7	43.1	37.1
11/20/2024	4:53 AM	39	46	35.3	40.8	36.8
11/20/2024	5:03 AM	40	52.8	34.9	41.9	37.4
11/20/2024	5:13 AM	43.1	50	36.5	46	39.1
11/20/2024	5:23 AM	42.8	57.6	35.8	45	38
11/20/2024	5:33 AM	41.7	54	36.5	43.5	38.8
11/20/2024	5:43 AM	42.7	59.1	37.3	43.9	39.1
11/20/2024	5:53 AM	41.1	53.1	35.1	43.4	36.9
11/20/2024	6:03 AM	40.1	55.4	35.4	41.7	37.2
11/20/2024	6:13 AM	39.9	50.4	34.6	42.4	37
11/20/2024	6:23 AM	41.1	54.3	37.2	42.7	38.7
11/20/2024	6:33 AM	41	56.5	36.4	42.4	38.4
11/20/2024	6:43 AM	41.4	55.3	37.2	43.3	39.1
11/20/2024	6:53 AM	43.3	56.3	39.1	44.7	40.6
11/20/2024	7:03 AM	42.2	58	38	44.1	39.7
11/20/2024	7:13 AM	44.6	53.7	39.4	47	41.7
11/20/2024	7:23 AM	44.6	57	37.9	46.7	41
11/20/2024	7:33 AM	46.2	69.1	38.2	48.3	40.7
11/20/2024	7:43 AM	43.8	58.2	38.1	45.7	40.6
11/20/2024	7:53 AM	41.1	48.8	34.9	43.4	37.5
11/20/2024	8:03 AM	41.2	51.8	35.9	43.3	38.8
11/20/2024	8:13 AM	42.2	51.4	36.4	43.8	39.6
11/20/2024	8:23 AM	41.8	49.6	37.9	43.3	40.4
11/20/2024	8:33 AM	45.5	64.6	40.6	46.9	42.7
11/20/2024	8:43 AM	44.8	58.9	40.2	46.8	42.1
11/20/2024	8:53 AM	51.8	65.4	39.6	57	41.7
11/20/2024	9:03 AM	43.8	56.4	36.3	46.3	38.4
11/20/2024	9:13 AM	38.7	51.6	34.4	40.7	35.9
11/20/2024	9:23 AM	38.2	54.5	33.3	39.7	35.2
11/20/2024	9:33 AM	37.5	60.7	32.2	38.3	33.7
11/20/2024	9:43 AM	38.9	56.8	32.1	40.6	33.8
11/20/2024	9:53 AM	40.8	56.7	31.6	40.7	32.9
11/20/2024	10:03 AM	37.6	52.2	32.9	39.3	34.4
11/20/2024	10:13 AM	36.9	49.6	32.9	38.1	34.8
11/20/2024	10:23 AM	36.6	48.6	33.3	37.8	34.8
11/20/2024	10:33 AM	40.2	58.1	34.4	40.9	36.1

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/20/2024	10:43 AM	38.9	53.4	33.2	41.1	35.3
11/20/2024	10:53 AM	41.2	59.8	33.3	41.6	35.4
11/20/2024	11:03 AM	47.8	63.6	33.4	52	35.4
11/20/2024	11:13 AM	36.7	47.6	33.5	37.8	35.2
11/20/2024	11:23 AM	39.4	54.9	33.6	40.5	35.3
11/20/2024	11:33 AM	40.7	63.9	31.3	39.1	32.8
11/20/2024	11:43 AM	38.7	56.9	31.9	40.4	33.3
11/20/2024	11:53 AM	39.4	52.4	34.3	41	36.8
11/20/2024	12:03 PM	45.4	58.1	37.9	49.1	39.1
11/20/2024	12:13 PM	47.2	60.5	33.6	50.8	35.8
11/20/2024	12:23 PM	44.2	52.9	32.7	46.9	37.6
11/20/2024	12:33 PM	43.9	54.3	36	46.8	38.6
11/20/2024	12:43 PM	43.7	56.1	34.5	47.6	36.9
11/20/2024	12:53 PM	43.5	52.6	36	46.5	38.4
11/20/2024	1:03 PM	37.4	52.9	33.3	39.3	34.8
11/20/2024	1:13 PM	39.2	57.3	32	40.3	34
11/20/2024	1:23 PM	40.6	59.9	33.7	42	35.8
11/20/2024	1:33 PM	58.2	81.7	32	44	34.7
11/20/2024	1:43 PM	41.5	67.2	32.9	42	36.2
11/20/2024	1:53 PM	41.6	62.5	33.4	42.8	37.1
11/20/2024	2:03 PM	40.4	60.2	35	42.2	37.9
11/20/2024	2:13 PM	40.5	53.6	35.7	42.2	37.9
11/20/2024	2:23 PM	39.3	54.3	32.8	41.2	36.4
11/20/2024	2:33 PM	39.1	47.1	31.1	41.3	36
11/20/2024	2:43 PM	39.5	52.2	31.9	42.3	34.8
11/20/2024	2:53 PM	39.6	47.3	32.4	41.7	34.9
11/20/2024	3:03 PM	41.4	53.8	32.1	43.8	37.7
11/20/2024	3:13 PM	40.8	54.5	31.7	44.8	34.6
11/20/2024	3:23 PM	41.9	62	34.1	43.3	37.3
11/20/2024	3:33 PM	42.8	49.1	34.8	45	39.1
11/20/2024	3:43 PM	40.2	48.2	34.4	42.6	36.1
11/20/2024	3:53 PM	43.4	63.7	37.1	45.5	40.1
11/20/2024	4:03 PM	42.3	51.8	36.2	44.3	39.9
11/20/2024	4:13 PM	43.2	73.3	37.3	43.8	39.7
11/20/2024	4:23 PM	43.3	53.9	38.2	45.4	41.1
11/20/2024	4:33 PM	45.4	61.7	40.1	46	42.3
11/20/2024	4:43 PM	46.1	58.4	39.5	48.5	42
11/20/2024	4:53 PM	45	54.7	40.7	46.8	42.5
11/20/2024	5:03 PM	45.4	61.2	40.4	46.8	42.4
11/20/2024	5:13 PM	46.2	62.8	39.9	47	42.1
11/20/2024	5:23 PM	43.5	54.6	39.1	45	41.3
11/20/2024	5:33 PM	43.3	56.7	38.5	45.5	40.4
11/20/2024	5:43 PM	43.5	52.5	38.5	45.6	40.9
11/20/2024	5:53 PM	41.7	50.6	37.9	43.3	39.8
11/20/2024	6:03 PM	42.4	54.3	37.3	44.8	39.4

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/20/2024	6:13 PM	44	63.2	37.2	44.4	39.5
11/20/2024	6:23 PM	44	60.6	36.8	45.9	39.1
11/20/2024	6:33 PM	42.8	59.3	37.4	44.7	39.1
11/20/2024	6:43 PM	42.7	54.4	38.6	44.3	40.6
11/20/2024	6:53 PM	42.1	50.2	38.3	44	39.9
11/20/2024	7:03 PM	42.4	55.1	37.9	44.4	39.7
11/20/2024	7:13 PM	41.4	49.2	36.6	43.1	39.1
11/20/2024	7:23 PM	41.8	53	37.6	43.5	39.8
11/20/2024	7:33 PM	41.4	49.4	36.9	42.9	39.2
11/20/2024	7:43 PM	42.9	54.2	37.1	45	40.1
11/20/2024	7:53 PM	42.8	50.3	37.6	44.8	40
11/20/2024	8:03 PM	44.4	57.6	38.3	46.7	40.3
11/20/2024	8:13 PM	41.1	52	36.1	43.1	38.3
11/20/2024	8:23 PM	43.5	55.8	36.9	45.9	39.3
11/20/2024	8:33 PM	44	57	36.9	46.4	39.2

NA-1 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
11/19/2024	8:34 PM	0.8	1.4	315
11/19/2024	8:44 PM	0.5	0.9	262
11/19/2024	8:54 PM	0.7	1.2	324
11/19/2024	9:04 PM	0.2	0.8	193
11/19/2024	9:14 PM	0.5	0.7	342
11/19/2024	9:24 PM	0.7	1.3	329
11/19/2024	9:34 PM	0.8	1.1	331
11/19/2024	9:44 PM	1	1.4	335
11/19/2024	9:54 PM	0.9	1.2	341
11/19/2024	10:04 PM	0.8	1.2	330
11/19/2024	10:14 PM	0.4	0.9	1
11/19/2024	10:24 PM	0.6	1.1	341
11/19/2024	10:34 PM	0.9	1.3	338
11/19/2024	10:44 PM	1	1.4	329
11/19/2024	10:54 PM	1.1	1.4	320
11/19/2024	11:04 PM	1.1	1.7	320
11/19/2024	11:14 PM	1	1.7	318
11/19/2024	11:24 PM	0.6	1.1	187
11/19/2024	11:34 PM	0.4	1.1	181
11/19/2024	11:44 PM	0.5	1.1	247
11/19/2024	11:54 PM	0.3	0.8	321
11/20/2024	12:04 AM	0.3	0.8	347
11/20/2024	12:14 AM	0.6	0.9	341
11/20/2024	12:24 AM	0.7	1	330
11/20/2024	12:34 AM	0.8	1.1	340
11/20/2024	12:44 AM	0.8	0.9	351

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	12:54 AM	0.6	1	350
11/20/2024	1:04 AM	0.7	0.9	337
11/20/2024	1:14 AM	0.8	1.1	345
11/20/2024	1:24 AM	0.9	1.4	345
11/20/2024	1:34 AM	0.7	1	346
11/20/2024	1:44 AM	0.8	0.9	351
11/20/2024	1:54 AM	0.8	1.3	356
11/20/2024	2:04 AM	0.8	1.1	340
11/20/2024	2:14 AM	0.9	1.3	324
11/20/2024	2:24 AM	0.9	1.2	349
11/20/2024	2:34 AM	0.8	1.1	334
11/20/2024	2:44 AM	0.8	1.1	346
11/20/2024	2:54 AM	0.8	1.1	344
11/20/2024	3:04 AM	0.9	1.3	343
11/20/2024	3:14 AM	0.9	1.3	328
11/20/2024	3:24 AM	0.8	1.1	342
11/20/2024	3:34 AM	0.8	1.2	341
11/20/2024	3:44 AM	0.8	1.3	338
11/20/2024	3:54 AM	1	1.3	342
11/20/2024	4:04 AM	0.9	1.4	341
11/20/2024	4:14 AM	1.1	1.5	326
11/20/2024	4:24 AM	0.9	1.4	339
11/20/2024	4:34 AM	0.8	1.6	311
11/20/2024	4:44 AM	0.6	1.1	320
11/20/2024	4:54 AM	0.7	1.1	334
11/20/2024	5:04 AM	0.9	1.3	342
11/20/2024	5:14 AM	0.9	1.3	327
11/20/2024	5:24 AM	0.7	1.1	331
11/20/2024	5:34 AM	0.6	0.9	337
11/20/2024	5:44 AM	0.6	1	21
11/20/2024	5:54 AM	0.6	1	358
11/20/2024	6:04 AM	0.6	0.9	10
11/20/2024	6:14 AM	0.6	1	326
11/20/2024	6:24 AM	0.6	1.2	319
11/20/2024	6:34 AM	0.5	0.8	349
11/20/2024	6:44 AM	0.3	0.7	351
11/20/2024	6:54 AM	0.9	1.3	336
11/20/2024	7:04 AM	0.5	0.9	23
11/20/2024	7:14 AM	0.7	0.9	358
11/20/2024	7:24 AM	0.8	1.1	344
11/20/2024	7:34 AM	0.9	1.3	335
11/20/2024	7:44 AM	1	1.5	333
11/20/2024	7:54 AM	1.1	1.5	315
11/20/2024	8:04 AM	1	1.6	322
11/20/2024	8:14 AM	0.8	1.3	332

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	8:24 AM	0.6	0.9	349
11/20/2024	8:34 AM	0.6	1.5	157
11/20/2024	8:44 AM	0.4	0.8	203
11/20/2024	8:54 AM	0.3	0.9	298
11/20/2024	9:04 AM	0.3	0.8	186
11/20/2024	9:14 AM	0.7	1	308
11/20/2024	9:24 AM	1.1	1.7	336
11/20/2024	9:34 AM	0.8	1.3	9
11/20/2024	9:44 AM	0.7	1.3	29
11/20/2024	9:54 AM	0.7	1.1	28
11/20/2024	10:04 AM	0.8	1.6	110
11/20/2024	10:14 AM	0.8	1.3	110
11/20/2024	10:24 AM	0.7	1.2	143
11/20/2024	10:34 AM	1	1.8	154
11/20/2024	10:44 AM	0.7	1.3	148
11/20/2024	10:54 AM	0.6	1	126
11/20/2024	11:04 AM	0.7	1.1	100
11/20/2024	11:14 AM	0.7	1.1	93
11/20/2024	11:24 AM	0.6	1.4	157
11/20/2024	11:34 AM	0.7	1.1	133
11/20/2024	11:44 AM	0.5	1	286
11/20/2024	11:54 AM	0.8	1.7	119
11/20/2024	12:04 PM	0.8	1.4	140
11/20/2024	12:14 PM	0.7	1.4	166
11/20/2024	12:24 PM	0.7	1.3	180
11/20/2024	12:34 PM	0.6	1.3	175
11/20/2024	12:44 PM	0.9	1.6	183
11/20/2024	12:54 PM	0.9	1.6	191
11/20/2024	1:04 PM	0.9	1.6	192
11/20/2024	1:14 PM	0.5	1	293
11/20/2024	1:24 PM	0.7	1.2	220
11/20/2024	1:34 PM	0.6	1	10
11/20/2024	1:44 PM	0.4	0.9	43
11/20/2024	1:54 PM	0.8	1.4	110
11/20/2024	2:04 PM	0.9	1.6	137
11/20/2024	2:14 PM	0.9	1.4	149
11/20/2024	2:24 PM	0.6	1.5	145
11/20/2024	2:34 PM	0.7	1.3	71
11/20/2024	2:44 PM	0.8	1.7	32
11/20/2024	2:54 PM	0.9	1.8	107
11/20/2024	3:04 PM	0.7	1.5	65
11/20/2024	3:14 PM	0.9	1.7	57
11/20/2024	3:24 PM	1	2	111
11/20/2024	3:34 PM	0.8	1.8	89
11/20/2024	3:44 PM	0.8	1.4	99

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	3:54 PM	0.5	1.3	137
11/20/2024	4:04 PM	0.1	0.7	287
11/20/2024	4:14 PM	0.2	0.7	303
11/20/2024	4:24 PM	0.3	0.7	350
11/20/2024	4:34 PM	0.4	1	304
11/20/2024	4:44 PM	0.5	1.1	250
11/20/2024	4:54 PM	0.7	1.4	254
11/20/2024	5:04 PM	0.4	1.3	267
11/20/2024	5:14 PM	0.8	1.6	253
11/20/2024	5:24 PM	0.8	2.2	236
11/20/2024	5:34 PM	1.1	2.3	244
11/20/2024	5:44 PM	1.2	2.4	244
11/20/2024	5:54 PM	1.4	3.2	229
11/20/2024	6:04 PM	1.4	3	244
11/20/2024	6:14 PM	1.8	4.5	241
11/20/2024	6:24 PM	1.6	3.9	238
11/20/2024	6:34 PM	1.7	4	244
11/20/2024	6:44 PM	2	5.2	241
11/20/2024	6:54 PM	2	4.7	233
11/20/2024	7:04 PM	1.9	4.9	242
11/20/2024	7:14 PM	1.9	4.1	229
11/20/2024	7:24 PM	2.2	4.5	232
11/20/2024	7:34 PM	2.1	5.1	237
11/20/2024	7:44 PM	1.9	4.4	248
11/20/2024	7:54 PM	1.8	3.7	241
11/20/2024	8:04 PM	1.8	4.1	227
11/20/2024	8:14 PM	1.8	4.3	260
11/20/2024	8:24 PM	1.7	4.2	267
11/20/2024	8:34 PM	1.8	4.1	253

NA-1 Air quality

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/16/2024	9:15 AM	2661.7	47.92	0	18.73	22.41
11/16/2024	9:30 AM	2968.4	51.59	0	27.72	33.81
11/16/2024	9:45 AM	2917.86	46.03	0	29.47	33.49
11/16/2024	10:00 AM	2651.1	39	0	20.76	24.9
11/16/2024	10:15 AM	2517.43	38.91	0	14.55	18.19
11/16/2024	10:30 AM	2375.22	33.42	0	8.48	10.96
11/16/2024	10:45 AM	2328.93	32.07	0	8.46	11.38
11/16/2024	11:00 AM	2220.99	26.64	0	4.83	6.72
11/16/2024	11:15 AM	2193.45	24.16	0	5.4	7.2
11/16/2024	11:30 AM	2191.23	22.1	0	6.8	9.66
11/16/2024	11:45 AM	2280.88	22.08	0	11.87	16.78
11/16/2024	12:00 PM	2254	22.94	0	6.53	8.73
11/16/2024	12:15 PM	2254.95	22.23	0	7.59	9.55
11/16/2024	12:30 PM	2200.84	25.63	0	6.24	8.63

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/16/2024	12:45 PM	2169.67	26.93	0	6.38	8.53
11/16/2024	1:00 PM	2151.59	26.63	0	6.03	8.21
11/16/2024	1:15 PM	2158.1	26.89	0	12.36	14.9
11/16/2024	1:30 PM	2183.27	22.58	0	18.16	21.84
11/16/2024	1:45 PM	2092.67	26.32	0	11.36	15.76
11/16/2024	2:00 PM	2182.27	28.94	0	28.67	38.57
11/16/2024	2:15 PM	2122.37	23.03	0	24.82	30.54
11/16/2024	2:30 PM	2085.36	20.95	0	23.4	26.09
11/16/2024	2:45 PM	2027.39	25.98	0	10.13	14.84
11/16/2024	3:00 PM	2024.53	28.12	0	10.89	14.49
11/16/2024	3:15 PM	2021.51	23.15	0	16.15	19.03
11/16/2024	3:30 PM	2186.17	19.88	0	39.22	45.77
11/16/2024	3:45 PM	2383.06	19.9	0	70.93	79.27
11/16/2024	4:00 PM	2413.97	26.19	0	53.98	63.16
11/16/2024	4:15 PM	2627.76	27.79	0	55.49	65.65
11/16/2024	4:30 PM	2909.25	32.13	0	73.22	83.59
11/16/2024	4:45 PM	3633.7	28.97	0	123.39	132.26
11/16/2024	5:00 PM	4179.15	35.87	0	144.42	177.85
11/16/2024	5:15 PM	4674.14	39.94	0	158.41	186.32
11/16/2024	5:30 PM	4297.69	32.53	0	143.11	167.21
11/16/2024	5:45 PM	2708.33	17.02	0	58.78	62.98
11/16/2024	6:00 PM	2464.61	19.48	0	39.2	42.61
11/16/2024	6:15 PM	2434.76	18.7	0	37.43	38.72
11/16/2024	6:30 PM	2147.99	20.07	0	32.15	34.9
11/16/2024	6:45 PM	2110.63	20.82	0	28.7	33.47
11/16/2024	7:00 PM	2258.35	24.31	0	31.2	33.98
11/16/2024	7:15 PM	3136.9	32.28	0	82.95	93.93
11/16/2024	7:30 PM	3937.41	42.08	0	132.26	155.94
11/16/2024	7:45 PM	3428.9	39.5	0	85.69	99.01
11/16/2024	8:00 PM	2960.44	31.42	0	59.91	63.5
11/16/2024	8:15 PM	2812.32	27.91	0	73.38	84.28
11/16/2024	8:30 PM	3569.18	28.88	0	159.46	182.75
11/16/2024	8:45 PM	3437.24	26.55	0	152.94	178.21
11/16/2024	9:00 PM	2278.5	29.39	0	30.71	41.94
11/16/2024	9:15 PM	2237.82	29.34	0	27.42	39.01
11/16/2024	9:30 PM	2117.31	29.43	0	12.88	16.01
11/16/2024	9:45 PM	1824.6	30.52	0	7.69	8.96
11/16/2024	10:00 PM	1881.98	31.15	0	16.58	17.84
11/16/2024	10:15 PM	2139.88	30.14	0	48.09	62.36
11/16/2024	10:30 PM	1745.87	29.43	0	9.4	11.79
11/16/2024	10:45 PM	2009.23	29.47	0	42.45	69.8
11/16/2024	11:00 PM	1688.25	29.13	0	6.21	8.26
11/16/2024	11:15 PM	1657.16	30.04	0	7.68	8.95
11/16/2024	11:30 PM	1703.25	29.22	0	8.55	10.21
11/16/2024	11:45 PM	1735.39	29.82	0	13.24	15.23
11/17/2024	12:00 AM	2019.71	31.17	0	23.6	32.14
11/17/2024	12:15 AM	1877.03	36.06	0	12	14.99
11/17/2024	12:30 AM	1687.48	33.65	0	10.03	13.07
11/17/2024	12:45 AM	1586.48	28.15	0	4.44	6.5

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/17/2024	1:00 AM	1514.85	27.1	0	3.84	5.51
11/17/2024	1:15 AM	1696.92	29.59	0	6.58	8.87
11/17/2024	1:30 AM	2085.82	28.97	0	13.02	15.62
11/17/2024	1:45 AM	3483.98	29.32	0	71.89	80.38
11/17/2024	2:00 AM	4569	31.3	0	114.56	130.1
11/17/2024	2:15 AM	3337.24	30.33	0	56.25	64.9
11/17/2024	2:30 AM	2170.57	31.3	0	16.85	26.76
11/17/2024	2:45 AM	1864.54	27.5	0	6.53	9.24
11/17/2024	3:00 AM	1587.83	23.26	0	3.1	4.86
11/17/2024	3:15 AM	1574.57	25	0	3.27	5.01
11/17/2024	3:30 AM	1570.32	23.36	0	3.42	5.05
11/17/2024	3:45 AM	1545.06	26.03	0	3.14	4.83
11/17/2024	4:00 AM	1606.26	25.52	0	3.18	4.93
11/17/2024	4:15 AM	1538.42	27.6	0	3.33	4.97
11/17/2024	4:30 AM	1502.67	27.16	0	3.64	5.3
11/17/2024	4:45 AM	1505.26	28.9	0	3.8	5.47
11/17/2024	5:00 AM	1502.14	26.26	0	5.71	8.23
11/17/2024	5:15 AM	1600.99	27.89	0	9.23	12.45
11/17/2024	5:30 AM	1619.46	30.2	0	10.8	13.37
11/17/2024	5:45 AM	1703.81	28.4	0	19.18	21
11/17/2024	6:00 AM	1645.29	24.68	0	18.32	19.01
11/17/2024	6:15 AM	1585.09	27.27	0	4.82	7.45
11/17/2024	6:30 AM	1594.86	29.55	0	6.67	8.07
11/17/2024	6:45 AM	1584.61	32.62	0	13.32	15.3
11/17/2024	7:00 AM	1596.94	31.73	0	47.57	57.12
11/17/2024	7:15 AM	1524.04	34.65	0	14.26	16.62
11/17/2024	7:30 AM	1548.49	37.59	0	10.31	12.32
11/17/2024	7:45 AM	1528.08	35.39	0	8.85	10.95
11/17/2024	8:00 AM	1538	37.23	0	7.65	9.36
11/17/2024	8:15 AM	1547.8	38.07	0	7.34	9.92
11/17/2024	8:30 AM	1521.63	37	0	5.82	7.51
11/17/2024	8:45 AM	1490.9	38.58	0	5.99	7.93
11/17/2024	9:00 AM	1424.19	38.89	0	6.2	7.92
11/17/2024	9:15 AM	1343.24	44.45	0	6.12	8.38

NA-2 Noise load

Date	Time	LAeq	LAm _{ax}	LAm _{in}	LA10	LA90
11/17/2024	1:01 PM	53	82.2	32.7	54.3	37.4
11/17/2024	1:11 PM	43	63	34.3	45.5	37.2
11/17/2024	1:21 PM	43.1	55.9	36.9	44.7	39.6
11/17/2024	1:31 PM	42.9	61	35.7	44.4	38.7
11/17/2024	1:41 PM	44.5	57.4	36	47.2	40.1
11/17/2024	1:51 PM	43.8	58.3	34	45.8	39.2
11/17/2024	2:01 PM	45.5	57.5	35.6	48.4	39.9
11/17/2024	2:11 PM	45.1	58.7	34.9	47	40.4
11/17/2024	2:21 PM	46.5	60.5	37.5	48.6	41.8
11/17/2024	2:31 PM	45.4	60.9	37.7	47.8	40.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/17/2024	2:41 PM	47.5	63.1	38	49.9	41.3
11/17/2024	2:51 PM	47.4	61.4	38.6	49.3	42.8
11/17/2024	3:01 PM	48.1	67.5	40.1	50.1	42.8
11/17/2024	3:11 PM	45.8	61.5	36	48.1	40.9
11/17/2024	3:21 PM	49.5	69.8	38.5	52	42.8
11/17/2024	3:31 PM	51.5	74.5	36.3	54.2	40.3
11/17/2024	3:41 PM	48.1	63.4	38.5	49.4	40.6
11/17/2024	3:51 PM	45.4	61.7	34.2	47.4	38.2
11/17/2024	4:01 PM	45.1	59.3	35.8	47.4	38.4
11/17/2024	4:11 PM	46.1	63	36.3	47.2	38.8
11/17/2024	4:21 PM	46.4	62.1	35.2	47.4	40.3
11/17/2024	4:31 PM	44.7	58.5	38.1	46.2	41
11/17/2024	4:41 PM	50.5	66.2	37.1	55.9	40.2
11/17/2024	4:51 PM	46.4	62.5	34.8	48	38.8
11/17/2024	5:01 PM	44.1	60.9	36.3	45	38.7
11/17/2024	5:11 PM	42.1	59.9	33.5	43	37.3
11/17/2024	5:21 PM	40	52.1	32.2	41.6	37
11/17/2024	5:31 PM	38.1	54.2	32	39.1	34.7
11/17/2024	5:41 PM	41	57.6	33.2	42.9	35.6
11/17/2024	5:51 PM	39.1	58.7	33	40	35.1
11/17/2024	6:01 PM	57.1	83.9	33.3	49.2	36.4
11/17/2024	6:11 PM	47.4	77.2	32.4	47.9	37.7
11/17/2024	6:21 PM	46.3	55.5	33.4	49.2	40.3
11/17/2024	6:31 PM	51.8	64.2	36.5	53.4	41.5
11/17/2024	6:41 PM	48.2	62.1	37	51.3	41.1
11/17/2024	6:51 PM	47	56.5	37.6	50.2	42.2
11/17/2024	7:01 PM	46.3	57.5	29.3	49.6	35.8
11/17/2024	7:11 PM	46.8	59.3	34.5	49.6	39.8
11/17/2024	7:21 PM	46.3	67	32.6	49	38.2
11/17/2024	7:31 PM	45.1	58.6	34.7	48.3	38.8
11/17/2024	7:41 PM	44.6	55.2	32.3	48	36.6
11/17/2024	7:51 PM	43.6	53.1	32.2	46.7	36.4
11/17/2024	8:01 PM	45.6	57	32	49.4	38.2
11/17/2024	8:11 PM	54.6	71.6	35.3	57.7	39.8
11/17/2024	8:21 PM	48.7	76.8	35.7	49.1	41.1
11/17/2024	8:31 PM	45.2	58.9	33	48	38.3
11/17/2024	8:41 PM	44.9	55	28	48.3	36
11/17/2024	8:51 PM	45.9	56.3	31.7	49.2	38.7
11/17/2024	9:01 PM	47.9	67.4	35.4	49.6	40.1
11/17/2024	9:11 PM	44.3	54.1	32.4	47.9	36.8
11/17/2024	9:21 PM	48.4	59.8	39.5	51.1	43.2
11/17/2024	9:31 PM	44.2	53.9	32.2	47.1	38.5
11/17/2024	9:41 PM	44	53.3	33.9	46.8	38.2
11/17/2024	9:51 PM	45.2	54.4	31.8	49.1	37.4
11/17/2024	10:01 PM	46.3	54.4	33.2	50.3	37.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/17/2024	10:11 PM	48	65.4	35	48.6	40.7
11/17/2024	10:21 PM	43.8	52.2	34.2	46.4	38.8
11/17/2024	10:31 PM	50.6	80.8	32.7	51.2	38.2
11/17/2024	10:41 PM	46.2	58.2	32.9	49.3	40.4
11/17/2024	10:51 PM	46.6	58.8	34.6	50.4	37.9
11/17/2024	11:01 PM	51.2	66.1	30	51.4	36.1
11/17/2024	11:11 PM	44.9	56.6	31.5	48.1	37.6
11/17/2024	11:21 PM	47.4	55.5	37.2	50.9	40
11/17/2024	11:31 PM	45.8	55.1	35.4	49.1	39.2
11/17/2024	11:41 PM	47.5	57.6	31.8	52	37.6
11/17/2024	11:51 PM	44.7	55.2	34.9	48	39.4
11/18/2024	12:01 AM	44.7	55.5	34.8	48.5	37.7
11/18/2024	12:11 AM	45.9	56.3	35.1	48.5	39.7
11/18/2024	12:21 AM	53.5	79.1	35.2	53.3	38.2
11/18/2024	12:31 AM	47.2	61.9	35	50.9	38
11/18/2024	12:41 AM	47	59.9	35.3	49.9	39.7
11/18/2024	12:51 AM	45.6	55.2	32.5	49	38.3
11/18/2024	1:01 AM	45	54.3	32.8	48.4	37.8
11/18/2024	1:11 AM	44.7	63	33	46.3	34.7
11/18/2024	1:21 AM	49.4	64.1	34.7	53.3	37.8
11/18/2024	1:31 AM	44.1	55.5	34.5	47.4	37.2
11/18/2024	1:41 AM	43	55.7	32	46.7	34.3
11/18/2024	1:51 AM	44.9	57.2	31.7	49.2	34.3
11/18/2024	2:01 AM	47.1	61.6	34.2	50.2	38.7
11/18/2024	2:11 AM	47.7	58.6	34.8	51.6	39.6
11/18/2024	2:21 AM	43.7	61.5	31.8	45.3	33.8
11/18/2024	2:31 AM	47.5	59	30.6	51.5	35.5
11/18/2024	2:41 AM	45.8	57	30.9	50.3	32.4
11/18/2024	2:51 AM	45.8	59.2	31.4	49.9	34.4
11/18/2024	3:01 AM	47.7	62.4	30.3	51.5	31.9
11/18/2024	3:11 AM	44.5	57.1	32.2	48	34.6
11/18/2024	3:21 AM	40.8	52.5	29.8	43.8	33.7
11/18/2024	3:31 AM	37.4	48	29.1	40.8	31.4
11/18/2024	3:41 AM	45	59.1	30.5	49.7	31.7
11/18/2024	3:51 AM	44.5	65.8	28.4	46.2	31.6
11/18/2024	4:01 AM	40.9	55.2	27.5	45.5	29
11/18/2024	4:11 AM	45.1	59	28.9	49.6	32.6
11/18/2024	4:21 AM	46.5	62.3	29.7	48.3	32.2
11/18/2024	4:31 AM	42.7	54.1	31.6	46.5	34
11/18/2024	4:41 AM	40.2	53.1	29.5	43.1	32.2
11/18/2024	4:51 AM	44.1	53.1	33.2	47.3	36.5
11/18/2024	5:01 AM	47.3	62.9	32.9	50.8	34.5
11/18/2024	5:11 AM	44.9	58	34.9	47.8	38.2
11/18/2024	5:21 AM	40.7	53.1	29	42.9	33
11/18/2024	5:31 AM	46.6	60.3	32.7	49.5	35.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/18/2024	5:41 AM	45.1	56.1	33.7	48.7	38
11/18/2024	5:51 AM	43.9	59.3	31.8	47.1	35.4
11/18/2024	6:01 AM	48.6	62.7	32.6	52.2	37.5
11/18/2024	6:11 AM	45.6	61.9	31.2	48.6	35.8
11/18/2024	6:21 AM	47.7	60.2	29.6	51.9	36.1
11/18/2024	6:31 AM	44.7	55.9	33.2	47.8	37.7
11/18/2024	6:41 AM	46.9	59.2	35.5	50.2	40
11/18/2024	6:51 AM	54.1	67.5	36.2	58.9	42.7
11/18/2024	7:01 AM	47.6	62.8	36.4	51	40.4
11/18/2024	7:11 AM	48.2	65.2	35.1	50.5	39.9
11/18/2024	7:21 AM	46.4	58.4	35.3	49.3	39.1
11/18/2024	7:31 AM	48.8	64	32.1	52.4	39.5
11/18/2024	7:41 AM	46.2	60.5	35.5	49.7	39.2
11/18/2024	7:51 AM	46.4	64.4	33	48.9	36.9
11/18/2024	8:01 AM	44.1	58.1	31.3	46.8	36.4
11/18/2024	8:11 AM	47.9	80.2	27.6	47.4	33.5
11/18/2024	8:21 AM	44.5	62.1	29.1	46.5	34.4
11/18/2024	8:31 AM	44.5	70	27.5	44.2	32.6
11/18/2024	8:41 AM	38.9	57.5	29.1	43	31.7
11/18/2024	8:51 AM	39.8	60.5	27.7	42.8	32.4
11/18/2024	9:01 AM	45.5	73.1	32.8	46	35.2
11/18/2024	9:11 AM	38.7	52.9	25.2	41.4	31.5
11/18/2024	9:21 AM	39.7	56	26.4	43.6	31.6
11/18/2024	9:31 AM	38.4	56.7	26.7	41.3	32.1
11/18/2024	9:41 AM	37.6	57.4	24	39.9	29
11/18/2024	9:51 AM	35.7	51.3	25.5	38	29.7
11/18/2024	10:01 AM	41.6	63.4	28	41.2	32.8
11/18/2024	10:11 AM	38.1	51.5	24	40.7	30
11/18/2024	10:21 AM	36.1	54.1	23.4	38.5	27.5
11/18/2024	10:31 AM	36.9	54.3	26	39.6	29.8
11/18/2024	10:41 AM	36.9	57	24.6	39.1	28.9
11/18/2024	10:51 AM	33.9	57.7	24.6	34.1	27.9
11/18/2024	11:01 AM	37.2	53.5	28.1	39	30.8
11/18/2024	11:11 AM	42	57.7	31.9	43.6	36.2
11/18/2024	11:21 AM	41.3	60.9	28.5	42.5	31.6
11/18/2024	11:31 AM	40.8	61.5	27.2	41.8	32.8
11/18/2024	11:41 AM	42.4	56.2	31.4	45.6	34.6
11/18/2024	11:51 AM	39.2	52.2	30.6	42	34.1
11/18/2024	12:01 PM	42.1	64.5	32.2	44.9	36.2
11/18/2024	12:11 PM	42.8	56.2	32.6	46.2	36.1
11/18/2024	12:21 PM	51.5	81.8	35.9	46	38.9
11/18/2024	12:31 PM	45.6	61.4	36.8	47.9	40.4
11/18/2024	12:41 PM	47.1	60.8	35	50.1	41.6
11/18/2024	12:51 PM	44.4	58.5	37	46.4	39.8
11/18/2024	1:01 PM	46	63	36	48.7	41.1

NA-2 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
11/17/2024	12:58 PM	1,5	4,8	64
11/17/2024	1:08 PM	1,4	3,9	80
11/17/2024	1:18 PM	1,4	3,6	118
11/17/2024	1:28 PM	1,3	4,9	44
11/17/2024	1:38 PM	1,5	4,5	40
11/17/2024	1:48 PM	1,4	4,9	96
11/17/2024	1:58 PM	1,6	3,9	127
11/17/2024	2:08 PM	1,6	3,6	101
11/17/2024	2:18 PM	1,5	4,4	77
11/17/2024	2:28 PM	1,8	4,3	115
11/17/2024	2:38 PM	1,5	3,9	122
11/17/2024	2:48 PM	1,5	4,1	113
11/17/2024	2:58 PM	1,6	3,8	100
11/17/2024	3:08 PM	1,7	5,1	118
11/17/2024	3:18 PM	1,4	4,4	92
11/17/2024	3:28 PM	1,5	4,5	62
11/17/2024	3:38 PM	1,4	3,8	44
11/17/2024	3:48 PM	1,4	4,7	180
11/17/2024	3:58 PM	1,3	3,7	176
11/17/2024	4:08 PM	1,3	2,5	173
11/17/2024	4:18 PM	1,4	3,9	168
11/17/2024	4:28 PM	1,1	2,4	193
11/17/2024	4:38 PM	0,9	2,2	212
11/17/2024	4:48 PM	1,1	3,1	166
11/17/2024	4:58 PM	0,9	1,8	185
11/17/2024	5:08 PM	0,9	2,0	181
11/17/2024	5:18 PM	1,1	2,0	170
11/17/2024	5:28 PM	1,1	2,0	183
11/17/2024	5:38 PM	1,0	1,7	177
11/17/2024	5:48 PM	0,8	1,4	177
11/17/2024	5:58 PM	0,8	1,5	174
11/17/2024	6:08 PM	0,5	1,3	181
11/17/2024	6:18 PM	0,5	0,9	187
11/17/2024	6:28 PM	0,4	1,1	177
11/17/2024	6:38 PM	0,5	1,1	148
11/17/2024	6:48 PM	0,6	1,1	179
11/17/2024	6:58 PM	0,7	1,2	150
11/17/2024	7:08 PM	0,6	1,2	128
11/17/2024	7:18 PM	0,8	1,5	141
11/17/2024	7:28 PM	0,8	1,6	107
11/17/2024	7:38 PM	1,0	1,9	114
11/17/2024	7:48 PM	0,9	1,8	162
11/17/2024	7:58 PM	1,0	2,2	122

Date	Time	Wind speed	Wind speed max	Wind direction
11/17/2024	8:08 PM	0,9	1,8	155
11/17/2024	8:18 PM	0,8	1,8	148
11/17/2024	8:28 PM	0,8	1,7	144
11/17/2024	8:38 PM	0,9	1,8	125
11/17/2024	8:48 PM	0,9	1,8	113
11/17/2024	8:58 PM	0,7	1,7	186
11/17/2024	9:08 PM	0,6	1,0	136
11/17/2024	9:18 PM	0,5	1,4	162
11/17/2024	9:28 PM	0,7	1,3	111
11/17/2024	9:38 PM	0,6	1,3	141
11/17/2024	9:48 PM	0,6	1,6	131
11/17/2024	9:58 PM	0,7	1,3	114
11/17/2024	10:08 PM	0,5	1,2	163
11/17/2024	10:18 PM	0,4	1,0	152
11/17/2024	10:28 PM	0,2	1,2	73
11/17/2024	10:38 PM	0,5	1,1	149
11/17/2024	10:48 PM	0,4	1,2	177
11/17/2024	10:58 PM	0,8	1,6	170
11/17/2024	11:08 PM	0,6	1,2	166
11/17/2024	11:18 PM	0,6	1,1	160
11/17/2024	11:28 PM	0,8	1,2	183
11/17/2024	11:38 PM	0,4	1,0	36
11/17/2024	11:48 PM	0,5	1,3	184
11/17/2024	11:58 PM	0,6	1,3	211
11/18/2024	12:08 AM	0,5	0,9	151
11/18/2024	12:18 AM	0,6	1,3	157
11/18/2024	12:28 AM	0,8	1,7	180
11/18/2024	12:38 AM	0,9	1,6	157
11/18/2024	12:48 AM	0,3	1,1	163
11/18/2024	12:58 AM	0,6	1,3	196
11/18/2024	1:08 AM	0,5	1,3	219
11/18/2024	1:18 AM	0,5	1,4	147
11/18/2024	1:28 AM	0,8	1,3	240
11/18/2024	1:38 AM	0,9	1,6	163
11/18/2024	1:48 AM	0,6	1,5	161
11/18/2024	1:58 AM	0,8	1,9	169
11/18/2024	2:08 AM	0,9	1,3	148
11/18/2024	2:18 AM	0,6	1,0	157
11/18/2024	2:28 AM	0,8	1,6	142
11/18/2024	2:38 AM	0,6	1,2	142
11/18/2024	2:48 AM	0,6	1,2	157
11/18/2024	2:58 AM	0,7	1,2	142
11/18/2024	3:08 AM	0,7	1,4	141
11/18/2024	3:18 AM	0,8	1,4	283

Date	Time	Wind speed	Wind speed max	Wind direction
11/18/2024	3:28 AM	0,8	1,3	180
11/18/2024	3:38 AM	0,8	1,4	151
11/18/2024	3:48 AM	0,6	1,1	167
11/18/2024	3:58 AM	0,3	1,4	167
11/18/2024	4:08 AM	0,6	1,2	153
11/18/2024	4:18 AM	0,7	1,3	142
11/18/2024	4:28 AM	0,8	1,4	152
11/18/2024	4:38 AM	0,6	1,1	176
11/18/2024	4:48 AM	0,4	1,0	156
11/18/2024	4:58 AM	0,4	0,9	230
11/18/2024	5:08 AM	0,8	1,4	143
11/18/2024	5:18 AM	0,6	1,2	167
11/18/2024	5:28 AM	0,6	1,1	154
11/18/2024	5:38 AM	0,6	1,1	158
11/18/2024	5:48 AM	0,6	1,0	147
11/18/2024	5:58 AM	0,5	1,1	182
11/18/2024	6:08 AM	0,6	0,9	151
11/18/2024	6:18 AM	0,6	1,0	135
11/18/2024	6:28 AM	0,7	1,4	149
11/18/2024	6:38 AM	0,7	1,1	211
11/18/2024	6:48 AM	0,7	1,4	150
11/18/2024	6:58 AM	0,6	1,3	164
11/18/2024	7:08 AM	0,3	0,7	182
11/18/2024	7:18 AM	0,5	1,0	144
11/18/2024	7:28 AM	0,4	0,9	187
11/18/2024	7:38 AM	0,4	0,9	164
11/18/2024	7:48 AM	0,4	1,1	193
11/18/2024	7:58 AM	0,4	0,9	214
11/18/2024	8:08 AM	0,3	0,7	285
11/18/2024	8:18 AM	0,2	0,9	184
11/18/2024	8:28 AM	0,3	0,7	112
11/18/2024	8:38 AM	0,1	0,6	232
11/18/2024	8:48 AM	0,4	0,8	116
11/18/2024	8:58 AM	0,3	0,7	203
11/18/2024	9:08 AM	0,3	0,9	21
11/18/2024	9:18 AM	0,5	1,0	19
11/18/2024	9:28 AM	0,6	1,3	255
11/18/2024	9:38 AM	0,5	1,2	206
11/18/2024	9:48 AM	0,6	1,8	163
11/18/2024	9:58 AM	0,9	2,3	85
11/18/2024	10:08 AM	0,7	2,0	338
11/18/2024	10:18 AM	1,1	2,0	149
11/18/2024	10:28 AM	0,8	1,6	204
11/18/2024	10:38 AM	0,9	3,1	185

Date	Time	Wind speed	Wind speed max	Wind direction
11/18/2024	10:48 AM	1,1	2,4	166
11/18/2024	10:58 AM	1,0	2,2	168
11/18/2024	11:08 AM	1,1	3,0	196
11/18/2024	11:18 AM	1,5	4,3	50
11/18/2024	11:28 AM	1,4	4,2	147
11/18/2024	11:38 AM	1,5	3,2	101
11/18/2024	11:48 AM	1,1	4,0	182
11/18/2024	11:58 AM	1,4	3,6	180
11/18/2024	12:08 PM	1,3	3,8	184
11/18/2024	12:18 PM	1,5	3,8	139
11/18/2024	12:28 PM	1,5	4,1	99
11/18/2024	12:38 PM	1,6	3,9	137
11/18/2024	12:48 PM	1,6	3,4	126
11/18/2024	12:58 PM	1,8	4,5	114

NA-2 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/17/2024	1:15 PM	1602.94	28.19	0	8.33	12.72
11/17/2024	1:30 PM	1646.05	5.08	0	13.4	17.64
11/17/2024	1:45 PM	1493.14	5.73	0	7.32	9.11
11/17/2024	2:00 PM	1417.86	6.47	0	6.21	8.08
11/17/2024	2:15 PM	1328.44	6.76	0	5.43	7.22
11/17/2024	2:30 PM	1267.71	10.41	0	5.99	8.34
11/17/2024	2:45 PM	1222.15	6.38	0	4.52	6.79
11/17/2024	3:00 PM	1203.42	11.69	0	4.37	6.88
11/17/2024	3:15 PM	1184.81	12.22	0	5.11	7.26
11/17/2024	3:30 PM	1191.5	14.52	0	5.84	8.85
11/17/2024	3:45 PM	1139.92	9	0	6.87	10.18
11/17/2024	4:00 PM	1130.03	11.52	0	8.16	11.99
11/17/2024	4:15 PM	1103.42	10.33	0	6.47	9.42
11/17/2024	4:30 PM	1296.09	14.52	0	20.87	25.32
11/17/2024	4:45 PM	1519.02	13.83	0	44.78	57.48
11/17/2024	5:00 PM	1281.82	11.5	0	10.77	13.48
11/17/2024	5:15 PM	1519.39	18.03	0	20.03	21.59
11/17/2024	5:30 PM	1514.49	22.18	0	12.03	13.27
11/17/2024	5:45 PM	1291.63	19.69	0	8.46	13.3
11/17/2024	6:00 PM	1261.59	21.37	0	14.42	21.01
11/17/2024	6:15 PM	1437.13	16.94	0	21.04	24.9
11/17/2024	6:30 PM	1564.75	35.18	0	17.95	21.22
11/17/2024	6:45 PM	1464.14	38.31	0	14.16	17.26
11/17/2024	7:00 PM	1386.72	44.06	0	8.93	10.67
11/17/2024	7:15 PM	1568.67	41.81	0	9.25	11.81
11/17/2024	7:30 PM	1524.51	40.38	0	33.18	54
11/17/2024	7:45 PM	1424.63	41.45	0	10.55	13.22
11/17/2024	8:00 PM	1331.78	35.97	0	4.57	6.3
11/17/2024	8:15 PM	1556.98	50.14	0	10.87	12.17

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/17/2024	8:30 PM	1710.45	51.63	0	16.28	18.99
11/17/2024	8:45 PM	1635.51	51.93	0	21.15	25.49
11/17/2024	9:00 PM	1622.98	48.63	0	22.07	30.71
11/17/2024	9:15 PM	1761.29	45.52	0	34.69	53.4
11/17/2024	9:30 PM	1564.58	42.98	0	29.27	45.77
11/17/2024	9:45 PM	1728.07	41.6	0	38.93	55.06
11/17/2024	10:00 PM	1704.18	45.74	0	26.38	34.22
11/17/2024	10:15 PM	1469.99	40.87	0	17.68	21.33
11/17/2024	10:30 PM	1586.39	39.82	0	20.05	24.12
11/17/2024	10:45 PM	1549.99	41.6	0	17.42	21
11/17/2024	11:00 PM	1641.92	46.87	0	17.39	22.37
11/17/2024	11:15 PM	1700.06	46.01	0	32.69	41.29
11/17/2024	11:30 PM	1642.31	43.76	0	20.71	30.08
11/17/2024	11:45 PM	1685.68	37.99	0	25.07	34.88
11/18/2024	12:00 AM	1807.26	37.17	0	22.2	30.01
11/18/2024	12:15 AM	1814.62	38.85	0	19.92	25.43
11/18/2024	12:30 AM	1763.39	35.07	0	17.06	21.91
11/18/2024	12:45 AM	1953.48	33.65	0	19.51	22.98
11/18/2024	1:00 AM	2112.86	32.16	0	21.96	25.28
11/18/2024	1:15 AM	1916.65	31.17	0	16.55	19.87
11/18/2024	1:30 AM	1859.22	34.3	0	15.21	18.17
11/18/2024	1:45 AM	1815.47	36.58	0	14	16.63
11/18/2024	2:00 AM	1971.46	34.78	0	15.78	19.43
11/18/2024	2:15 AM	1991.66	34.61	0	14.83	17.26
11/18/2024	2:30 AM	1922.95	35.28	0	17.9	23.14
11/18/2024	2:45 AM	1869.12	40.89	0	19.4	24.44
11/18/2024	3:00 AM	1824.03	40.28	0	14.44	18.26
11/18/2024	3:15 AM	1664.16	36.88	0	11.92	14.3
11/18/2024	3:30 AM	1611.48	39.31	0	11.24	13.31
11/18/2024	3:45 AM	1664.47	37.72	0	12.55	16.26
11/18/2024	4:00 AM	1680.49	32.36	0	11.19	13.7
11/18/2024	4:15 AM	1689.4	33.94	0	14.25	17.11
11/18/2024	4:30 AM	1615.23	34.46	0	11.41	13.35
11/18/2024	4:45 AM	1582.38	28.34	0	11.98	14.23
11/18/2024	5:00 AM	1569.18	26.15	0	11.28	13.51
11/18/2024	5:15 AM	1515.83	26.74	0	11.19	13.85
11/18/2024	5:30 AM	1584.51	26.97	0	12.36	15.57
11/18/2024	5:45 AM	1591.59	26.55	0	13.05	15.4
11/18/2024	6:00 AM	1697.71	23.61	0	12.74	14.68
11/18/2024	6:15 AM	1806.14	26.43	0	19.32	20.37
11/18/2024	6:30 AM	2200.63	22.37	0	77.38	126.83
11/18/2024	6:45 AM	1993.96	22.5	0	36.02	38.47
11/18/2024	7:00 AM	1952.58	25.61	0	32.12	32.58
11/18/2024	7:15 AM	1875.53	24.7	0	26.19	27.47
11/18/2024	7:30 AM	2114.63	27.22	0	34.09	38
11/18/2024	7:45 AM	2063.55	27.94	0	31.85	32.21
11/18/2024	8:00 AM	2043.16	30.35	0	33.12	34.24
11/18/2024	8:15 AM	1679.25	44.24	0	12.12	14.2
11/18/2024	8:30 AM	1752.02	49.89	0	19.91	22.64

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/18/2024	8:45 AM	1696.64	53.9	0	17.25	19.3
11/18/2024	9:00 AM	1878.49	54.93	0	24.37	25.4
11/18/2024	9:15 AM	1494.69	54.68	0	13.54	15.17
11/18/2024	9:30 AM	1391.46	48.46	0	14.89	16.17
11/18/2024	9:45 AM	1195.17	50.1	0	7.22	9.47
11/18/2024	10:00 AM	1058.49	49.83	0	5.62	7.75
11/18/2024	10:15 AM	903.88	47.2	0	4.67	6.54
11/18/2024	10:30 AM	845.29	41.68	0	4.33	6.99
11/18/2024	10:45 AM	740.66	38.72	0	3.27	5.19
11/18/2024	11:00 AM	692.48	31.95	0	2.79	4.79
11/18/2024	11:15 AM	668.12	27.91	0	2.95	4.8
11/18/2024	11:30 AM	552.05	29.53	0	3.05	4.87
11/18/2024	11:45 AM	564.26	4.93	0	2.7	4.6
11/18/2024	12:00 PM	566.64	5.48	0	2.71	4.54
11/18/2024	12:15 PM	531.67	4.34	0	2.96	4.79
11/18/2024	12:30 PM	573.39	7.47	0	3.73	5.81
11/18/2024	12:45 PM	595.6	7.14	0	3.22	5.02
11/18/2024	1:00 PM	629.2	4.34	0	4.07	6.15
11/18/2024	1:15 PM	633.91	8.75	0	4.07	5.81

NA-3 Noise load

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/18/2024	4:16 PM	46.6	78.2	31.4	46.5	33.4
11/18/2024	4:26 PM	41.8	52.8	33.4	45.4	35.5
11/18/2024	4:36 PM	42.5	53.4	32.7	45.5	36.3
11/18/2024	4:46 PM	37.9	61.4	31.2	39.8	33.3
11/18/2024	4:56 PM	37.6	55.7	31.4	39.7	33.8
11/18/2024	5:06 PM	39.1	56.5	31.7	40.3	33.8
11/18/2024	5:16 PM	35.4	49.7	28.6	38.5	30.6
11/18/2024	5:26 PM	39	57.4	29.1	39.9	33
11/18/2024	5:36 PM	37.8	49.7	31.1	40.7	33.3
11/18/2024	5:46 PM	35.4	47.8	29	38	31.8
11/18/2024	5:56 PM	39.8	53.2	31.5	42.3	33.8
11/18/2024	6:06 PM	35.2	43.1	30	37.5	31.8
11/18/2024	6:16 PM	61.2	75.5	30.2	64.2	32.9
11/18/2024	6:26 PM	39.1	50.3	32.4	41.5	35
11/18/2024	6:36 PM	37.2	48	30.9	39.7	33.5
11/18/2024	6:46 PM	41.1	55.3	31.9	44.6	34.9
11/18/2024	6:56 PM	42	51.9	34.5	45	37.8
11/18/2024	7:06 PM	41.1	53.1	33.1	44.2	36.9
11/18/2024	7:16 PM	39.8	52	33.4	42	35.7
11/18/2024	7:26 PM	43.9	55.8	34.8	47.8	37
11/18/2024	7:36 PM	40.5	51.1	33.7	43.6	36.2
11/18/2024	7:46 PM	40.3	53.1	33.4	43.1	36.2
11/18/2024	7:56 PM	38.7	50.8	33.4	40.9	35.1
11/18/2024	8:06 PM	39.6	50.3	33.5	41.7	36.3

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/18/2024	8:16 PM	40.8	52.5	34.5	43.2	36.7
11/18/2024	8:26 PM	40.7	51.1	34.1	43.9	36.3
11/18/2024	8:36 PM	42.1	53.1	36.1	45	37.9
11/18/2024	8:46 PM	40.9	48.9	34.4	43.8	36.7
11/18/2024	8:56 PM	40.1	51.6	33.8	42.7	35.9
11/18/2024	9:06 PM	41.3	52.6	36.2	43.5	38.2
11/18/2024	9:16 PM	43.6	58.7	35.7	46.1	37.6
11/18/2024	9:26 PM	42	50	35.4	45.2	37.5
11/18/2024	9:36 PM	42.4	50.9	36.6	44.9	39.1
11/18/2024	9:46 PM	41.3	48.5	36.3	43.4	38.6
11/18/2024	9:56 PM	42.4	62.7	36.1	44.5	39.1
11/18/2024	10:06 PM	46.3	79.1	34.7	43.9	37.6
11/18/2024	10:16 PM	38.4	46	34.7	40.4	36.3
11/18/2024	10:26 PM	37.4	47	33.4	39.1	35.1
11/18/2024	10:36 PM	40.6	51	33.1	43.8	35
11/18/2024	10:46 PM	39.5	50.8	33.2	42	35.1
11/18/2024	10:56 PM	38.2	45.5	32.3	40.7	34.2
11/18/2024	11:06 PM	36.8	50.5	31.2	38.6	33
11/18/2024	11:16 PM	35.7	47.6	31.5	37.8	32.8
11/18/2024	11:26 PM	39.5	54.8	32.2	41.5	34.4
11/18/2024	11:36 PM	39.3	55.2	33.1	41.4	34.4
11/18/2024	11:46 PM	40.1	52.6	32.8	42.9	35.5
11/18/2024	11:56 PM	39.4	52.5	33.8	41.9	35.6
11/19/2024	12:06 AM	57.3	73.8	34.4	50.4	36.1
11/19/2024	12:16 AM	37	49.2	32.5	38.5	34.4
11/19/2024	12:26 AM	38.8	51	31.8	40.7	34.2
11/19/2024	12:36 AM	37	48.6	32	38.8	34.4
11/19/2024	12:46 AM	37.5	49.5	32.3	39.2	34.3
11/19/2024	12:56 AM	37.7	53.3	31.6	40.3	33.3
11/19/2024	1:06 AM	37.4	52.1	32.6	39.1	34.3
11/19/2024	1:16 AM	38.8	52.7	31.9	42	33.6
11/19/2024	1:26 AM	35.1	49.2	31.3	36.7	32.9
11/19/2024	1:36 AM	34.9	47.1	31.2	36.4	32.9
11/19/2024	1:46 AM	36.5	46.5	31.6	38.9	33
11/19/2024	1:56 AM	35.9	48.1	30.9	38.7	32.2
11/19/2024	2:06 AM	36.5	48.6	30.9	38.9	32.4
11/19/2024	2:16 AM	34.4	45.6	31	36	32.2
11/19/2024	2:26 AM	33.1	43.6	30.1	34.7	31.4
11/19/2024	2:36 AM	35	46.2	30.6	37	32.3
11/19/2024	2:46 AM	34	46.4	29.2	35.7	31.8
11/19/2024	2:56 AM	36.3	49.4	30.9	38.1	33
11/19/2024	3:06 AM	39.9	52.9	32.4	43.5	34
11/19/2024	3:16 AM	35.2	46	31.4	37.3	32.7
11/19/2024	3:26 AM	35.8	46	30.6	38.1	32.7
11/19/2024	3:36 AM	35.5	46.7	31.2	38.2	32.8

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/19/2024	3:46 AM	36.8	51.4	31.8	38.2	33.2
11/19/2024	3:56 AM	35.4	51.1	30	37.8	31.5
11/19/2024	4:06 AM	46.7	63.4	31.4	50.9	33
11/19/2024	4:16 AM	62.1	75.3	32.7	66.6	35
11/19/2024	4:26 AM	37.6	50.9	32.1	40.7	33.7
11/19/2024	4:36 AM	38.7	57.2	32.5	39.7	34.6
11/19/2024	4:46 AM	40.3	53.1	31.3	44.5	33.9
11/19/2024	4:56 AM	36	49.6	31.1	37.4	33
11/19/2024	5:06 AM	40.6	57.2	31.7	43.3	33.6
11/19/2024	5:16 AM	35.4	45.6	31.1	37.3	32.5
11/19/2024	5:26 AM	38.2	50.6	31.8	39.9	34.4
11/19/2024	5:36 AM	37.8	54.9	30.6	41.2	32.6
11/19/2024	5:46 AM	34.6	46.1	31.4	36	32.9
11/19/2024	5:56 AM	37	52.5	30.7	39.6	32.9
11/19/2024	6:06 AM	35.7	44.8	32.3	37.2	33.8
11/19/2024	6:16 AM	36.7	50.8	31.1	39.1	32.9
11/19/2024	6:26 AM	36	45.7	30.6	38.1	32.4
11/19/2024	6:36 AM	41.9	58.8	34.3	45.1	36.4
11/19/2024	6:46 AM	39.2	59	31.8	41	33.9
11/19/2024	6:56 AM	44.6	76.8	32.6	45.5	35.4
11/19/2024	7:06 AM	40.7	50.6	33.1	43.9	35.7
11/19/2024	7:16 AM	41.2	51.9	33.6	44.5	36.6
11/19/2024	7:26 AM	41	51.5	32.6	44.4	35.3
11/19/2024	7:36 AM	39.5	54.7	32.5	42.9	34.6
11/19/2024	7:46 AM	43.3	53.7	32.8	47.1	35.3
11/19/2024	7:56 AM	41.2	53.1	32.1	44.7	35.1
11/19/2024	8:06 AM	38.3	49.5	32.3	41.2	34.3
11/19/2024	8:16 AM	38.7	54.9	30.9	42	33.3
11/19/2024	8:26 AM	41.9	56.6	30.7	45.4	34.1
11/19/2024	8:36 AM	39.9	55.3	32.4	42.9	34.5
11/19/2024	8:46 AM	38.4	49	30.8	41.5	33.6
11/19/2024	8:56 AM	41.7	58.5	32.6	44.8	35.5
11/19/2024	9:06 AM	42.5	55.3	32.7	46.4	34.9
11/19/2024	9:16 AM	43.7	55.5	33.6	47.6	36.3
11/19/2024	9:26 AM	41.1	52.8	30	44.5	33.4
11/19/2024	9:36 AM	43.4	60.5	34.8	46.5	37.5
11/19/2024	9:46 AM	42.6	52.2	35	45.4	38.5
11/19/2024	9:56 AM	43.7	57	34.6	47.3	37.4
11/19/2024	10:06 AM	68.2	94.9	35.7	57.1	37.8
11/19/2024	10:16 AM	42.7	58	34.3	45.8	37
11/19/2024	10:26 AM	42.2	53.9	33.3	45.5	36.7
11/19/2024	10:36 AM	38.3	51.8	32.7	40.8	35
11/19/2024	10:46 AM	40.7	60.4	33	43.5	35.6
11/19/2024	10:56 AM	38.6	62.8	30.3	41.2	32.7
11/19/2024	11:06 AM	39.9	58.2	31.2	41.8	34.6

Date	Time	LAeq	LAmaz	Lamin	LA10	LA90
11/19/2024	11:16 AM	63.4	78.4	34.4	66.6	37.1
11/19/2024	11:26 AM	39.4	51.5	31.2	42.5	34.8
11/19/2024	11:36 AM	41	62.1	32.1	42.3	35.4
11/19/2024	11:46 AM	40.1	50.1	33.3	43.6	35.5
11/19/2024	11:56 AM	39.2	48.9	32.2	42.9	34.1
11/19/2024	12:06 PM	34.8	44.5	30.2	36.8	32.4
11/19/2024	12:16 PM	40.3	60.3	31.9	42.9	33.9
11/19/2024	12:26 PM	39.2	51.8	29.4	42.6	32
11/19/2024	12:36 PM	36.3	50.6	31.3	38.7	32.7
11/19/2024	12:46 PM	40.4	63.7	31.6	41	34.3
11/19/2024	12:56 PM	40.8	63	30	42.7	31.7
11/19/2024	1:06 PM	36	47.2	30	38.4	32.1
11/19/2024	1:16 PM	36.3	53.3	29.6	38.6	32
11/19/2024	1:26 PM	34.6	48.3	29.6	36.9	31.5
11/19/2024	1:36 PM	39.6	64.9	31.9	41.6	35.4
11/19/2024	1:46 PM	40.4	65.8	30.6	40.4	33.2
11/19/2024	1:56 PM	37.6	49.7	31	40.1	34.1
11/19/2024	2:06 PM	39.4	63.4	32.5	40.4	35
11/19/2024	2:16 PM	38.3	50.4	32.9	40.6	35.1
11/19/2024	2:26 PM	41.9	65.1	33.6	43.2	36.3
11/19/2024	2:36 PM	41.3	57.5	33.4	43.1	36
11/19/2024	2:46 PM	43.5	61.1	33.1	45.4	37.3
11/19/2024	2:56 PM	45	69	33.6	45.5	36.8
11/19/2024	3:06 PM	42.3	56.5	33.2	45	37.4
11/19/2024	3:16 PM	39.4	56.2	32.1	42.1	34.9
11/19/2024	3:26 PM	42.5	61.4	33.7	45	36.5
11/19/2024	3:36 PM	41.5	53.6	34.2	44	37.6
11/19/2024	3:46 PM	41.2	51.1	35.2	43.7	37.6
11/19/2024	3:56 PM	41.9	49	37	44	39.2
11/19/2024	4:06 PM	40.6	48.1	33.8	43.5	36.6
11/19/2024	4:16 PM	43	60	34.1	45.5	38.9

NA-3 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
18/11/24 16:16	16:16:51	0,8	1,6	241
18/11/24 16:26	16:26:51	1,2	2,2	26
18/11/24 16:36	16:36:51	1,0	2,8	124
18/11/24 16:46	16:46:51	1,4	4,4	248
18/11/24 16:56	16:56:51	1,3	2,8	254
18/11/24 17:06	17:06:51	2,0	3,6	277
18/11/24 17:16	17:16:51	1,4	2,9	284
18/11/24 17:26	17:26:51	1,9	3,6	254
18/11/24 17:36	17:36:51	0,8	2,4	263
18/11/24 17:46	17:46:51	1,2	4,1	179

Date	Time	Wind speed	Wind speed max	Wind direction
18/11/24 17:56	17:56:51	1,7	3,8	235
18/11/24 18:06	18:06:51	1,4	3,7	288
18/11/24 18:16	18:16:51	2,3	5,4	237
18/11/24 18:26	18:26:51	2,1	4,5	239
18/11/24 18:36	18:36:51	1,5	4,8	250
18/11/24 18:46	18:46:51	1,3	4,0	167
18/11/24 18:56	18:56:51	1,4	2,6	114
18/11/24 19:06	19:06:51	1,1	1,9	24
18/11/24 19:16	19:16:51	1,2	2,8	348
18/11/24 19:26	19:26:51	1,4	2,7	23
18/11/24 19:36	19:36:51	1,3	2,2	347
18/11/24 19:46	19:46:51	0,8	1,8	89
18/11/24 19:56	19:56:51	1,3	2,4	202
18/11/24 20:06	20:06:51	1,1	2,2	211
18/11/24 20:16	20:16:51	0,9	2,1	286
18/11/24 20:26	20:26:51	0,7	1,8	209
18/11/24 20:36	20:36:51	0,9	1,3	212
18/11/24 20:46	20:46:51	1,3	1,8	182
18/11/24 20:56	20:56:51	1,6	2,6	217
18/11/24 21:06	21:06:51	1,5	2,4	205
18/11/24 21:16	21:16:51	1,4	2,4	203
18/11/24 21:26	21:26:51	1,6	2,5	205
18/11/24 21:36	21:36:51	1,3	3,0	206
18/11/24 21:46	21:46:51	1,8	2,8	209
18/11/24 21:56	21:56:51	1,8	2,7	209
18/11/24 22:06	22:06:51	1,2	2,4	226
18/11/24 22:16	22:16:51	1,5	3,4	201
18/11/24 22:26	22:26:51	1,6	3,0	214
18/11/24 22:36	22:36:51	1,0	2,2	199
18/11/24 22:46	22:46:51	1,3	2,7	244
18/11/24 22:56	22:56:51	0,8	1,7	234
18/11/24 23:06	23:06:51	1,1	3,2	244
18/11/24 23:16	23:16:51	1,1	2,7	240
18/11/24 23:26	23:26:51	1,3	2,6	238
18/11/24 23:36	23:36:51	1,5	2,4	223
18/11/24 23:46	23:46:51	1,2	2,5	165
18/11/24 23:56	23:56:51	1,2	2,6	120
19/11/24 00:06	00:06:51	2,1	5,2	353
19/11/24 00:16	00:16:51	1,8	4,4	42
19/11/24 00:26	00:26:51	2,5	5,4	66
19/11/24 00:36	00:36:51	2,6	5,8	86
19/11/24 00:46	00:46:51	2,3	5,6	73
19/11/24 00:56	00:56:51	2,3	6,7	79
19/11/24 01:06	01:06:51	1,1	3,1	12
19/11/24 01:16	01:16:51	1,7	4,5	78

Date	Time	Wind speed	Wind speed max	Wind direction
19/11/24 01:26	01:26:51	1,9	4,3	86
19/11/24 01:36	01:36:51	1,2	2,6	173
19/11/24 01:46	01:46:51	1,2	2,7	248
19/11/24 01:56	01:56:51	1,2	3,5	104
19/11/24 02:06	02:06:51	1,0	1,9	181
19/11/24 02:16	02:16:51	1,5	3,4	169
19/11/24 02:26	02:26:51	1,4	3,8	220
19/11/24 02:36	02:36:51	1,5	3,3	194
19/11/24 02:46	02:46:51	2,4	5,3	129
19/11/24 02:56	02:56:51	1,4	4,9	178
19/11/24 03:06	03:06:51	0,8	1,6	201
19/11/24 03:16	03:16:51	1,1	3,0	177
19/11/24 03:26	03:26:51	2,0	4,8	70
19/11/24 03:36	03:36:51	2,3	6,4	62
19/11/24 03:46	03:46:51	1,8	3,8	44
19/11/24 03:56	03:56:51	1,7	4,1	36
19/11/24 04:06	04:06:51	1,4	2,6	262
19/11/24 04:16	04:16:51	1,3	3,7	213
19/11/24 04:26	04:26:51	2,2	5,7	86
19/11/24 04:36	04:36:51	2,9	7,3	97
19/11/24 04:46	04:46:51	2,9	5,6	100
19/11/24 04:56	04:56:51	2,0	6,3	94
19/11/24 05:06	05:06:51	2,6	5,4	116
19/11/24 05:16	05:16:51	2,8	5,4	109
19/11/24 05:26	05:26:51	1,9	5,3	137
19/11/24 05:36	05:36:51	3,2	5,3	101
19/11/24 05:46	05:46:51	2,3	6,5	160
19/11/24 05:56	05:56:51	1,9	5,2	113
19/11/24 06:06	06:06:51	1,3	4,1	64
19/11/24 06:16	06:16:51	1,5	2,6	295
19/11/24 06:26	06:26:51	0,7	1,3	247
19/11/24 06:36	06:36:51	1,3	3,5	335
19/11/24 06:46	06:46:51	0,9	4,1	358
19/11/24 06:56	06:56:51	1,4	3,6	91
19/11/24 07:06	07:06:51	1,3	2,8	254
19/11/24 07:16	07:16:51	1,2	2,0	293
19/11/24 07:26	07:26:51	0,9	1,5	292
19/11/24 07:36	07:36:51	1,4	3,3	27
19/11/24 07:46	07:46:51	2,1	4,9	92
19/11/24 07:56	07:56:51	1,2	2,5	148
19/11/24 08:06	08:06:51	1,3	2,6	338
19/11/24 08:16	08:16:51	1,0	1,6	296
19/11/24 08:26	08:26:51	1,4	2,8	11
19/11/24 08:36	08:36:51	1,9	4,7	47
19/11/24 08:46	08:46:51	2,6	6,0	82

Date	Time	Wind speed	Wind speed max	Wind direction
19/11/24 08:56	08:56:51	3,1	5,3	81
19/11/24 09:06	09:06:51	3,6	7,2	85
19/11/24 09:16	09:16:51	2,6	5,1	71
19/11/24 09:26	09:26:51	3,3	7,9	82
19/11/24 09:36	09:36:51	1,9	3,9	45
19/11/24 09:46	09:46:51	2,2	5,9	56
19/11/24 09:56	09:56:51	2,7	7,4	64
19/11/24 10:06	10:06:51	2,6	5,3	70
19/11/24 10:16	10:16:51	3,0	7,5	93
19/11/24 10:26	10:26:51	3,3	7,0	69
19/11/24 10:36	10:36:51	3,3	6,7	69
19/11/24 10:46	10:46:51	2,3	6,0	35
19/11/24 10:56	10:56:51	1,8	4,6	64
19/11/24 11:06	11:06:51	1,9	4,2	41
19/11/24 11:16	11:16:51	2,4	5,1	47
19/11/24 11:26	11:26:51	2,5	4,9	55
19/11/24 11:36	11:36:51	2,0	4,0	2
19/11/24 11:46	11:46:51	1,8	3,6	354
19/11/24 11:56	11:56:51	1,7	3,6	315
19/11/24 12:06	12:06:51	1,3	2,4	307
19/11/24 12:16	12:16:51	1,4	2,8	318
19/11/24 12:26	12:26:51	1,7	3,9	325
19/11/24 12:36	12:36:51	1,1	2,2	221
19/11/24 12:46	12:46:51	1,3	3,4	4
19/11/24 12:56	12:56:51	1,5	2,9	340
19/11/24 13:06	13:06:51	1,8	3,6	329
19/11/24 13:16	13:16:51	1,7	2,8	331
19/11/24 13:26	13:26:51	1,9	3,3	298
19/11/24 13:36	13:36:51	1,7	3,0	298
19/11/24 13:46	13:46:51	1,4	2,4	308
19/11/24 13:56	13:56:51	1,9	3,0	296
19/11/24 14:06	14:06:51	1,9	3,5	295
19/11/24 14:16	14:16:51	1,5	2,8	283
19/11/24 14:26	14:26:51	1,1	2,4	349
19/11/24 14:36	14:36:51	1,1	2,4	13
19/11/24 14:46	14:46:51	1,8	3,2	358
19/11/24 14:56	14:56:51	2,1	4,5	353
19/11/24 15:06	15:06:51	1,9	3,6	9
19/11/24 15:16	15:16:51	1,6	3,2	358
19/11/24 15:26	15:26:51	1,5	2,7	327
19/11/24 15:36	15:36:51	1,3	2,5	12
19/11/24 15:46	15:46:51	0,7	2,0	29
19/11/24 15:56	15:56:51	1,1	2,4	24
19/11/24 16:06	16:06:51	0,7	1,6	308
19/11/24 16:16	16:16:51	0,6	1,6	233

NA-3 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/18/2024	4:30:00 PM	1575.17	22.23	0	7.42	9.61
11/18/2024	4:45:00 PM	1527.98	8.02	0	10.06	12.11
11/18/2024	5:00:00 PM	1357.8	5.83	0	8.8	10.74
11/18/2024	5:15:00 PM	1233.98	6.05	0	8.59	10.9
11/18/2024	5:30:00 PM	1164.31	7.79	0	4.42	6.06
11/18/2024	5:45:00 PM	1134.12	10.66	0	4.95	7.51
11/18/2024	6:00:00 PM	1128.34	16.46	0	4.37	5.98
11/18/2024	6:15:00 PM	1047.48	17.8	0	2.86	4.69
11/18/2024	6:30:00 PM	1089.49	20.21	0	2.63	4.44
11/18/2024	6:45:00 PM	1012.19	22.77	0	11.09	14.24
11/18/2024	7:00:00 PM	987.26	22.25	0	5.21	7.68
11/18/2024	7:15:00 PM	1060.73	27.41	0	12.92	16.58
11/18/2024	7:30:00 PM	958.25	29.87	0	7.91	11.6
11/18/2024	7:45:00 PM	1164.02	29.26	0	11.02	14.34
11/18/2024	8:00:00 PM	1178.12	26.45	0	10.71	13.18
11/18/2024	8:15:00 PM	1058.36	17.78	0	9.72	13.71
11/18/2024	8:30:00 PM	1162	27.48	0	13.86	17.51
11/18/2024	8:45:00 PM	1080.13	28.17	0	11.4	14.07
11/18/2024	9:00:00 PM	1109.87	22.67	0	12.57	15.39
11/18/2024	9:15:00 PM	1052.95	26.55	0	11.61	14.95
11/18/2024	9:30:00 PM	1075.1	27.05	0	12.42	15.44
11/18/2024	9:45:00 PM	1145.68	27.31	0	13.19	16.06
11/18/2024	10:00:00 PM	1137.29	27.71	0	12.74	15.96
11/18/2024	10:15:00 PM	1235.17	29.55	0	11.55	14.86
11/18/2024	10:30:00 PM	1083.55	32.76	0	11.59	14.79
11/18/2024	10:45:00 PM	1064.74	34.23	0	7.99	9.97
11/18/2024	11:00:00 PM	1033.39	35.64	0	8.51	10.51
11/18/2024	11:15:00 PM	973.86	39.58	0	5.07	7.04
11/18/2024	11:30:00 PM	1038.23	37.05	0	4.65	6.42
11/18/2024	11:45:00 PM	915.28	36.37	0	4.39	6.16
11/19/2024	12:00:00 AM	870.47	39.84	0	4.04	6.08
11/19/2024	12:15:00 AM	857.43	47.54	0	4.38	6.93
11/19/2024	12:30:00 AM	818.03	39.71	0	3.88	5.92
11/19/2024	12:45:00 AM	770.57	38.3	0	3.7	5.45
11/19/2024	1:00:00 AM	709.9	36.12	0	4.14	6.13
11/19/2024	1:15:00 AM	665.71	34.38	0	4.13	5.86
11/19/2024	1:30:00 AM	659.25	33.86	0	4.1	5.94
11/19/2024	1:45:00 AM	644.65	28.96	0	3.95	5.7
11/19/2024	2:00:00 AM	650.22	26.05	0	3.83	5.62
11/19/2024	2:15:00 AM	656.88	22.25	0	3.82	5.6
11/19/2024	2:30:00 AM	647.48	23.45	0	3.63	5.36
11/19/2024	2:45:00 AM	650.8	26.61	0	3.64	5.46
11/19/2024	3:00:00 AM	658.32	28.44	0	3.64	5.41
11/19/2024	3:15:00 AM	656.95	18.83	0	3.75	5.85
11/19/2024	3:30:00 AM	645.75	32.58	0	3.65	5.68
11/19/2024	3:45:00 AM	649.33	33.56	0	3.52	5.4
11/19/2024	4:00:00 AM	611.84	29.18	0	3.4	5.14

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
11/19/2024	4:15:00 AM	610	21.24	0	3.56	5.32
11/19/2024	4:30:00 AM	583.2	34.74	0	3.54	5.31
11/19/2024	4:45:00 AM	596.58	32.81	0	3.51	5.23
11/19/2024	5:00:00 AM	586.23	28.34	0	3.27	4.95
11/19/2024	5:15:00 AM	589.19	30.56	0	3.51	5.2
11/19/2024	5:30:00 AM	570.78	30.18	0	3.49	5.43
11/19/2024	5:45:00 AM	562.83	30.06	0	3.6	5.32
11/19/2024	6:00:00 AM	563.13	28.13	0	3.43	5.37
11/19/2024	6:15:00 AM	569.61	26.19	0	3.72	5.55
11/19/2024	6:30:00 AM	792.66	22.42	0	50.12	55.01
11/19/2024	6:45:00 AM	571.59	28.86	0	3.5	5.32
11/19/2024	7:00:00 AM	583.32	29.41	0	3.59	5.43
11/19/2024	7:15:00 AM	593.66	27.54	0	3.81	5.98
11/19/2024	7:30:00 AM	643.73	22.94	0	4.13	6.5
11/19/2024	7:45:00 AM	618.11	33.69	0	3.74	5.96
11/19/2024	8:00:00 AM	670.68	34.48	0	4.01	6.57
11/19/2024	8:15:00 AM	642.08	34.46	0	3.82	5.91
11/19/2024	8:30:00 AM	567.63	36.23	0	3.37	5.15
11/19/2024	8:45:00 AM	502.19	37.72	0	3.25	5.14
11/19/2024	9:00:00 AM	433.68	36.46	0	3.32	5.1
11/19/2024	9:15:00 AM	415.74	35.45	0	3.47	5.43
11/19/2024	9:30:00 AM	400.82	31.73	0	3.44	5.31
11/19/2024	9:45:00 AM	424.87	32.64	0	3.55	5.3
11/19/2024	10:00:00 AM	403.16	26.3	0	3.66	5.69
11/19/2024	10:15:00 AM	447.14	32.68	0	3.7	5.87
11/19/2024	10:30:00 AM	445.29	40.76	0	3.59	5.88
11/19/2024	10:45:00 AM	416.1	27.14	0	3.71	6.59
11/19/2024	11:00:00 AM	404.16	31.42	0	3.27	5.32
11/19/2024	11:15:00 AM	367.68	32.64	0	3.1	4.94
11/19/2024	11:30:00 AM	394.35	36.04	0	3.62	5.91
11/19/2024	11:45:00 AM	331.73	29.68	0	4.21	6.78
11/19/2024	12:00:00 PM	326.48	31.46	0	3.3	5.43
11/19/2024	12:15:00 PM	311.69	25.02	0	3.86	5.68
11/19/2024	12:30:00 PM	245.21	26.82	0	3.19	5.1
11/19/2024	12:45:00 PM	275.79	23.21	0	3.94	6.31
11/19/2024	1:00:00 PM	236.13	19.67	0	3.22	5.56
11/19/2024	1:15:00 PM	288.03	17.82	0	4.21	6.19
11/19/2024	1:30:00 PM	279.47	16.18	0	3.26	5.16
11/19/2024	1:45:00 PM	288.4	22.08	0	6.46	8.15
11/19/2024	2:00:00 PM	368.14	19.48	0	28.3	33.89
11/19/2024	2:15:00 PM	318.19	15.05	0	13.97	20.89
11/19/2024	2:30:00 PM	314.89	17.13	0	7.42	11.64
11/19/2024	2:45:00 PM	385.84	26.05	0	9.81	13.14
11/19/2024	3:00:00 PM	454.5	19.71	0	12.08	16.45
11/19/2024	3:15:00 PM	444.11	21.26	0	13.22	17.76
11/19/2024	3:30:00 PM	508.32	20.32	0	14.09	19.58
11/19/2024	3:45:00 PM	566.49	36.98	0	12.82	16.81
11/19/2024	4:00:00 PM	623.5	35.11	0	13.61	17.42
11/19/2024	4:15:00 PM	597.66	35.55	0	13.67	16.95

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/19/2024	4:30:00 PM	582.4	32.43	0	11.79	14.7



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Soil and Water assessment report

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Table of Contents

1	Introduction	3
2	Soil and Water sampling	4
3	Results of visual investigation and laboratory analysis	10
3.1	Soil analyses results	10
3.2	Water analyses results	12
4	National standards and Maximum Permissible Concentrations (MPC) for soil and water.....	7
	Annex 1. Picture of the soil and water sampling and quartering	14
	Annex 2. Original protocol of the result	18

Table of Figures

Figure 1: Location of sample collection	5
Figure 2: Soil sampling at S-1	14
Figure 3: Soil profile at S-2	14
Figure 4: Composite sample and background at S-2	14
Figure 5: Soil profile and composite sample at S-3	15
Figure 6: S-3 sample background	15
Figure 7: Soil profile at S-4	15
Figure 8: S-4 sample background	15
Figure 9: Sampling process at S-5 (under fresh snow that fell a few hours before sampling)	16
Figure 10: Soil profile at S-6 (under fresh snow that fell a few hours before sampling)	16
Figure 11: Water sample (SW-1)	17
Figure 12: Water sampling (SW-3)	17

Table of Tables

Table 1: Coordinates of sampling locations	6
Table 2: Coordinates of planned sampling	6
Table 3: Parameters provided for analysis in the laboratory	6
Table 4: Results of soil analysis	11
Table 5: Results of water analysis	13
Table 6: MPCs of Chemical Substances in Soil	7
Table 7: TPCs of Chemical Substances in Soil	7
Table 8: Dutch Standards for Soil Contamination (2013)	9
Table 9: MPCs of Chemical Substances in water	10

1 Introduction

The Project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. Three route options for the OHTL are under consideration. Two routes (Options 1 and 3) run parallel to the course of the transboundary Chu River on its right bank and cross the Boom Gorge. Route Option 2 deviates southwest from the River valley and crosses the eastern part of the Kyrgyz Range. The absolute elevations of the route vary between approximately 1,500 and 2,000 meters above sea level.

In the eastern part of the project area, the climate is influenced by the terrain and Lake Issyk-Kul. Since mountain ranges are located north of the lake, the main air exchange with northern air masses occurs through the Boom Gorge, resulting in strong winds. Precipitation is highly dependent on Issyk-Kul and wind dynamics, leading to most precipitation falling east of the lake, while the project area east of the Boom Gorge is characterized by a semi-desert zone¹. Within the gorge, the terrain mainly consists of steep mountain slopes and a highly anthropogenically modified area due to the presence of a highway, a railway, OHTL, and numerous roadside structures in the narrow gorge. Route Option 2 to the southwest passes through steep slopes and small mountain meadows. This area has also been modified by several existing OHTLs but to a significantly lesser extent than for Options 1 and 3. Where all route options converge, the terrain transitions into a flat landscape, with fields and intermountain plains used for agriculture.

The Chu River, which runs near the proposed routes, is one of the largest Rivers in the region, forming a major drainage basin. The primary source of the river's water, as with many other rivers in the region, is glaciers. The mountain slopes on both sides of the Chu River contain multiple small Riverbeds, most of which remain dry for most of the year. The main perennial right tributaries include the Chon-Kemin River and the smaller tributary (mountain stream) Kiyamat-Kur-Kul. The left tributary is the small mountain River Komorchek.

In the semi-desert zone of the project, the soils are classified as Brown Desert-Steppe Soils (USSR classification²³) or Xerosols (WRB⁴). These soils are characterized by a weakly developed soil profile, low fertility, and sparse vegetation cover. Mountain meadows and the western part of the project area are classified as Mountain Chestnut Soils (USSR classification) or Chestnut (WRB). These soils have higher fertility, and vegetation development depends on the topographic position and the degree of soil profile development.

The main sources of soil contamination may include livestock grazing, littering, and pollutant deposition from precipitation. Water quality in the area may deteriorate due to household pollution, livestock farming, and discharges from wastewater treatment facilities located upstream relative to the project area, as well as from contaminants carried by inflowing tributaries.

1 Geography of the Kyrgyz Republic, Part 1. Physical Geography of the Kyrgyz Republic: Study Guide / Edited by Yu.V. Shinko. - Bishkek, KRSU Publishing House, 2021. - 242 pages

2 Due to the large body of data accumulated under the Soviet classification, this chapter discusses the USSR Soil Classification System² alongside the international World Reference Base for Soil Resources (WRB) classification

3 Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

4 World Reference Base for Soil Resources.IUSS Working Group WRB. 2022.

2 Soil and Water sampling

Samples were taken at 10 locations where the intended sampling of soil and water was determined (Figure 1).

Soil samples were taken from 20 cm in accordance with the established State standard 17.4.4.02-2017 "Nature protection. Soils. Methods for sampling and preparation of soil for chemical, bacteriological, helminthological analysis". For sample collection, five points were determined using the envelope method. Whenever possible, a distance of approximately 100 meters was maintained between the outermost points to ensure representative sampling. At each point, a pit was dug to collect 500 grams of soil, after which all collected soil was thoroughly mixed. Using the quartering method, a portion of the sample was returned to the pits. As a result, the composite sample weighed approximately 800 to 1000 grams.

Water sampling was carried out in accordance with the established State standard 31861-2012 "Water. General requirements for sampling". The water sample points are strategically located to capture surface water from the nearest source to the project and within the project activity area. A one-liter water sample was collected and stored in polymer bottles for subsequent analysis in the laboratory. One sample of ground water was taken from existing borehole.

The sampling coordinates are provided in Table 1. Since the first round of sampling was conducted to study Options 1 and 3, additional soil sampling is planned to reflect the baseline conditions of Option 2. The preliminary coordinates for the second round of sampling are provided in Table 2.

Figure 1: Location of sample collection

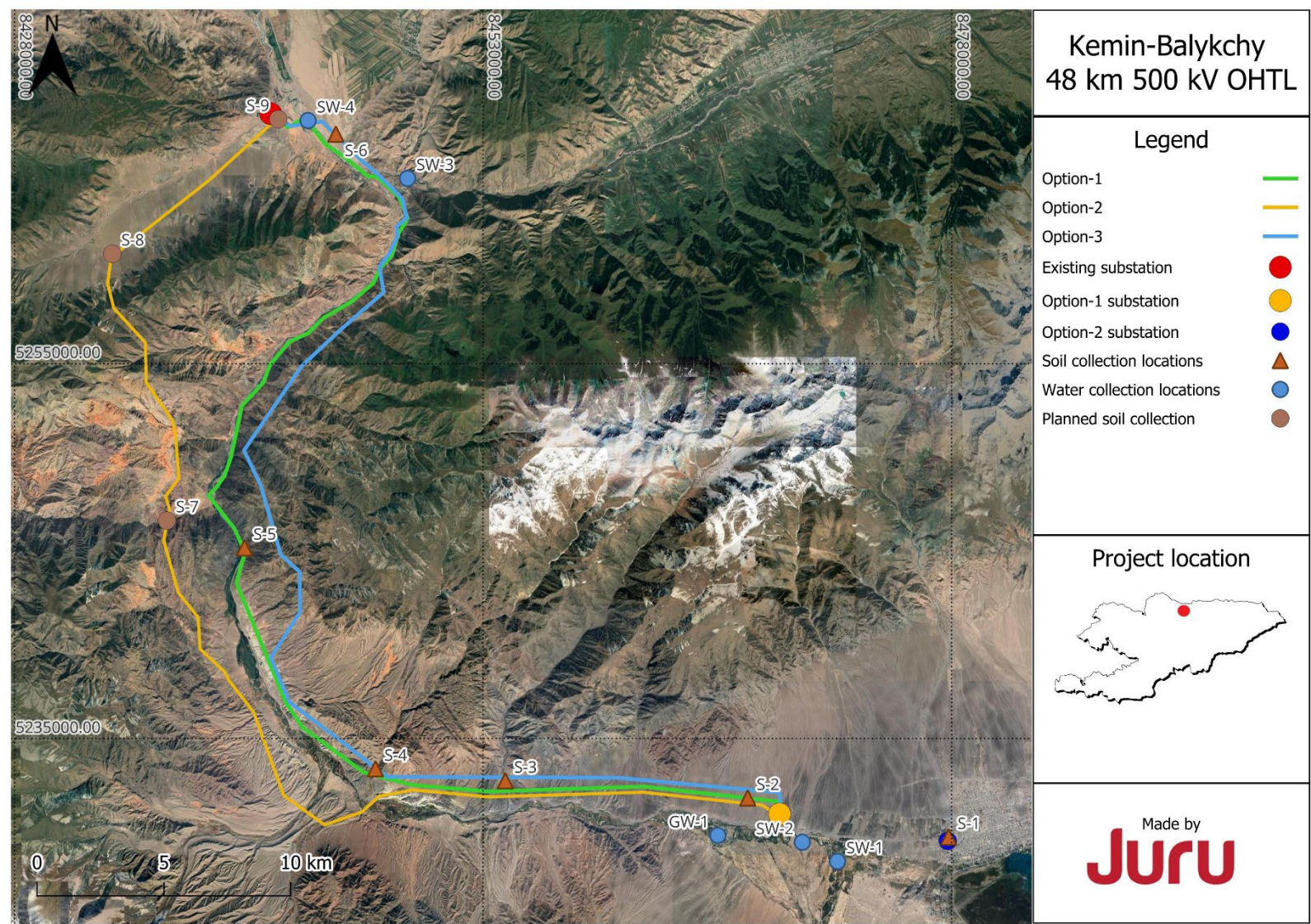


Table 1: Coordinates of sampling locations

Name of sample	Coordinates	
	Northing	Easting
S-1	42.45746	76.15770
S-2	42.47128	76.06139
S-3	42.47737	75.94523
S-4	42.48161	75.88302
S-5	42.55967	75.82026
S-6	42.70553	75.86404
SW-1	42.44886	76.10441
SW-2	42.45563	76.08755
SW-3	42.68992	75.89839
SW-4	42.71031	75.85072
GW-1	42.45807	76.04708

Table 2: Coordinates of planned sampling

Name of sample	Coordinates	
	Northing	Easting
S-7	42.56928	75.78310
S-8	42.66333	75.75694
S-9	42.71076	75.83645

Table 3: Parameters provided for analysis in the laboratory

Nature component	Parameters	Laboratory
Soil	pH	STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC (Kyrgyz Republic, Kara-Balta city)
	Gross content (Zn, Cr, Cd, Cu, Mn, Hg, Ni, Fe, Pb, Na, K)	
	NO ³⁻	
Water	pH	
	Gross content (As, Zn, Al, Cd, Cu, Ni, Pb)	
	Cr ⁶⁺	

3 National standards and Maximum Permissible Concentrations (MPC) for soil and water

In Kyrgyzstan, at the national level, two types of indicators are used for soil: Maximum Permissible Concentrations (MPC) (Table 4) and Tentative Permissible Concentrations (TPC) (Table 5). MPC values are applied based on specific land use types.

- The indicator may be translocation-based, meaning it is determined using a method that estimates the potential uptake of the substance by agricultural crops.
- It may also be defined for water migration, which applies to substances that actively migrate through the landscape and accumulate in water bodies, most commonly fertilizers and pesticides.
- The general sanitary indicator refers to the concentration of a substance in soils of residential areas.

For natural soils without a specific land use type, TPC is applied. Substances under this regulation are measured in their total content form.

Table 4: MPCs of Chemical Substances in Soil⁵

Substance name	Substance form	MPC value, mg/kg of soil considering background (Clarke)	Limiting factor
Arsenic (As)	Mobile	2,0	Translocation
Nitrates (NO ³⁻)	Gross content	130,0	Water migration
Mercury (Hg)	Mobile	2,1	Translocation
Lead (Pb)	Gross content	32,0	General sanitary
Copper (Cu) ¹	Mobile	3,0	General sanitary
Nickel (Ni)	Mobile	4,0	General sanitary
Lead (Pb)	Mobile	6,0	General sanitary
Zinc (Zn)	Mobile	23,0	Translocation
Chromium (Cr)	Mobile	6,0	General sanitary

Table 5: TPCs of Chemical Substances in Soil⁶

Substance name	Group of soils	TPC value, mg/kg of soil considering background (Clarke)
Cadmium (Cd)	Sandy and sandy loam soils	0,5

⁵ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Appendix 21).

⁶ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Appendix 21).

Substance name	Group of soils	TPC value, mg/kg of soil considering background (Clarke)
	Acidic (loamy and clayey) soils, pH KCl < 5.5	1,0
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	2,0
Copper (Cu)	Sandy and sandy loam soils	33
	Acidic (loamy and clayey) soils, pH KCl < 5.5	66
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	132
Arsenic (As)	Sandy and sandy loam soils	2
	Acidic (loamy and clayey) soils, pH KCl < 5.5	5
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	10
Nickel (Ni)	Sandy and sandy loam soils	20
	Acidic (loamy and clayey) soils, pH KCl < 5.5	40
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	80
Lead (Pb)	Sandy and sandy loam soils	32
	Acidic (loamy and clayey) soils, pH KCl < 5.5	65
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	130
Zinc (Zn)	Sandy and sandy loam soils	55
	Acidic (loamy and clayey) soils, pH KCl < 5.5	110
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	220

The Table 6 presenting the Dutch Standards values for soil.

Table 6: Dutch Standards for Soil Contamination (2013)⁷

Parameters	Soil (mg/kg dry matter)	
	Target value*	Intervention value
Arsenic	29	76
Barium	160	-
Cadmium	0.8	13
Chromium	100	-
Chromium III	-	180
Chromium IV	-	78
Cobalt	-	190
Copper	36	190
Lead	85	530
Mercury	0.3	36 (inorganic) 4 (organic)
Molybdenum	3	190
Nickel	35	100
Zinc	140	720
<p>Note: The soil values are calculated for a 'Standard Soil' with 10% organic matter and 25% clay. A case of environmental contamination is defined as 'serious' if >25 m³ soil or >100 m³ groundwater is contaminated above the intervention value. Where contaminants are found to exceed 'intervention' levels, this is considered to be a case of soil contamination, which is dangerous to the health of humans and the natural environment. Such a level of contamination should prompt a need for remediation, appropriate treatment and disposal.</p>		

National water quality standards are presented in Table 7. These parameters represent the Maximum Permissible Concentrations (MPC) for water used for domestic, drinking, and recreational purposes.

The limiting factor depends on the chemical properties of a substance and is determined by the characteristic on which its negative impact manifests at the lowest concentration compared to other effects.

- Organoleptic refers to negative qualities of a substance that are perceptible by human senses, such as odor or turbidity, etc.
- Sanitary-toxicological indicates harm to health due to toxicity.

⁷ Source: Soil Remediation Circular 2013, (*Target values for soil refer to 2000 version as they are not present in the 2013)

- General sanitary includes a combination of different impacts.

Substances are also assigned a hazard class, where:

- Class 1 – Extremely hazardous
- Class 2 – Highly hazardous
- Class 3 – Hazardous
- Class 4 – Moderately hazardous

Table 7: MPCs of Chemical Substances in water⁸

Substance name	MPC, mg/l	Limiting factor	Hazard class
Aluminum (Al)	0,2	Organoleptic – Turbidity	3
Cadmium (Cd)	0,001	Sanitary-toxicological	2
Copper (Cu)	1,0	Sanitary-toxicological	3
Arsenic (As)	0,01	Sanitary-toxicological	1
Nickel (Ni)	0,02	Sanitary-toxicological	2
Lead (Pb)	0,01	Sanitary-toxicological	2
Chromium VI (Cr VI)	0,05	Sanitary-toxicological	3
Zinc (Zn)	1	General sanitary	3

4 Results of visual investigation and laboratory analysis

4.1 Soil analyses results

Soil samples can be divided into several groups. Points S-1 to S-4 belong to Brown Desert-Steppe Soils/Xerosols, Point S-5 to Mountain Chestnut/Chestnut but has been significantly altered by constant deposits from the mountains and anthropogenic activity. S-6 belongs to Mountain Chestnut/Chestnut, significantly transformed by agricultural activities.

Points S-1 to S-4 had a weakly developed and weakly differentiated profile with high rockiness. According to literature data, this type of soil in Kyrgyzstan is represented by loams. The upper horizons have almost no distinct colour differences from the underlying layers, indicating a low organic matter content.

Laboratory analyses of samples S-1 to S-4 revealed an alkaline reaction, which is typical for this soil type. The heavy metal content varies within acceptable concentrations according to both national

⁸ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum permissible concentrations of chemical substances in water bodies for domestic and drinking water use" according to Appendix 16).

standards (reference values for loamy soils with pH ≥ 6 are used) and European regional indicators. For metals such as Chromium (Cr) and Manganese (Mn), national regulations consider only the mobile form, which is used to assess metal transfer into plants in agriculture, whereas for processes like dust dispersion, the total element content is more relevant. The total content of these metals is relatively low, especially given their low mobility under alkaline conditions.

The Sodium (Na) concentration in sample S-2 is high, indicating significant salinization of the surrounding area. At the same time, all samples show relatively high potassium (K) reserves due to its low utilization, given the sparse vegetation cover. Nitrate concentrations are relatively high for non-agricultural soils, which may indicate contamination due to grazing activities.

Point S-5 is located in an area of periodic rockfalls, and the surrounding territories were significantly littered with construction debris. The soil profile is about 25 cm deep, after which high rockiness is observed. Exceedances of national or European standards are noted for zinc (Zn), copper (Cu), nickel (Ni), and lead (Pb). The Cadmium (Cd) concentration is also above background levels but only slightly. Compared to other samples, this point has the highest iron (Fe) content, most likely due to contamination.

Point S-6 is located near agricultural fields and, judging by its profile, was also involved in agriculture. The upper horizon has a significantly darker colour than in other samples. Heavy metal concentrations are below the strictest regulatory limits, there are no signs of salinization, and no nitrate contamination is present.

The soil analysis results are presented in Table 8.

Table 8: Results of soil analysis (red cells indicate exceedances)

Name of parameters	Locations						The lower limit of detection	TPC/MPC ⁹ in mg/kg	Dutch intervention Value / Target Value ¹⁰	
	S-1	S-2	S-3	S-4	S-5	S-6				
pH	8	8	8	8	8	8	1-14	-	-	-
Zinc (Zn), mg/kg	134	64	105	71	200	60	1.0 mg/kg	55.0 ¹¹ / 220.0 ¹² (gross content)	7200	140
Chromium (Cr), mg/kg	38	24	35	39	84	36	1.0 mg/kg	6.0 (mobile)	180	-

⁹ Maximum Permissible Concentration – MPC. The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards “Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil” according to Appendix 21) - **The studied soils are not of a specific land use type; therefore, TPC was used as a reference when available, and MPC was applied in the absence of an alternative.**

¹⁰ Dutch Standards for Soil and groundwater Contamination (2013).

¹¹ Sandy or sandy loam soil

¹² Loamy and clayey soils

Name of parameters	Locations						The lower limit of detection	TPC/MPC ⁹ in mg/kg	Dutch intervention Value / Target Value ¹⁰	
	S-1	S-2	S-3	S-4	S-5	S-6				
Cadmium (Cd), mg/kg	<0.5	<0.5	<0.5	<0.5	1	<0.5	0.5 mg/kg	0.5 ¹¹ / 2.0 ¹² (gross content)	13	0.8
Copper (Cu), mg/kg	32	23	39	23	139	27	1.0 mg/kg	33.0 ¹¹ / 132.0 ¹² (gross content)	190	36
Manganese (Mn), mg/kg	557	592	683	484	1128	583	20 mg/kg	60.0 ¹¹ / 700.0 ¹² (mobile)	-	-
Mercury (Hg), mg/kg	<1	<1	<1	<1	<1	<1	1 mg/kg	2.1 (gross content)	36	0.3
Nickel (Ni), mg/kg	23	23	23	18	62	32	1.0 mg/kg	20.0 ¹¹ / 80.0 ¹² (gross content)	100	35
Iron (Fe), mg/kg	29507	24626	29125	28195	41858	27553	60 mg/kg	-	-	-
Lead (Pb), mg/kg	39	23	68	36	206	23	0.1 mg/kg	32.0 ¹¹ – 130.0 ¹² (gross content)	530	85
Sodium (Na), mg/kg	449	1274	195	497	315	118	1.0 mg/kg	-	-	-
Potassium (K), mg/kg	2987	3330	2786	2978	2963	3523	1.0 mg/kg	-	-	-
Nitrate (NO³⁻)	30	22	89	47	3.7	3.8	1.0 mg/kg	130	-	-

4.2 Water analysis results

Water sampling was conducted in the upper reaches of the Chu River, upstream and downstream of the wastewater treatment facilities, with samples SW-1 and SW-2 taken accordingly. Samples SW-3 and SW-4 were collected near the endpoint of the OHTL, from a major right tributary of the Chon-Kemin River and after its confluence, respectively. A groundwater sample was taken from the settlement of Kok-Moynok-1 from a drinking water well. All samples have an alkaline reaction, with a pH ranging from 8.0 to 8.4, which is normal for the southern region of Kyrgyzstan.

This alkalinity is at the upper limit of what is considered safe for drinking water consumption. The concentration of heavy metals in all samples is very low, at the detection limit of the method. The only exception is arsenic in surface water samples downstream; however, its concentration remains safe and is several times below national standards.

The water analysis results are presented in Table 9.

Table 9: Results of water analysis

Name of parameters	Locations					The lower limit of detection	MPC ¹³ mg/l ¹⁴ (Domestic and drinking water use)
	SW-1	SW-2	SW-3	SW-4	GW-1		
pH	8.1	8.2	8.4	8.3	8.0	1-14	-
Aluminum (Al), ppm	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.2
Cadmium (Cd), ppm	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0003	0.001
Chromium (Cr VI), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.05
Copper (Cu), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	1.0
Lead (Pb), ppm	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.01
Nickel (Ni), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.02
Zinc (Zn), ppm	<0.004	<0.004	<0.004	<0.004	<0.004	0.004	1.0
Arsenic (As), ppm	<0.001	<0.001	0.002	0.002	<0.001	0.001	0.01

¹³ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum permissible concentrations of chemical substances in water bodies for domestic and drinking water use" according to Appendix 16).

¹⁴ 1 mg/l ≈ 1 ppm

Annex 1. Picture of the soil and water sampling and quartering

Figure 2: Soil sampling at S-1



Figure 3: Soil profile at S-2



Figure 4: Composite sample and background at S-2



Figure 5: Soil profile and composite sample at S-3



Figure 6: S-3 sample background



Figure 7: Soil profile at S-4



Figure 8: S-4 sample background



Figure 9: Sampling process at S-5 (under fresh snow that fell a few hours before sampling)



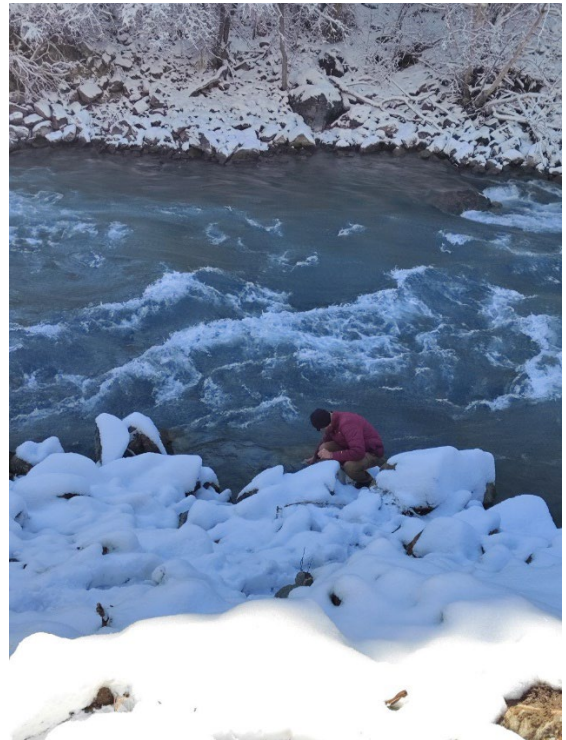
Figure 10: Soil profile at S-6 (under fresh snow that fell a few hours before sampling)



Figure 11: Water sample (SW-1)



Figure 12: Water sampling (SW-3)



Annex 2. Original protocol of the result
Soil analysis protocol

Cover sheet Page 1 of 1

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Client Name/ Имя клиента:	JURU LIMITED	Number of Samples/ Количество проб:	6
Client Reference/ Ссылка клиента:	№ JEC-OUT-24-20 от 14.11.2024	Lab Job No./ № лаб. Заказа:	27448
Receiving Date/ Дата получения:	15.11.2024	Finalized Date/ Дата завершения:	27.11.2024
Sample Type/ Тип пробы:	Soil/ Почва	Date of report/ Дата отчёта:	28.11.2024
Sample Conditions/ Состояние пробы:	Satisfactory/ Удовлетворительное	Report Reference/ Ссылка отчёта:	2881
Place of analysis/ Место анализа:	SAEL Lab / Лаборатория СЭИЛ	Report Status/ Статус отчёта:	Final /Финальный
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<u>Preparation / Подготовка</u>	None / Нет
<u>Analysis / Анализ</u>	
Code: S3*, S6*, S8*	Soil analysis

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За ОсОО "Стюарт Эссей энд Инваронментал Лэборэторис"

Vladimir Schudro / Владимир Щудро
Managing Director / Управляющий директор

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Soil analysis protocol

SampleID	S1	S2	S3	S4	S5	S6
Ag, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Al, mg/kg	15377	13577	15199	10438	23677	16472
As, mg/kg	12	8	14	10	11	13
Ba, mg/kg	110	100	90	113	80	160
Be, mg/kg	1	1	1	1	1	1
Bi, mg/kg	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Ca, mg/kg	23849	38356	24776	27870	>50000	28000
Cd, mg/kg	<0.5	<0.5	<0.5	<0.5	1	<0.5
Co, mg/kg	11	10	14	10	25	11
Cr, mg/kg	38	24	35	39	84	36
Cu, mg/kg	32	23	39	23	139	27
Fe, mg/kg	29507	24626	29125	28195	41858	27553
Hg, mg/kg	<1	<1	<1	<1	<1	<1
K, mg/kg	2987	3330	2786	2978	2963	3523
La, mg/kg	21	25	24	26	15	23
Mg, mg/kg	12856	12588	12175	8670	22746	10222
Mn, mg/kg	557	592	683	484	1128	583
Mo, mg/kg	1	<1	2	1	<1	<1
Na, mg/kg	449	1274	195	497	315	118
Ni, mg/kg	23	23	23	18	62	32
P, mg/kg	1153	851	880	1040	570	531
Pb, mg/kg	39	23	68	36	206	23
S, mg/kg	1170	811	737	427	272	223
Sb, mg/kg	3	<2.5	<2.5	<2.5	<2.5	<2.5
Sc, mg/kg	5	4	4	3	11	5
Se, mg/kg	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Sn, mg/kg	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Sr, mg/kg	114	131	52	57	114	50
Te, mg/kg	<5	<5	<5	<5	<5	<5
Ti, mg/kg	803	823	733	681	>1000	500
U, mg/kg	<50	<50	<50	<50	<50	<50
V, mg/kg	49	38	52	62	101	47
W, mg/kg	<10	<10	<10	<10	<10	<10
Y, mg/kg	10	13	11	12	12	12
Zn, mg/kg	134	64	105	71	200	60
Zr, mg/kg	5	5	4	4	6	3
pH	8	8	8	8	8	8
NO3, mg/kg	30	22	89	47	3.7	3.8



Water analysis protocol

Cover sheet

Page 1 of 1

STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC
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Client Reference/ Ссылка клиента:	№JEC-OUT-24-20 от 14.11.2024	Lab Job No./ № лаб. Заказа:	27447
Receiving Date/ Дата получения:	15.11.2024	Finalized Date/ Дата завершения:	27.11.2024
Sample Type/ Тип пробы:	Water / Вода	Date of report/ Дата отчёта:	28.11.2024
Sample Conditions/ Состояние пробы:	Satisfactory/ Удовлетворительное	Report Reference/ Ссылка отчёта:	2880
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<u>Preparation / Подготовка</u>	None / Нет
<u>Analysis / Анализ</u>	

Code: W6**, SAEL-WA-21, SAEL-WA-Cr Water analysis / Анализ воды

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marked with ** are within the scope of UKAS accreditation.	

Water analysis protocol

SampleID	SW1	GW1	SW2	SW3	SW4
Ag, ppm	<0.003	<0.003	<0.003	<0.003	<0.003
Al, ppm	<0.03	<0.03	<0.03	<0.03	<0.03
As, ppm	<0.001	<0.001	0.001	0.002	0.002
Ca, ppm	60.70	50.25	61.25	35.31	38.16
Cd, ppm	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Co, ppm	<0.004	<0.004	<0.004	<0.004	<0.004
Cr, ppm	<0.008	<0.008	<0.008	<0.008	<0.008
Cu, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Fe, ppm	<0.004	0.074	0.015	0.007	0.016
Hg, ppm	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
K, ppm	2.13	1.98	2.80	1.28	1.47
Mg, ppm	16.84	13.44	15.94	7.00	8.51
Mn, ppm	<0.003	<0.003	<0.003	<0.003	<0.003
Mo, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Na, ppm	21.12	17.63	22.27	6.36	9.74
Ni, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Pb, ppm	<0.002	<0.002	<0.002	<0.002	<0.002
Sb, ppm	<0.001	<0.001	<0.001	<0.001	<0.001
Se, ppm	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, ppm	<0.004	<0.004	<0.004	<0.004	<0.004
Cr VI, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
pH	8.062	8.017	8.214	8.354	8.262





Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Traffic count

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Table of contents

1. Introduction.....	3
1.1. Overview.....	3
1.2. Sampling overview.....	3
2. Measurement methodology.....	5
3. Summary	16

Table of Figures

Table 1: Traffic count at T-1 (both directions).....	6
--	---

Table of Tables

Figure 1: Traffic count monitoring locations	4
Figure 2: Examples of cars at T-1	7
Figure 3: Example of VAN (pic. 1) and HGVs at T-1	8
Figure 4: Other examples of traffic at T-1	9
Figure 5: Examples of HGVs at T-2	10
Figure 6: Examples of cars at T-2	12
Figure 7: Examples of cars at T-3	14
Figure 8: Examples of VANs at T-3	15

1. Introduction

1.1. Overview

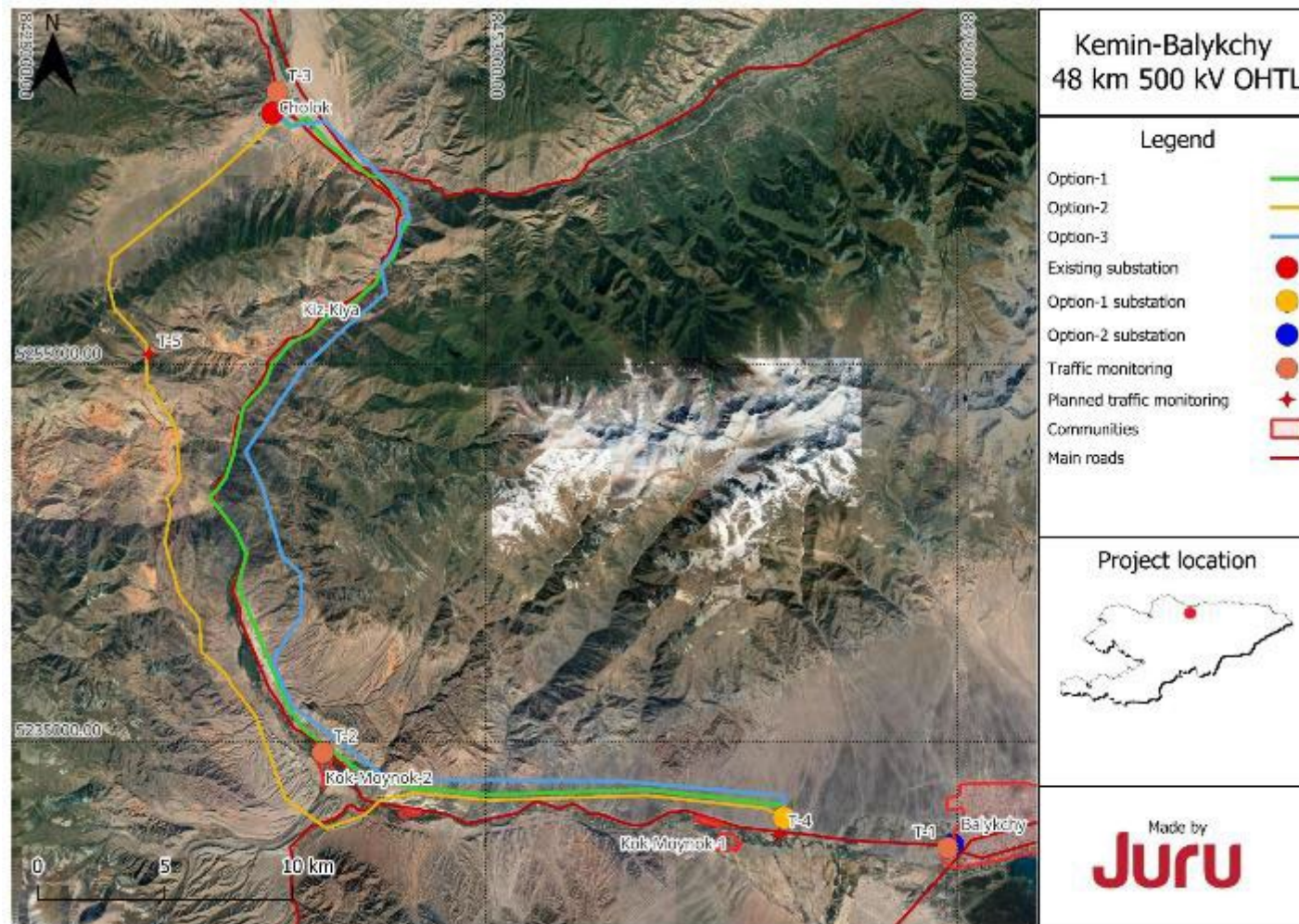
The Project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. Three route options for the OHTL are under consideration. Two routes (Options 1 and 3) run parallel to the course of the transboundary Chu River on its right bank and cross the Boom Gorge. Route Option 2 deviates southwest from the River valley and crosses the eastern part of the Kyrgyz Range. The absolute elevations of the route vary between approximately 1,500 and 2,000 meters above sea level.

1.2. Sampling overview

Traffic monitoring was conducted at three points near the nearest communities (T-1 at Balykchy city; T-2 at Kok-Moynok-2; T-3 at Cholok). Vehicles were categorized into HGVs, cars, and vans. Figure 1 shows the map of the monitoring points.

Since the first round of sampling as reported here was conducted to study Options 1 and 3, additional traffic counting is planned to reflect the baseline conditions of Option 2.

Figure 1: Traffic count monitoring locations



2. Measurement methodology

For traffic counts observers were located a specific time interval (as shown in Table 1) for a total of six hours per day over three different time periods, (morning, noon and evening) representing the busiest times of the day. The observers manually counted the volume of cars, HGV's, vans and motorcycles. Observations were performed over one day and are considered representative of typical traffic in this area.

All vehicles were travelling north / south along EM11. The locations were determined to reflect either the areas where there may be the highest concentration of project vehicles (near substation locations) or at points where traffic flow is considered typical of the average flow on the road. Observers choose a location at these points where they had good vision of traffic approaching.

The dates chosen reflect normal weekday (e.g. avoiding holidays, or other peak traffic periods). Information was recorded on a tally sheet.

Table 1: Traffic count at T-1 (both directions)

Location	Date	Duration	HGV ¹	Cars ²	VAN ³	Motorcycle ⁴	Total
T-1	November 17	9:00-9:30	4	129	19	0	152
		9:30-10:00	6	107	29	0	142
		10:00-10:30	9	157	23	0	189
		10:30-11:00	2	194	28	0	224
		subtotal					707
		13:00-13:30	25	196	41	0	262
		13:30-14:00	17	231	36	0	284
		14:00-14:30	24	211	28	0	263
		14:30-15:00	9	213	41	0	263
		subtotal					1072
		17:00-17:30	17	221	43	0	281
		17:30-18:00	21	239	58	0	318
		18:00-18:30	28	247	67	0	342

¹ HGV include a heavy (3 or more axles) or medium truck (2 axle trucks) including Agricultural tractors and trailers, large buses.

² Cars – includes All types of cars used either for personal or taxi services, jeeps and three-wheeled light vehicles with a cargo body.

³ Van includes - utility vehicles, minibuses, light trucks (up to #3 tonnes).

⁴ Motorcycle - All two wheeled motorised vehicles.

Location	Date	Duration	HGV ¹	Cars ²	VAN ³	Motorcycle ⁴	Total
		18:30-19:00	18	168	47	0	233
						subtotal	1174

Total: 2953

Figure 2: Examples of cars at T-1



Figure 3: Example of VAN (pic. 1) and HGVs at T-1



Figure 4: Other examples of traffic at T-1



Table 2 Traffic count at T-2 (*both directions*)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total	
T-2	November 18	9:00-9:30	15	101	25	0	141	
		9:30-10:00	15	110	25	0	150	
		10:00-10:30	25	85	29	0	139	
		10:30-11:00	14	123	29	1	166	
		subtotal						596
		13:00-13:30	30	162	34	0	226	
		13:30-14:00	45	244	58	0	347	
		14:00-14:30	48	229	53	0	330	
		14:30-15:00	36	201	36	0	273	
		subtotal						1176
		17:00-17:30	42	387	40	0	469	
		17:30-18:00	35	346	38	0	419	
		18:00-18:30	32	402	51	0	485	
		18:30-19:00	36	269	57	0	362	
		subtotal						1735

Total: 3507

Figure 5: Examples of HGVs at T-2



Figure 6: Examples of cars at T-2



Table 3: Traffic count at T-3 (both directions)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total	
T-3	November 19	9:00-9:30	0	45	6	0	51	
		9:30-10:00	0	26	1	0	27	
		10:00-10:30	0	41	7	0	48	
		10:30-11:00	0	59	13	0	72	
		subtotal						198
		13:00-13:30	0	51	7	0	58	
		13:30-14:00	0	37	2	0	39	
		14:00-14:30	0	36	7	0	43	
		14:30-15:00	0	39	11	0	50	
		subtotal						190
		17:00-17:30	0	37	3	0	40	
		17:30-18:00	0	52	5	0	57	
		18:00-18:30	0	44	3	0	47	
		18:30-19:00	0	43	0	0	43	
		subtotal						187

Total: 575

Figure 7: Examples of cars at T-3



Figure 8: Examples of VANs at T-3



3. Summary

At Point T-1, the highest volume of car-type traffic was observed, with approximately the same number of vehicles during the day and in the evening. The morning traffic peak was not very pronounced and fell between 10:30 and 11:00 AM, while the evening peak was between 6:00 and 6:30 PM. During the daytime, the number of HGVs was 2–3 times lower than in other periods. The number of vans increases in the evening.

Point T-2 has the highest volume of HGV traffic, between 30 and 40 vehicles, with a clear drop in the morning hours to 10–20 vehicles. The morning peak is the same as at T-1, between 10:30 and 11:00 AM, and the evening peak is between 6:00 and 6:30 PM.

At T-3, there were no HGVs because the location is on the M-036 bypass. There may be a ban on this type of traffic. A significant portion of the traffic stopped near roadside cafes in the village of Cholok. The morning peak coincided with the other points, and the evening peak was slightly later - from 6:20 to 7:00 PM. The highest number of vehicles was observed at midday, between 1:00 and 1:30 PM.

Technical appendix 2: Critical Habitat Assessment



Kemin-Balykchy OHTL and Balykchy Substation Environmental & Social Impact Assessment (ESIA): Critical Habitat Assessment (EBRD PR6)

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Prepared for:



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Juru's Project Manager	Nicola Davies
Juru's Project Director	Jushkinbek Ismailov

Document Control

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Table of Contents

Abbreviations	5
1 Introduction	6
1.1 Overview and Project Background	6
1.2 Structure of the CHA	6
2 Project Description	7
2.1 Project Location	7
2.2 Project Technology	9
3 Assessment Overview	15
4 Assessment of Critical Habitats and Priority Biodiversity Features	16
4.1 CH/PBF Justification and Potential for Project Impacts	33

Table of Tables

Table 1: Summary of OHTL characteristics.....	11
Table 2: Main components of Balykchy SS	13
Table 3: Ecologically Appropriate Areas of Analysis (EAAA) used in the Critical Habitat and PBF assessment for the Kemin-Balykchy OHTL Project.....	19
Table 4: Summary of observations of potential CH-and PBF trigger species collected during baseline surveys for Kemin-Balykchy OHTL Project. Data presented in the table represent total numbers of observations for each species for each survey report, unless otherwise indicated (see footnotes). Only those surveys in which at least one observation of a potential CH feature or PBF occurred are included in this table.	24
Table 5: Results of Critical Habitat and Priority Biodiversity Feature assessment for Kemin-Balykchy OHTL Project. Red list categories for the IUCN and national redlists are abbreviated as follows: LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, DD = Data Deficient; blank = not listed or not evaluated.	27

Table of Figures

Figure 1: Project location.....	8
Figure 2: Concept of electric energy transmission.....	9
Figure 3: Components of an OHTL (source: Juru)	11
Figure 4: Proposed Balykchy SS layout.....	13
Figure 5: Ecologically Appropriate Area of Analysis (EAAA, orange polygon) #1 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total area of 130,814 hectares and was used for the Critical Habitat/PBF assessment of large mammals and seasonally, or year-round resident bird species.....	20
Figure 6: Ecologically Appropriate Area of Analysis (EAAA, orange polygon) #2 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total area of 5,349 hectares and was used for the Critical Habitat/PBF assessment of small mammals, reptiles and amphibians, plants, and bird species occurring in the area only during migration.....	21
Figure 7: Ecologically Appropriate Area of Analysis (EAAA, orange portions of rivers) #3 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total length of 15.047 kilometers of the Chui, Konorchok, and Kok-Moinok Rivers and was used for the Critical Habitat/PBF assessment of fish species.....	22

Abbreviations

Acronym	Definition
AMI	Automated Metering System
AoI	Area of Influence
ASL	Above Sea Level
BAP	Biodiversity Action Plan
CHA	Critical Habitat Assessment
CR	Critically Endangered
EAAA	Ecologically Appropriate Areas of Analysis
EBRD	European Bank of Reconstruction and Development
EIA	Environmental Impact Assessment
EN	Endangered
EOO	Extent of Occurrence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
GIP	Global Infrastructure Partners
GoK	Government of Kyrgyzstan
GN	Guidance Note
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
IFIs	international finance institutions
IUCN	International Union for Conservation of Nature
JE	Juru Energy Ltd
KBA	Key Biodiversity Areas (KBA)
LC	Least Concern
NH	Natural Habitat
NT	Near Threatened
OHTL	Overhead Head Transmission Line
PBF	Priority Biodiversity Features
PPA	Power Purchase Agreement
PR	Performance Requirements
PS	Performance Standards
PV	photovoltaic
RR	Restricted Range
ROW	Right of Way
SS	Substation
TA	Technical Appendix
VU	Vulnerable

1 Introduction

1.1 Overview and Project Background

The European Bank for Reconstruction and Development ("EBRD") is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic ("NEGK") to finance the construction of an approximate 53 km 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the existing Kemin substation (SS) in Chui region and a new substation named "Balykchy, SS", 6.4 kilometres outside Balykchy city in the Issyk-Kul region,

The Project's primary purpose is to facilitate the evacuation to the national power grid of the electricity generated by renewable energy power plants under development. Implementing the Project will also significantly improve the transmission network's reliability, efficiency, stability, and quality and security of the electricity supply.

EBRD Environmental and Social Policy (ESP) (2019), Appendix 2 "Category A Projects" (paragraph 24) makes specific reference to the "construction of high voltage overhead electrical power lines" as a project with the potential to generate significant adverse E&S impacts. Considering Appendix 2, the Project is expected to be categorised as Category "A". Category A projects require a comprehensive Environmental and Social Impact Assessment (ESIA) and review of associated documents, followed by public disclosure of key documents for a minimum of 120 days. This requirement aligns with the EU EIA Directive requirements for Annex I projects.

The EBRD has appointed Juru Ltd. ("Juru" or the "ESIA Consultant") to perform the ESIA for the Project following EBRD Environmental and Social Policy 2019 (ESP 2019) and supporting Performance Requirements (PRs). Juru is supported by "Evidence CA", a local social consulting and research organisation.

According to the Law of the Kyrgyz Republic "On Environmental Protection" dated June 16, 1999, No. 53 for projects of this type, it is required to conduct an environmental impact assessment (EIA) when designing economic activity facilities. The categorization of facilities is carried out following Appendix 2 of the Law of the Kyrgyz Republic dated May 8, 2009, No. 151 "General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic," based on the calculation of expected impacts using the provided formula, which is performed during the development of the EIA. The Project will deliver a national EIA using a separate third-party consultant as part of the feasibility study.

This document is the Critical Habitat Assessment (CHA) and has been prepared on behalf of NEGK following the most recent guidance for such in EBRD PR6¹, including pertinent Guidance Note (GN)².

1.2 Structure of the CHA

The CHA is structured as follows:

- Chapter 2: Project Description
- Chapter 3: Assessment Overview

- Chapter 4: Assessment of Critical Habitat and Priority Biodiversity Features
- Chapter 5: Consultation and participation

2 Project Description

2.1 Project Location

The planned OHTL starts from the existing Kemin SS, which is located close to Cholok village (200 m) to the new Balykchy SS. The OHTL route passes through two regions, one district, one city, and three ayils, as well as the pasture lands of another city:

- Chui region (Kemin district, Cholok ayil, Orlovka City (pasturelands))
- Issyk-Kul region (Kok-Moinok 1 and Kok-Moinok 2 ayils, and Balykchy city)

Within the 2km of the Project, there are the villages of Kok-Moinok-1, Kok-Moinok-2 (Balykchy city), and Cholok village (Kemin district).

The final selected route of the Project is illustrated in Figure 1.

The primary components of the K-B OHTL and substation Project are:

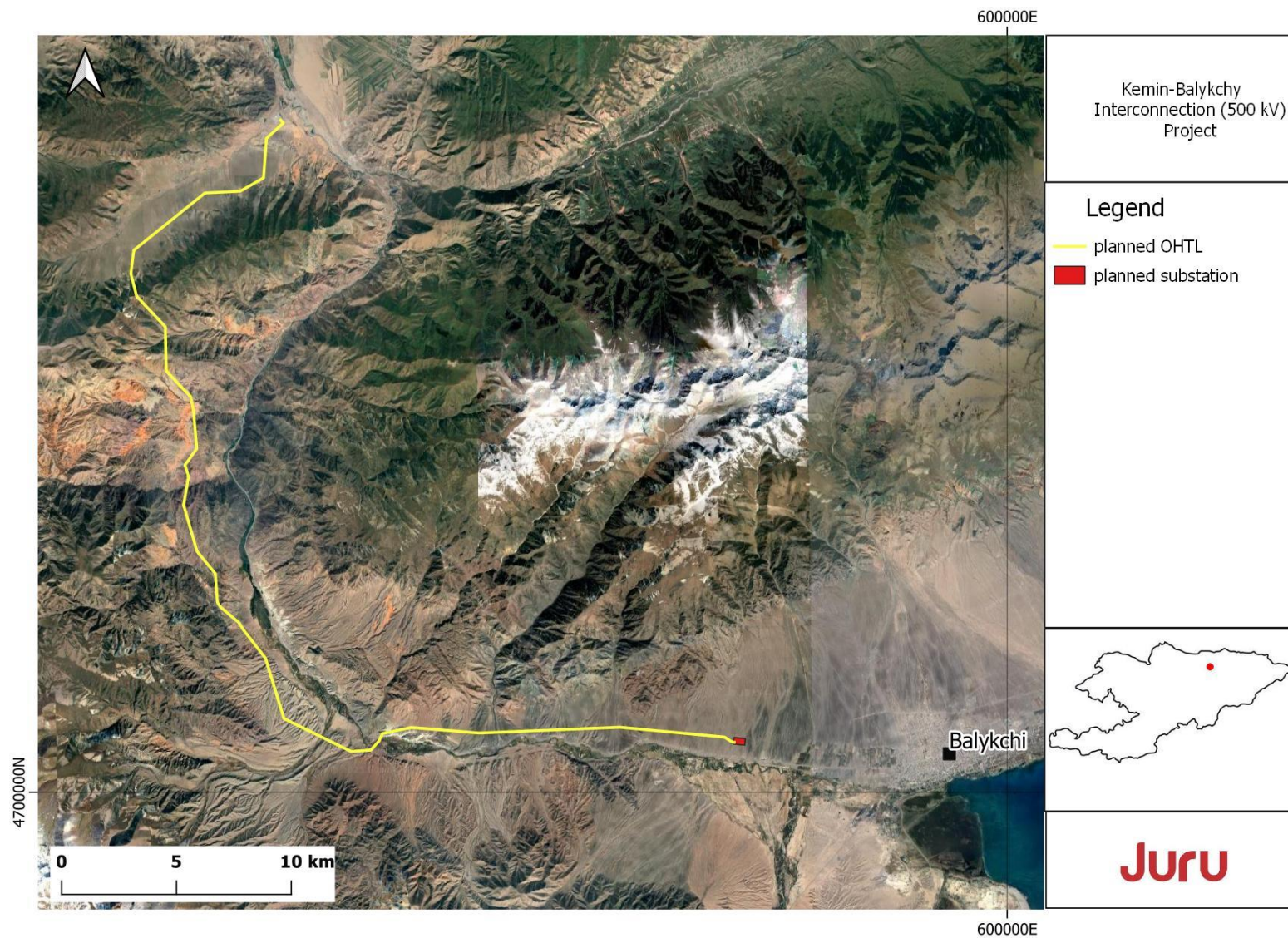
- 52.9 km of 500kV OHTL between the settlements of Cholok (Chui region, 13 km from Kemin city) and a new substation (Balykchy) near Kok-Moynok-1 settlement, (Issyk-Kul region, 6 km away from Balykchy city)

Related activities in support of the OHTL works will include:

- End-user works at the Kemin SS - the connection is expected to be within an existing reserve bay within the current substation footprint (Figure 4)
- New 14.3 ha standalone substation - Balykchy SS
- 78 m servitude under the OHTL (including the area for tower footprint, and the health protection set back of 30 m on either side of the outermost conductor).

Upgrades to existing access routes (gravel) or new access routes (gravel) suitable to provide access to the OHTL ROW and new substation.

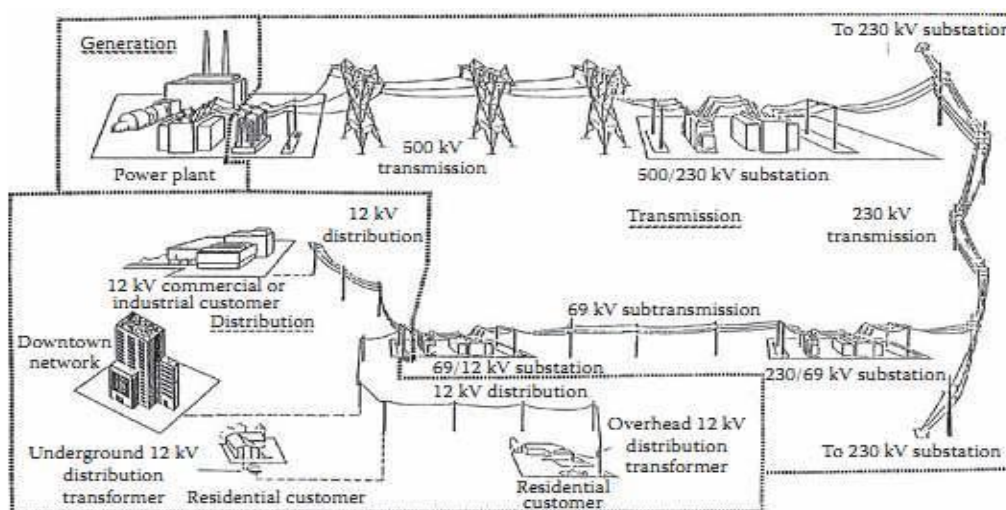
Figure 1: Project location



2.2 Project Technology

Figure 2 illustrates the key features of a typical energy transmission and distribution system. The generating station produces electric energy at around 15-25 kV. At the generating station, a transformer is used to increase ("step up") the voltage to a voltage more appropriate for transmission (e.g., 500 kV as for this Project). The higher the voltage, the less energy loss is incurred during transmission. In the Kyrgyz Republic, 500 kV OHTL transmits electricity between 500 kV substations. At these substations, energy may then be stepped down to 220 kV for transmission at a more regional level and then to even lower voltages for distribution around cities, from which it is reduced to 110 kV for distribution along streets and then finally to 240/110V to supply homes.

Figure 2: Concept of electric energy transmission



The main components of an OHTL are the towers, foundations, insulators, conductors (wires), and earth wire as shown in

Figure 3. All components will be designed following the relevant statutes and norms of the Kyrgyz Republic and GIP.

The OHTL will consist of galvanised steel towers, primarily of two types depending on terrain: anchor towers, which provide stability at angles or end points, and suspension towers, which support conductors along straight sections. These tower types are commonly used in Kyrgyz Republic. The tower height and span will vary depending on topography, but all installations will adhere to national and international safety standards (*Figure 3*).

Figure 3: Components of an OHTL (source: Juru)



A summary of the key characteristics for the OHTL options is provided in Table 1. A final decision on many of the technology choices, e.g., type of OHTL tower or the number of towers, has not yet been made.

Table 1: Summary of OHTL characteristics

Feature	Description route
Circuit type	Single
Number of phases	3
Approximate length of OHTL	52.9 km
Elevations along the route, m ASL (meters above sea level)	1,286 to 2,407

Feature	Description route
Length of new access road	Estimated between 50km to 70km (worst case estimate)
Tower Type	PB5, PB4, R2, U1, U2k
Tower height	24.3 to 38 m
Typical Span / Maximum span	250 m to 350 m / 1000m
Optical Ground Wire (OPGW)	Yes

2.2.1 New Balykchy substation

The proposed Balykchy substation (SS) as shown in Figure 4 is located 6 km west of Balykchy city. Key requirements for the development works include:

- Operational area of approximately 492m x 290m
- New access from EM11 highway of approximately 1 km
- Land acquisition
- Site preparation and levelling
- Substation construction works (including transformers and switchgear)
- Delivery of abnormal loads such as transformers
- Connection for the new 500kV OHTL.

Figure 4: Proposed Balykchy SS layout



The main components of the new Balykchy SS are summarised in Table 2.

Table 2: Main components of Balykchy SS

No.	Equipment	Description and Key Specifications
1	Autotransformers	500/220/35 kV, 167 MVA, 7 pcs (1 reserve), oil-immersed, OLTC, forced oil circulation, air cooling
2	Shunt Reactors	500 kV, 120 MVar, 3 pcs, oil-filled, air cooling
3	Circuit Breakers and Disconnectors	500 and 220 kV, various types, including with one or two earthing blades
4	Instrument Transformers	Current and voltage transformers (CTs and VTs) with support structures for 500 and 220 kV
5	Relay Protection and Automation (RPA)	Main and backup protection cabinets for transformers and lines (500/220 kV), breaker control cabinets, bus differential protection, central alarm cabinet
6	Automated Metering System (AMI)	Includes three-phase meters, data acquisition and transmission devices, power supply, and communication interface
7	Telemetry System	Measuring transducers, switching and power supply equipment

No.	Equipment	Description and Key Specifications
8	Communication System	High-frequency and optical communication cabinets, fixed/vehicle radio stations, antennas
9	Insulator Strings and Bus Conductors	Sets of suspension and tension insulator strings, 500/220 kV bus conductors
10	Supporting Structures and Surge Protection	Support insulators, bay/busbar gantries, surge arresters

2.2.2 Related activities

Related activities in support of the OHTL works will include:

- End-user works at the Kemin SS - within the substation area or extending beyond its boundaries, depending on the location of the bay;
- Establishment of a 78m ROW under the OHTL (including the area for towers and provision of any related livelihood compensation); and
- Upgrade of the existing track or new access track suitable to provide access to the OHTL ROW from the existing road that runs parallel to the OHTL route.

2.2.3 Land take requirements

There is a possibility of both temporary and permanent land take requirements as a result of the Project. The laydown areas are expected to be constructed within the Project limits. Servitude rights will also be required for the area underneath the OHTL right of way.

The Project will also require the permanent land take for the planned Balykchy substation. This substation requires an area of 492m x 290m of land. The land is currently empty and considered pastureland. It is located approximately 6.5 km from the existing Issyk-Kulskaya substation (located on the outskirts of Balykchy city).

Changes have been made to the project design to avoid residences, places of business, cultural heritage sites and other structures. Therefore, no physical displacement will be required for the Project. There may be some economic displacement as a result of temporary impacts to herding, businesses, and tourism. There may also be impacts related to the cutting of trees (particularly if fruit trees are cut), for safety within the OHTL ROW.

3 Assessment Overview

EBRD states that projects must “meet EU principles,” including the Habitats³ and Birds⁴ Directives, “regardless of their geographic location⁵.” Nonetheless, while the EBRD environmental and social policy extends the principles, and specific protections of EU nature legislation globally, and includes specific listed status of species and habitats under EU nature legislation among its CH and PBF criteria⁶, EBRD also recognizes that the conservation sensitivity of certain species and habitats may be different inside, compared with outside of Europe⁷. For this reason, EBRD Guidance Note (GN) 6 indicates that the CH and PBF criteria related to species’ or ecosystems’ listed status under the Habitats or Birds Directives and the Bern Convention⁸ are applicable for EU members only (Habitats and Birds Directives), or Bern Convention signatories only (Bern Convention)⁹. Kyrgyzstan is not located within the geographic or ecological realm of Europe, nor is Kyrgyzstan a Bern Convention signatory, or a political member of the EU. Therefore, the status of specific species and ecosystems within EU nature legislation is not pertinent to the present CHA, per EBRD policy.

Under EBRD PR6, a CH determination triggers a “net positive gain” mitigation standard, as well as the requirement to prepare a Biodiversity Action Plan (BAP). Furthermore, EBRD applies a “no net loss” mitigation standard to the second tier of biodiversity features, termed Priority Biodiversity Features (PBF). A BAP is only required for projects that trigger CH, though it may also be advisable in cases where significant mitigation and monitoring of PBF is required. In order to encompass the complete scope of prioritized biodiversity elements that are subject to special protections under EBRD PR6, this CHA includes a comprehensive assessment not only of CH features, but also PBF, as defined in EBRD PR6.

³ [https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en#:~:text=The%20Habitats%20Directive%20\(Council%20Directive.and%20outside%20Natura%202000%20sites](https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en#:~:text=The%20Habitats%20Directive%20(Council%20Directive.and%20outside%20Natura%202000%20sites). Accessed 29 June, 2023

⁴ https://environment.ec.europa.eu/topics/nature-and-biodiversity/birds-directive_en#:~:text=The%20Birds%20Directive%20aims%20to.thrive%20over%20the%20long%2Dterm. Accessed 29 June, 2023.

⁵ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Page 6

⁶ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Table 1

⁷ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Footnote 4.

⁸ <https://www.coe.int/en/web/bern-convention>. Accessed 29 June, 2023

⁹ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Table 1

4 Assessment of Critical Habitats and Priority Biodiversity Features

Preliminary screening for any triggers of a CH or PBF determination was conducted following the most recent guidance for such issued by EBRD¹⁰. The Project area does not have any highly unique or threatened ecosystem types or distinctive evolutionary processes that could result in a CH determination under CH criteria 1 or 5, hence, the CH/PBF screening was accordingly limited to species, and multi-species groupings of biological taxa.

A master list of potential CH/PBF trigger species was first compiled by reviewing the IBAT report¹¹, the IUCN red list of threatened species¹², the eBird database¹³, and the national red list for vertebrates¹⁴. From this master list, species falling into the following categories were considered to have negligible likelihood of being affected by the Project and were eliminated from further consideration:

- species that are extinct from the country/region;
- species that occur in the Project region only as extreme rarities (i.e. vagrants or accidentals);
- species with no geographic and/or ecological overlap with the Project area¹⁵.

This set of initial species was supplemented with any additional species potentially meeting CH or PBF criteria that were documented in the Project area during the baseline surveys, plus several species that are more common and widespread, but known or likely to be particularly susceptible to impacts from OHTL (the latter including especially cranes and large-bodied waterbirds). The final set of species was then assessed for triggering CH or PBF using a combination of desk-based information and biodiversity baseline survey information collected for the Project. Baseline surveys were initiated in spring 2024 and continued through spring 2025, and included one complexity, caused by a change to the routing in roughly the northern 40% of the line, that occurred after several seasons of baseline surveys had already been conducted¹⁶. Surveys conducted before January 2025 were conducted on the original OHTL. To accommodate the route change, some additional baseline surveys covering the

¹⁰ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022.

¹¹ IBAT PS6 & ESS6 Report. Generated under license 43172-72638 from the Integrated Biodiversity Assessment Tool on 09 October, 2024 (GMT) www.ibat-alliance.org

¹² <https://www.iucnredlist.org/> accessed 4 June, 2025

¹³ <https://ebird.org/home> accessed 4 June, 2025

¹⁴ Red Data Book of Kyrgyzstan, latest edition published in 2006.

¹⁵ Notably fish, and other aquatic species that are confined to Lake Issyk-Kul, and that do not occur in river habitats, i.e. the Chui River, were excluded from consideration, as the OHTL comes no closer than 6 km to the Lake, hence the Project is not considered to have potential to affect aquatic species restricted to the Lake.

¹⁶ See the Project's ESIA for more detail on the initial, and final routes that were studied

roughly 20 km northern portion of the line that deviated from the original route were conducted in spring, 2025. We note that for southern 60% of the line, the 2024 baseline surveys covered the final route, that the new route for the northern portion of the line is located in close proximity (within 1-10km) to the original route throughout its length, and that both routes passed through similar habitat types and elevation zones, hence this route change is considered relatively minor, and the original baseline data is still valid for consideration in this CH/PBF Assessment and ESIA. However, in order to fill the gap between the original and final routes, additional, supplementary baseline surveys were conducted in spring, 2025 in the new portion of the OHTL, as appropriate. Baseline study results available for this CH/PBF assessment included the following:

- Bird Vantage Point (VP) surveys, targeted at flight activity of large birds
 - Spring, 2024 surveys, 20 hours per VP x 8 VPs, between 27 March and 10 May on original route
 - Autumn, 2024 surveys, 20 hours per VP x 8 VPs, between 4 September and 11 November on original route
 - Spring, 2025 surveys, 20 hours per VP x 4 VPs, between 20 March and 14 April, on new portion of the route in the northern section
- Breeding bird surveys, all species, but focus on potentially collision-prone waterbirds
 - 2024 – 204 km² survey area focused on foothill, riparian, and lakeshore habitats along and within 10km of the southernmost 10 km of the OHTL, 6 days of survey from late April to late May
- Raptor/Vulture/Stork nest surveys
 - 2024 (original route) 16 days of survey between May and August
 - 2025 (new northern portion of route) 4 days of survey in April
- Winter water bird surveys
 - December, 2024 – February 2025. 3 days of survey along the western lakeshore of Lake Issyk-Kul and along the Chui River within roughly 15 km of the southern endpoint of the OHTL
- Bat roost surveys
 - April 2025, two days of survey covering caves and other potential bat roost features along the entire OHTL (including the new northern segment) and 2 km buffer
- Camera traps (mammals and other animals)
 - 9 camera traps operated between November 2024 and April 2025, covering the entire length of OHTL, including the new northern route¹⁷
- Mammal transect surveys

¹⁷ 10 traps were placed initially in November, 2024, three were stolen, one was replaced, and three initially located along the original northern portion of the route were moved in January, 2025 to new positions along the new northern portion of the route. In the end, between two and six months of data were retrieved from 9 camera locations. See the mammal baseline survey report annexed to the ESIA for more detail.

- 13.3 km of walking transects (9 separate transects) covering the entire OHTL, including the new northern portion, surveyed on 4 days in April, 2025
- Reptile surveys
 - September, 2024, 25 km of walking transects (14 separate transects) covering the entire original OHTL, surveyed on 4 days
 - April, 2025, 22.5 km of walking transects (10 separate transects) covering the entire OHTL, including the new northern portion, surveyed on 2 days
- Botany surveys/habitat mapping
 - 72 sample plots (10 x 10m), surveyed on 5 days in September, 2024 (entire original route), and 3 days in May, 2025 (entire route, including new northern portion) for botanical species composition sampling, and ground-truthing of satellite imagery-based habitat classification/mapping
- Fish/hydrobiological surveys
 - Surveys/sampling conducted at 7 locations along the middle reaches of the Chui River, and a major tributary, the Konorchok River, where roughly the middle 50% of the OHTL runs roughly alongside and parallel to the Chui River, on three days in late March 2025

Per current EBRD guidance, the spatial unit of analysis for CHA is termed the Ecologically Appropriate Area of Analysis (EAAA). This represents the Project's effective area of influence on a given biodiversity receptor. A key feature of EAAA is that a single project may have different EAAA for different biodiversity receptors, as a function of the different movement patterns and spatial ecology of different species, as they affect the species' potential exposure to impacts from the project¹⁸. Accordingly, a set of three different EAAA was developed for use in this CH/PBF assessment, designed to cover the variation in spatial exposure of the different potential CH/PBF triggers to possible impacts from the Project, with different species grouped and assigned to EAAA based on their spatial ecology. The EAAA used in this assessment are described and justified in Table 1 and illustrated in

Figure 5, Figure 6,

¹⁸ International Finance Corporation (IFC), 2019. Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. June 27, 2019, World Bank Group, Washington, DC

Figure 7.

Table 3: Ecologically Appropriate Areas of Analysis (EAAA) used in the Critical Habitat and PBF assessment for the Kemin-Balykchy OHTL Project.

EAAA #	Description	Species	Justification
1	Entire OHTL buffered by 10 km	Large mammals and locally breeding and/or locally wintering birds	Conservatively accounting for large home range sizes of seasonally or year-round resident bird species and large mammal species
2	Entire OHTL buffered by 500 m	Plants, small mammals, reptiles and amphibians, and bird species whose presence in the region is limited to migration	Accounting for sessile species, small terrestrial species with smaller home ranges, and the spatial limitations around the definition of potential exposure of migratory birds to impacts from aerial infrastructure, per GIIP and recent EBRD guidance ¹⁹
3	All portions of fish-bearing rivers within 2km of one of the Project's 3 river crossings	Fish	Encompassing all portions of rivers potentially containing sensitive fish species within reasonable proximity to areas

¹⁹ European Bank of Reconstruction and Development (EBRD), 2023. Memorandum: Determining biodiversity management requirements related to airspace around wind energy facilities. June 26, 2023.

EAAA #	Description	Species	Justification
	(15.047 km total length of river)		where the OHTL will cross one of these rivers. The eastern terminus of the OHTL lies 6.8 km from Lake Issyk-Kul; hence, fish species restricted to the Lake will not be exposed to impacts from the Project

Figure 5: Ecologically Appropriate Area of Analysis (EAAA, orange polygon) #1 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total area of 130,814 hectares and was used for the Critical Habitat/PBF assessment of large mammals and seasonally, or year-round resident bird species.

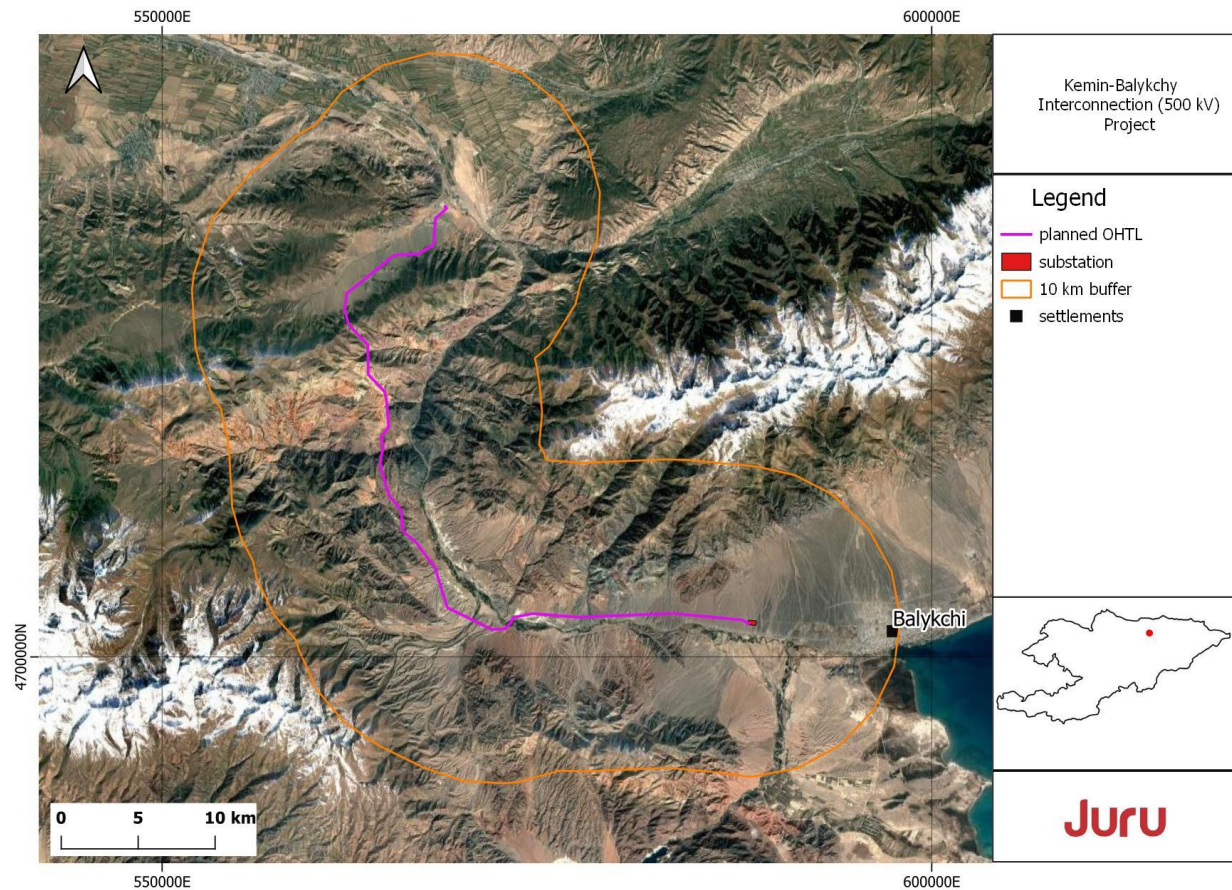


Figure 6: Ecologically Appropriate Area of Analysis (EAAA, orange polygon) #2 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total area of 5,349 hectares and was used for the Critical Habitat/PBF assessment of small mammals, reptiles and amphibians, plants, and bird species occurring in the area only during migration.

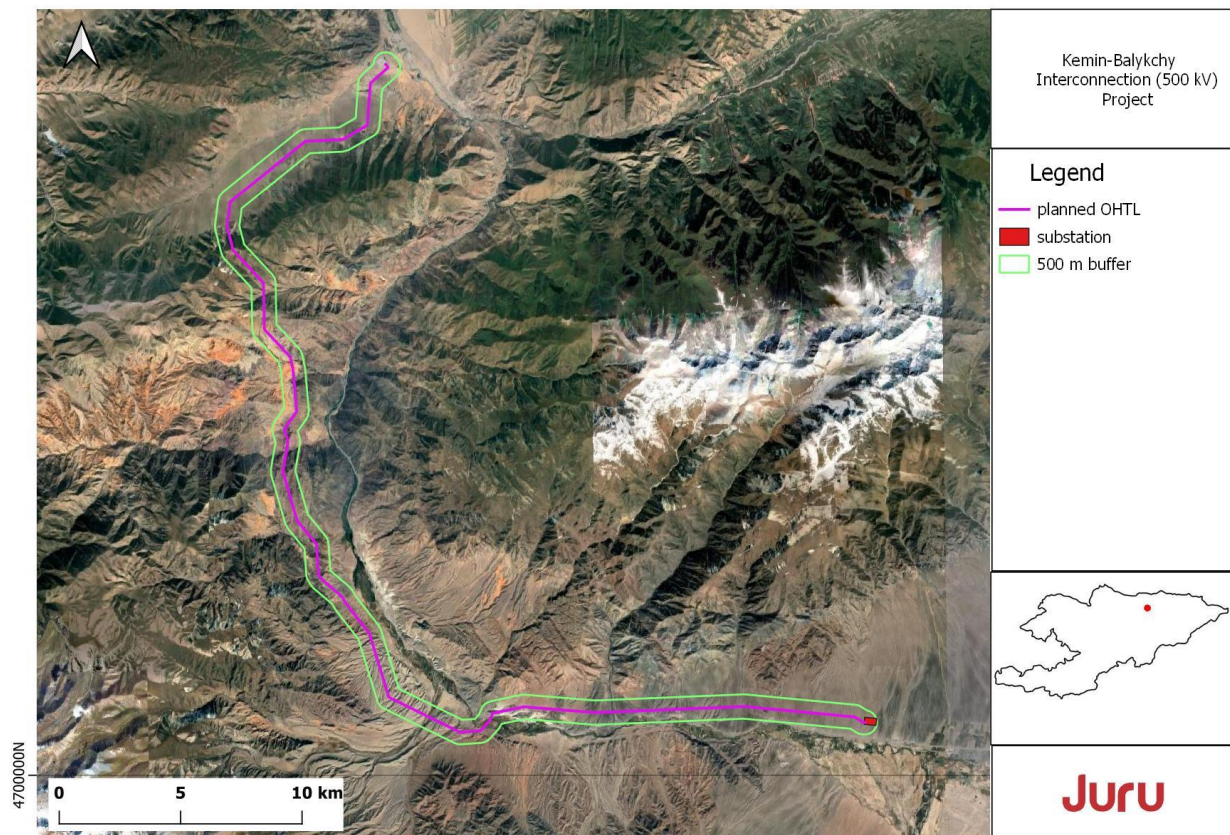
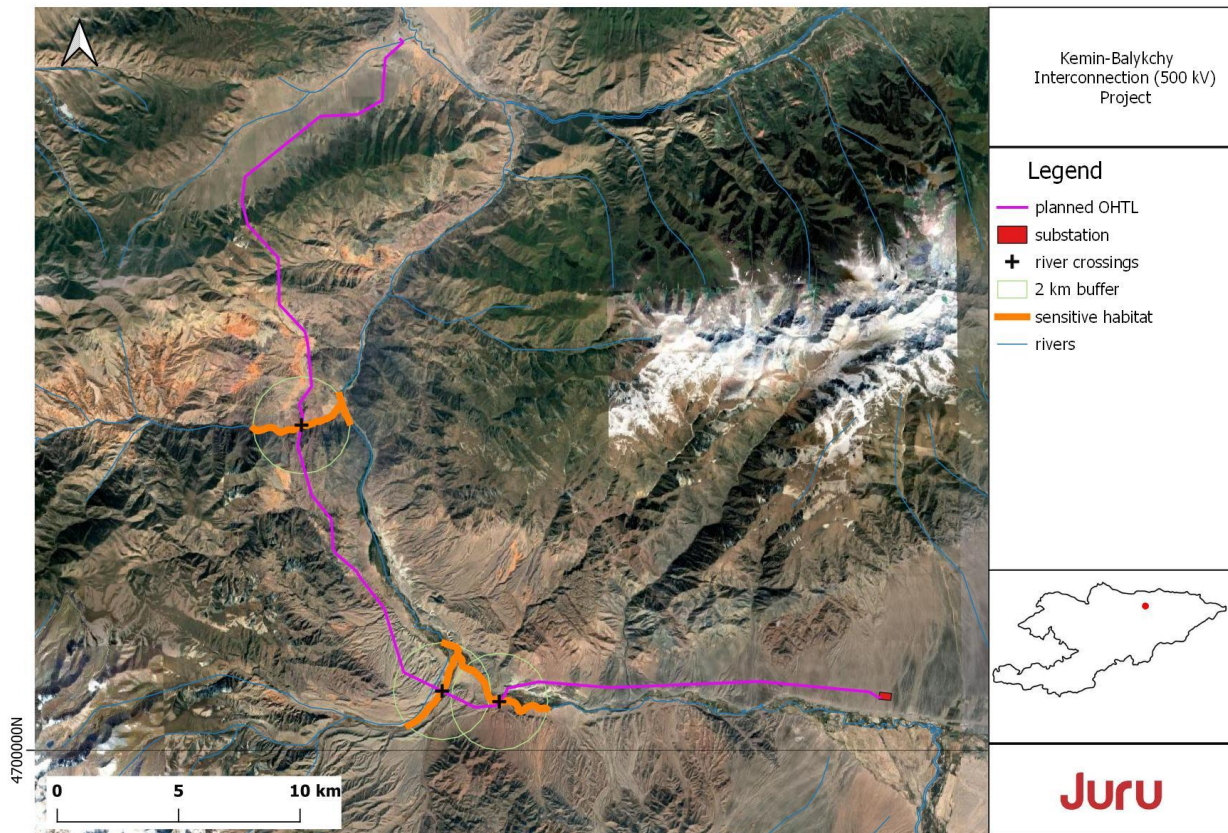


Figure 7: Ecologically Appropriate Area of Analysis (EAAA, orange portions of rivers) #3 for the Kemin-Balykchy OHTL Project (purple line). This EAAA covers a total length of 15.047 kilometers of the Chui, Konorchok, and Kok-Moinok Rivers and was used for the Critical Habitat/PBF assessment of fish species.



The evaluation of each of the potential CH/PBF receptors against the various CH and PBF criteria and thresholds described in EBRD PR6 was done based on holistic and integrated consideration of all sources of field and desktop information pertinent to the analysis, for example taking into account possible double-counting of individuals during the baseline surveys, methodological constraints and spatiotemporal limitations of the surveys that may have resulted in failure to detect some individuals present within the EAAA, and other factors. Numbers of observations of potential CH/PBF species occurring during the baseline surveys was the most heavily weighted consideration used to estimate the total population size of each receptor potentially occurring within the Project's EAAA. Additional information on each receptor's seasonality, habitat affinities, and general distribution within the region was gleaned from various sources, including the IUCN Red List of Threatened Species, the Kyrgyzstan Red Data Book, and the eBird database (birds only). A summary of observations of potential CH/PBF triggering species gathered through the Project's biodiversity baseline surveys is presented in Table 4.

Table 4: Summary of observations of potential CH-and PBF trigger species collected during baseline surveys for Kemin-Balykchy OHTL Project. Data presented in the table represent total numbers of observations for each species for each survey report, unless otherwise indicated (see footnotes). Only those surveys in which at least one observation of a potential CH feature or PBF occurred are included in this table.

Species	Project-specific survey source ²⁰							Total Observations
	1	2	3	4 ²¹	5 ²²	6 ²³	7	
<i>Malus sieversii</i>						2		2
<i>Amygdalus bucharica</i>								0
<i>Tulipa zenaidae</i>						1		1
<i>Tulipa greigii</i>								0
<i>Tulipa ostrowskiana</i>						12		12
<i>Chesneya villosa</i>								0
<i>Rhynchocypris dementjevi</i>							25	25
<i>Schizothorax pseudoaksaiensis</i>							27	27
<i>Phoxinus issykkulensis</i>								0
<i>Triplophysa labiata</i>								0
<i>Leuciscus schmidtii</i>								0
Asian Frog <i>Rana asiatica</i>								0
White-headed Duck <i>Oxyura leucocephala</i>								0

²⁰ Note that the only baseline surveys included in this table are those in which at least one observation of a PBF was recorded within the Project's EAAA.

Survey sources are numbered as follows:

1 = Bird Vantage Point (VP) surveys, autumn, 2024

2 = Bird Vantage Point (VP) surveys, spring, 2024

3 = Bird Vantage Point (VP) surveys, spring, 2025

4 = Raptor/Vulture nest surveys, 2024

5 = Raptor/Vulture nest surveys, 2025

6 = Botany surveys, 2024 + 2025

7 = Fish surveys, 2025

²¹ Numbers presented in this column represent number of active nests documented

²² Numbers presented in this column represent number of active nests documented

²³ Numbers presented in this column represent the number of sample plots inside the Project's EAAA in which the species was detected (of 72 total)

Species	Project-specific survey source ²⁰							Total Observations
	1	2	3	4 ²¹	5 ²²	6 ²³	7	
Demoiselle Crane <i>Anthropoides virgo</i>								0
Common Crane <i>Grus grus</i>								0
Sociable Lapwing <i>Vanellus gregarius</i>								0
Arctic Loon <i>Gavia arctica</i>								0
Great White Pelican <i>Pelecanus onocrotalus</i>								0
Dalmatian Pelican <i>Pelecanus crispus</i>								0
Bearded Vulture <i>Gypaetus barbatus</i>	2	15	17					34
Egyptian Vulture <i>Neophron percnopterus</i>								0
Cinereous Vulture <i>Aegypius monachus</i>	2	14	15					31
Himalayan Griffon <i>Gyps himalayensis</i>		51	15	1	1 (roost)			68
Eurasian Griffon <i>Gyps fulvus</i>			10					10
Greater Spotted Eagle <i>Clanga clanga</i>								0
Steppe Eagle <i>Aquila nipalensis</i>	3		1					4
Imperial Eagle <i>Aquila heliaca</i>			1					1
Golden Eagle <i>Aquila chysaetos</i>	8	11	23		2			44
Saker Falcon <i>Falco cherrug</i>	1							1
Marbled Polecat <i>Vormela peregusna</i>								0
Snow Leopard <i>Panthera uncia</i>								0

The list of possible trigger species, and the results of the CH/PBF classifications of them, based on the CH/PBF assessment, are presented in Table 5. Additional textual description regarding the potential for the project to impact these receptors is presented below the table.

Table 5: Results of Critical Habitat and Priority Biodiversity Feature assessment for Kemin-Balykchy OHTL Project. Red list categories for the IUCN and national redlists are abbreviated as follows: LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered, DD = Data Deficient; blank = not listed or not evaluated.

Feature ²⁴	Higher taxon	IUCN global status ²⁵	Kyrgyzstan status ²⁶	Applicable CH/PBF criterion ²⁷			EA AA ²⁸	IUCN minimum global population estimate ²⁹	Determination ³⁰	Rationale
				Threatened/Vulnerable Species	Range-restricted Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
<i>Malus sieversii</i>	Plant	VU	LC	X			2	unknown	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project

²⁴ The ecosystems and habitats potentially affected by the Project did not meet any of the criteria for “priority ecosystems,” including “threatened ecosystems,” “highly threatened or unique ecosystems” (EBRD CH criterion 1), “areas associated with key evolutionary processes” (EBRD CH criterion 5), or “threatened habitats” (PBF criterion i) as defined in EBRD PR6 and the associated Guidance Note 6. Neither were the criteria met for “ecological structure and functions needed to maintain the viability of priority biodiversity features” (PBF criterion iv), hence the only biodiversity features included in this table are species (and their habitats) that met one or more of the species-specific CH or PBF criteria/thresholds, as described in the table, or species that potentially met PBF criterion iii: “significant biodiversity features identified by a broad set of stakeholders or governments”

²⁵ <https://www.iucnredlist.org/> accessed 6 June, 2025

²⁶ Red Data Book of Kyrgyzstan, latest edition published in 2006.

²⁷ Kyrgyzstan is neither a member of the EU, nor a Bern Convention signatory, hence the specific CH/PBF criteria relating to habitats and species that receive special protection under EU nature legislation are not considered applicable, per EBRD GN6. CH criterion numbers in the column headers refer to them as numbered in EBRD PR6. An X in this column is only checked if the species is a possible CH or PBF trigger. If no columns are checked for a particular species, then the only applicable CH or PBF trigger is PBF criterion iii: “significant biodiversity features identified by a broad set of stakeholders or governments”

²⁸ See Table 1

²⁹ <https://www.iucnredlist.org/> accessed 6 June, 2025, for plants and selected vertebrate taxa, Extent of Occurrence (EOO) and/or Area of Occupancy (AOO) are given, as appropriate for use as a surrogate for population size in the CH/PBF assessment

³⁰ CH = Critical Habitat feature; PBF = Priority Biodiversity Feature, per EBRD PR6

<i>Amygdalus bucharica</i>	Plant	VU		X			2	unknown	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project
<i>Tulipa zenaidae</i>	Plant	VU	VU	X			2	10,000 in Kyrgyz.	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project
<i>Tulipa greigii</i>	Plant	LC	EN	X			2	1,000,000 in Kazakh. + 100,000 in Kyrgyz.	PBF	EAAA not likely to contain a nationally important concentration of the species
<i>Tulipa ostrowskiana</i>	Plant	NT	VU				2	100,000 in Kazakh. + 10,000 in Kyrgyz.	PBF	Species classified as PBF due to national protected status (EBRD PBF criterion iii)
<i>Chesneya villosa</i>	Plant		EN	X			2	unknown	PBF	EAAA not likely to contain a nationally important concentration of the species
<i>Rhynchocypris dementjevi</i>	fish	LC			X		3	Inhabits 200km of Chui River	PBF	EAAA not likely to contain at least 10% of global population
<i>Schizothorax pseudoaksaiensis</i>	fish	VU		X	X		3	AOO 300 km ² (S. pseudoaksaiensis)	PBF	EAAA not likely to contain at least 10% of global population, nor is the Project likely to cause the species to be

										globally uplisted to CR/EN
<i>Phoxinus issykkulensis</i>	Fish	LC			X		3	EOO 24,073 km ²	PBF	EAAA not likely to contain at least 10% of global population
<i>Triplophysa labiata</i>	Fish	VU		X			3	EOO 202,062 km ²	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project
<i>Leuciscus schmidtii</i>	Fish	VU		X	X		3	EOO 7,306 km ²	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project, and EAAA not likely to contain at least 10% of global population
Asian Frog <i>Rana asiatica</i>	Frog	VU	VU	X			2	EOO 239,020 km ²	PBF	Species not likely to be uplisted to globally EN/CR as a result of the Project
White-headed Duck <i>Oxyura leucocephala</i>	Bird	EN	EN	X		X	2	5,300	PBF	EAAA not likely to contain at least 0.5% of global population
Demoiselle Crane <i>Anthropoides virgo</i>	Bird	LC	NT			X	1	230,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Common Crane <i>Grus grus</i>	Bird	LC				X	1	491,000	PBF	EAAA not likely to contain ≥ 1% of the global population at any

										point in species' life cycle
Sociable Lapwing <i>Vanellus gregarius</i>	Bird	CR	CR	X		X	2	11,200	PBF	EAAA not likely to contain at least 0.5% of global population
Arctic Loon <i>Gavia arctica</i>	Bird	LC	CR	X		X	2	275,000	PBF	EAAA does not support a nationally important concentration, nor is EAAA likely to host $\geq 1\%$ of the global population at any point in species' life cycle
Great White Pelican <i>Pelecanus onocrotalus</i>	Bird	LC	NT			X	2	265,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle
Dalmatian Pelican <i>Pelecanus crispus</i>	Bird	NT	VU			X	2	11,400	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle
Bearded Vulture <i>Gypaetus barbatus</i>	Bird	NT	NT				1	1,675	PBF	considered to trigger PBF criterion iii due to large size, iconic status, and national listed status
Egyptian Vulture <i>Neophron percnopterus</i>	Bird	EN	VU	X		X	1	12,400	PBF	EAAA not likely to contain at least 0.5% of global population

Cinereous Vulture <i>Aegypius monachus</i>	Bird	NT	NT			X	1	16,800	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle
Himalayan Griffon <i>Gyps himalayensis</i>	Bird	NT	LC				1	66,000	PBF	Species classified as PBF due to importance to stakeholders (EBRD PBF criterion iii)
Eurasian Griffon <i>Gyps fulvus</i>	Bird	LC	NT			X	2	80,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle
Greater Spotted Eagle <i>Clanga clanga</i>	Bird	VU	NT	X		X	1	3,900	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN
Steppe Eagle <i>Aquila nipalensis</i>	Bird	EN	NT	X		X	1	50,000	PBF	EAAA not likely to contain at least 0.5% of global population
Imperial Eagle <i>Aquila heliaca</i>	Bird	VU	VU	X		X	1	2,500	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle. Project not likely to result in species' up-listing to globally CR/EN

Golden Eagle <i>Aquila chysaetos</i>	Bird	LC	NT			X	1	85,000	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle.
Saker Falcon <i>Falco cherrug</i>	Bird	EN	EN	X		X	1	12,200	PBF	EAAA not likely to contain at least 0.5% of global population
Other migratory waterbird species	Bird	variable	variable			X	2	variable	PBF	No species for which EAAA likely to contain $\geq 1\%$ of the global population at any point in species' life cycle.
Marbled Polecat <i>Vormela peregusna</i>	Mammal	VU	CR	X			1	unknown	PBF	Project not likely to result in species' up-listing to globally CR/EN, nor to contain a nationally important concentration
Snow Leopard <i>Panthera uncia</i>	Mammal	VU	CR	X			1	2,710	PBF	Project not likely to result in species' up-listing to globally CR/EN, nor to contain a nationally important concentration

4.1 CH/PBF Justification and Potential for Project Impacts

A cornerstone of EBRD PR6 with respect to CH and PBF determinations is that the determinations, themselves, are independent of the Project's predicted level of impact³¹. Thus, it is possible for a project to trigger a CH determination for a receptor even if there is little or no potential for the Project to impact that receptor adversely. Conversely, it is possible for a Project's most significant biodiversity impacts, and accordingly the focus of its biodiversity mitigation and monitoring programs, to be manifest on receptors that do not trigger a CH determination³². For this reason, in the present section, we present preliminary receptor-specific discussions of the potential for the Project to generate adverse impacts on each of the biodiversity receptors that has been classified either as a CH feature or a PBF (EBRD PR6), integrated with a discussion of data and biological considerations that underpin the CH/PBF determinations. These discussions are grouped into taxonomically-defined subsections, and are based on information reviewed for the assessment. Information regarding the abundance, distribution, and seasonality of birds in Kyrgyzstan derives largely from the eBird database. Information regarding geographic and ecological distributions of many species derives from the IUCN red list of threatened species. Information regarding the susceptibility of different taxa to collisions with, and/or electrocutions on OHTL is derived from technical literature.

4.1.1 Plants

Six species of plants were identified as PBF for the Project. Three of them were documented during the Project's baseline studies. None of them trigger a Critical Habitat determination. The construction of the Project has the potential to impact any plant species that is in the permanent infrastructure footprint of the Project or the temporary disturbance footprint. This zone of possible impact was the rationale for the selection of an EAAA for all plant species evaluated in the CHA, consisting of the entire OHTL buffered by 500m (Figure 6).

Malus sieversii (IUCN VU, Kyrgyz LC) This small tree species is considered to be the living wild relative of domesticated apples, thus carrying a level of conservation and genetic significance. Only two individuals were encountered during the baseline survey within the Project's EAAA; thus, this species does not trigger CH under criterion 2b, as the Project has no likelihood of causing this species to be globally uplisted to CR/EN status.

Amygdalus bucharica (IUCN VU, Kyrgyz unlisted) This small tree species could potentially occur within the Project region, but was not encountered during the baseline survey, hence it does not trigger CH under criterion 2b, as the Project has no likelihood of causing this species to be globally uplisted to CR/EN status.

³¹ Except to the extent that the potential for the receptor to be exposed to possible impacts is an essential consideration in defining receptor-specific EAAA

³² European Bank of Reconstruction and Development (EBRD), 2023. Memorandum: Determining biodiversity management requirements related to airspace around wind energy facilities. June 26, 2023.

Tulipa zenaidae (IUCN VU, Kyrgyz VU) This perennial geophyte species was encountered in one of the 72 botanical survey plots during the baseline study (Table 4). With such a limited presence within the Project's EAAA, it does not trigger CH under criterion 2b, as the Project has no likelihood of causing this species to be globally uplisted to CR/EN status.

Tulipa greigii (IUCN LC, Kyrgyz EN) This perennial geophyte species could potentially occur within the Project region, but was not encountered during the baseline survey, hence it does not trigger CH under criterion 2c, as the Project's EAAA does not contain a nationally important concentration of this species.

Tulipa ostrowskiana (IUCN NT, Kyrgyz VU) This perennial geophyte species was encountered in 14 of the 72 botanical sample plots during the baseline study, including 12 located within the Project's EAAA (Table 4). This species was encountered primarily in subalpine meadows, rocky montane slopes, and mesic steppe communities, where it sometimes comprised up to 10% cover of botanical survey plots. There is no possible CH trigger, due to its low-moderate conservation status on national and international red lists, but it is protected under the national regulatory framework of Kyrgyzstan, hence it is considered to trigger PBF criterion iii, and classified as a PBF for the Project.

Chesneya villosa (IUCN not evaluated, Kyrgyz EN) This perennial geophyte species could potentially occur within the Project region, but was not encountered during the baseline survey; hence it does not trigger CH under criterion 2c, as the Project's EAAA does not contain a nationally important concentration of this species.

4.1.2 Fish

Five species of fish were identified as PBF for the Project. Two of them were documented during the Project's baseline studies. None of them trigger a Critical Habitat determination. While most of the OHTL is located in purely upland habitats, and the line comes no closer than 6.8 km from the shore of Lake Issyk-Kul, the OHTL will cross fish-bearing rivers in three places (

Figure 7). The river crossings will be entirely aerial, and the terrestrial footprint of the Project's permanent infrastructure (towers) will not overlap or infringe upon the rivers at any of these crossings. Nonetheless, Project construction activities could potentially result in minor sediment inputs or other minor temporary impacts, hence the Project's EAAA for fish species that potentially occur in these rivers³³ was delineated as encompassing all portions of the Chui River and major tributaries (Konorchok River, Kok-Moinok River) within 2 km of one of the Project's river crossing points (Figure 7).

Rhynchocypris dementjevi (IUCN LC, Kyrgyz unlisted, Restricted Range) This is a very common and abundant fish species, with no elevated status on either national or international red lists. However, it has an extremely restricted geographic range, limited to a 200 km stretch of the Chui River in Kyrgyzstan and Kazakhstan. There were 25 total detections of this species during the Project's baseline surveys (Table 4). In river-dwelling species for which population size is not well-characterized, the length of a river is frequently used as a proxy for population, effectively assuming that populations are evenly distributed across the stretches of river in which they occur. The Project's EAAA encompasses 15.047 km of river, which comprises 7.5% of the 200 km total range of this species. CH criterion 3 requires that the EAAA contain at least 10% of the species' global population; hence, CH is not triggered for this species.

Schizothorax pseudoaksaiensis (IUCN VU, Kyrgyz unlisted, Restricted Range) This fish species is restricted to six watersheds draining into either Lake Balkash or Lake Issyk-Kul, encompassing a total Area of Occupancy (AOO) of 300 km². The IUCN does not present an Extent of Occurrence (EOO) for this species, but indicates that it was formerly more widespread, and has been extirpated from some parts of its former range due to overfishing and the introduction of exotic species. We note that there is a subspecies of *S. pseudoaksaiensis* (ssp. *Issykkuli*) that is classified as EN on the national red list, called the "Issyk Kul Marinka." However, this subspecies is entirely restricted to Lake Issyk-Kul, even spawning within the Lake, hence the Project does not have the potential to impact it. The form of *S. pseudoaksaiensis* occurring within the Chui River and major tributaries (called the "Illi Marinka") and documented with 27 observations during the Project's baseline study is not nationally redlisted, hence the only potential CH triggers would be 2b, requiring that the Project may result in the species' global uplisting to CR/EN or 3, requiring that the Project's EAAA encompass at least 10% of the global population. With only 15 km of the Chui River and tributaries contained within the Project's EAAA, and an AOO that encompasses 300 km² spread across 6 separate river systems, the fraction of this species' population contained within the Project's EAAA is likely far below 1%, hence CH is not triggered.

Phoxinus issykkulensis (IUCN LC, Kyrgyz unlisted, Restricted Range) This restricted-range fish species can occur within rivers, hence could potentially occur within the Project's EAAA. However, it was not detected during the Project's baseline study, and the species' EOO is much larger than

³³ Fish species restricted entirely to Lake Issyk-Kul, including for spawning activities, were excluded from consideration for the CHA

that of the other restricted range fish species evaluated in this CHA, at 24,073 km², hence, CH (criterion 3) is not triggered for this species.

Triplophysa labiata (IUCN VU, Kyrgyz unlisted) This globally VU fish species can occur within rivers, hence could potentially occur within the Project's EAAA. However, it was not detected during the Project's baseline study, hence, the Project is not considered likely to cause the species' uplisting to globally CR/EN. Therefore, CH is not triggered (criterion 2b).

Leuciscus schmidtii (IUCN VU, Kyrgyz unlisted, Restricted Range) This restricted-range fish species occurs only in Lake Issyk-Kul during most of its life, but it does come into the lower reaches of major rivers surrounding the Lake for spawning, hence it could potentially occur within the Project's EAAA. However, it was not detected during the Project's baseline study, which took place during this species' spawning season³⁴, and the Project's EAAA (15.047 km) is very small relative to this species' EOO (7,306 km²) hence neither of the potentially applicable CH criteria (2b, 3) are triggered for this species.

4.1.3 Reptiles and amphibians

Only a single species of reptile or amphibian, the Asian Frog, satisfied the requirements to be considered a potential CH/PBF trigger for the Project. The EAAA used to evaluate this species was EAAA #2 (Figure 6), consisting of the entire OHTL buffered by 500m, to account for this species' limited dispersiveness and small home range size. Any reptile or amphibian species occurring within this area could potentially be impacted by direct (e.g. fatality) or indirect (e.g. displacement or disturbance) impacts from the Project, especially during Project construction.

Asian Frog (IUCN VU, Kyrgyz VU) This frog species inhabits a wide variety of mountain, steppe, and desert habitats within its central Asian range, and could potentially occur within the Project's EAAA, especially in wetland and wooded habitats along the Chui River and tributaries. However, it was not detected during the Project's baseline study, suggesting that the Project is not likely to cause this species' uplisting to globally EN/CR. Thus, CH is not triggered for this species (criterion 2b).

4.1.4 Birds

Seventeen bird species and one multispecies category of birds were determined to be PBF for the Project, as a result of the CH/PBF assessment. No species triggered a CH determination. Two different EAAA were used to evaluate bird species against CH/PBF criteria, depending on species' spatial ecology, as follows:

- For species that are resident within the Project region either year-round or during a single season (e.g., breeding, wintering), an EAAA consisting of the entire OHTL buffered by 10

³⁴ Spawning end-march – mid-May, per <https://www.tagmyfish.com/waters/endorheic-lake/isik-kul#:~:text=Strictly%20endemic%20fish%20Schmidt%20Dace,is%20present%20throughout%20the%20shallows.>

km was used (EAAA #1, Figure 5). This EAAA encompasses a total area of 130,814 ha, and accounts for the large home range sizes and widely dispersive behaviors of some species, particularly raptors and vultures.

- For species likely to occur within the Project area primarily or exclusively during migration, an EAAA consisting of the entire OHTL buffered by 500 m was used (EAAA #2, Figure 6). This EAAA encompasses a total area of 5,349 ha and reflects recent EBRD guidance regarding the delineation of EAAA for migrating birds with regard to potential interactions with aerial infrastructure projects³⁵.

The Project's impacts on resident birds may include direct or indirect impacts during Project construction, similar to those potentially affecting any terrestrial species that occurs within, or in close proximity to either the Project's permanent infrastructure footprint, or its temporary disturbance footprint. However, potentially more significant are two well-known impacts that can be generated by OHTL on birds that may continue throughout the operational life of the OHTL, and that may impact birds as they make aerial transits of the OHTL, even if they are just passing through during migration, as follows³⁶:

- Collisions. Certain types of birds characterized either by high wing-loading, poor peripheral vision while in flight, or both, may experience death or injury as a result of colliding with OHTL, presumably because they do not see the lines with sufficient time to maneuver away from them during flight. Bird taxa known to be particularly susceptible to collisions with overhead powerlines include waterfowl, bustards, cranes, pelicans, flamingos, and a variety of other large-bodied water birds.
- Electrocutions. Certain types of birds that like to perch on powerline infrastructure may be electrocuted on powerlines if they make simultaneous contact either with two different electrified parts, or with an electrified part and a grounded part of the powerline infrastructure. Bird taxa known to be particularly susceptible to electrocutions on overhead powerlines include raptors, vultures, and owls, but any species with a behavioral tendency to perch on powerlines or support structures may be at risk of electrocution, particularly species with large wingspans.

In keeping with EBRD guidance, the evaluation of potential CH/PBF triggers was independent of the predicted level of impacts³⁷. Nonetheless, the nature of, and spatial extent of exposure to

³⁵ European Bank of Reconstruction and Development (EBRD), 2023. Memorandum: Determining biodiversity management requirements related to airspace around wind energy facilities. June 26, 2023.

³⁶ Martín Martín, J., Garrido López, J. R., Clavero Sousa, H. and Barrios, V. (eds.) 2022. Wildlife and power lines. Guidelines for preventing and mitigating wildlife mortality associated with electricity distribution networks. Gland, Switzerland: IUCN.

³⁷ European Bank of Reconstruction and Development (EBRD), 2019. Environmental and Social Policy: EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, 2019. EBRD

impacts, was used to delineate EAAA for the CH/PBF assessment, and also to identify migratory bird taxa that should be included within the assessment based on potential susceptibility to OHTL impacts.

White-headed Duck (IUCN EN; Kyrgyz EN) OHTL collision susceptibility is presumed high, similar to that of other large-bodied waterbirds. This species is a rare breeder on small ponds/lakes in the region, and is also known to winter in small numbers on Lake Issyk-Kul. There are recent eBird winter records of up to 6 individuals at several bays on Lake Issyk-Kul, and recent summer records, indicating breeding activity at several small lakes north of Almaty, Kazakhstan. Thus, this species is considered a possible rarity within the region year-round, and small numbers may migrate across the OHTL. There were no records of this species documented during the Project's baseline studies (Table 4), including wintering waterbird counts in the westernmost portion of Lake Issyk-Kul, and we note that this is not a trigger species for the Western Issyk-Kul Lake IBA³⁸. Therefore, this species does not trigger CH, as the EAAA is not likely to hold 26 or more individuals (criterion 1a) or hold a nationally significant concentration (criterion 1c).

Demoiselle Crane (IUCN LC; Kyrgyz NT). As a general rule, cranes are one of the bird taxa known to be highly susceptible to collisions with OHTL³⁹. The Demoiselle Crane occurs in the Project region primarily as a migrant, but also breeds in small numbers in steppe and wetland environments north of the Tien Shan mountains. On the eastern shore of Lake Issyk-Kul, over 160 km east of the Project area, there are eBird records of up to 2,000 individuals. However, there are no eBird records of this species on the western shore of Lake Issyk-Kul (closer to the Project area), and this species is not associated with the Western Issyk-Kul IBA. Despite intensive vantage point survey efforts along the OHTL route during both spring and autumn migration season, this species was never observed in the Project area during the baseline studies (Table 4), indicating that the Project is not located within a primary migration corridor of this species, and the number of birds present within the Project's EAAA would never exceed 2,300, required to trigger a CH determination under criterion 4.

Common Crane (IUCN LC, Kyrgyz unlisted). Collision susceptibility is presumably similar to that of cranes, in general, as discussed for the previous species. This species is more abundant globally, and generally less abundant regionally than the Demoiselle Crane, with fewer eBird reports in the region, and the largest number of individuals observed in any of them, on the eastern shore of Lake Issyk-Kul, is 23. This species was not observed in the Project area during the baseline studies (Table 4). Based on this information, it is considered highly unlikely that the Project's EAAA would ever contain more than 4,910 individuals, required to trigger a CH determination under criterion 4.

³⁸ <https://datazone.birdlife.org/site/factsheet/western-issyk-kul-lake#Qualifying-species> accessed 11 June, 2025

³⁹ Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, F. Moreira, 2018. Bird collisions with power lines: State of the art and priority areas for research. *Biological Conservation* 222:1-13.

Sociable Lapwing (IUCN CR; Kyrgyz CR). The Sociable Lapwing is a large shorebird (wader) that breeds in grassland/steppe habitats in Eurasia, from central Kazakhstan and northward, and winters primarily in India and the Arabian Peninsula. In the Project region, there are only a very small number of eBird records, all during spring migration, and all consisting of 2 individuals. It was not observed during the Project's baseline studies (Table 4), but it could occur as a very rare migrant, when it could be exposed to risk of collision with the OHTL, especially during its nocturnal migratory flights. Based on this information, it is assessed as not triggering CH, as it is highly unlikely that the Project's EAAA would ever contain a minimum of 56 individuals (criterion 2a) and the area does not hold a nationally important concentration (criterion 2c).

Arctic Loon (IUCN LC, Kyrgyz CR) Loons epitomize the heavy-bodied waterbirds that may be susceptible to collisions with OHTL. This globally abundant and widespread loon species is listed as CR in Kyrgyzstan because several pairs historically nested in bays in the eastern portion of Lake Issyk-Kul. However, even at the time of the latest edition of the Kyrgyzstan red data book (2006), this species had not nested in the Lake in recent years⁴⁰. It is not a trigger species for the western Lake Issyk-Kul IBA, and was not observed during the Project's baseline studies (Table 4). Therefore, it is assessed as not triggering CH, as the Project's EAAA does not contain a nationally important concentration (criterion 2c) and the EAAA is unlikely to ever contain in excess of 2,750 individuals (criterion 4).

Great White Pelican (IUCN LC, Kyrgyz NT) As a general rule, pelicans are highly susceptible to collisions with OHTL⁴¹, likely due to their large size and bulk. The Great White Pelican is present in the Project region only as a rare migrant, when small numbers may fly through the area⁴². There are no records of this species from Lake Issyk-Kul in the eBird database, it was not observed during the Project's baseline surveys (Table 4), and it is not a trigger species for the Western Lake Issyk-Kul IBA. Therefore, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 2,650 individuals (criterion 4).

Dalmatian Pelican (IUCN NT, Kyrgyz VU) This species, for the same reasons as the previous species, is likely to be highly susceptible to collisions with OHTL⁴³. Also similar to the previous species, it is present in the Project region only as a rare migrant, when small numbers may fly through the area⁴⁴. There are no records of this species from Lake Issyk-Kul in the eBird database, it was not observed during the Project's baseline surveys (Table 4), and it is not a trigger species for the Western Lake Issyk-Kul IBA. Therefore, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 114 individuals (criterion 4).

⁴⁰ Red Data Book of Kyrgyzstan, latest edition published in 2006.

⁴¹ Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, F. Moreira, 2018. Bird collisions with power lines: State of the art and priority areas for research. *Biological Conservation* 222:1-13.

⁴² Red Data Book of Kyrgyzstan, latest edition published in 2006.

⁴³ Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, F. Moreira, 2018. Bird collisions with power lines: State of the art and priority areas for research. *Biological Conservation* 222:1-13.

⁴⁴ Red Data Book of Kyrgyzstan, latest edition published in 2006.

Bearded Vulture (IUCN NT, Kyrgyz NT) This is a very large vulture that feeds on bones of dead animals, and that may be susceptible to either collisions or electrocution impacts from the Project. It is known to be a year-round resident in the Project region, with a large number of eBird observations from the area, as well as a total of 34 observations recorded during the Project's baseline studies (Table 4), indicating that this species is a common, though low-density resident of the Project area. There is no potential CH trigger for this species, but it is considered to trigger PBF criterion iii due to its large size, iconic nature, and national protected status.

Egyptian Vulture (IUCN EN, Kyrgyz VU) This is a smaller vulture, still quite a large bird, with a wider dietary range than many other vultures, often feeding at rubbish dumps as well as on drier carrion, and often relying to a significant degree on live prey, including tortoises⁴⁵. It could potentially be susceptible to either collision or electrocution impacts from the Project. It is present in Kyrgyzstan only during the warmer months, when it nests on bluffs and cliffs in low-lying desert mountains. This species was not observed during the Project's baseline studies (Table 4), but a handful of eBird records from the Project region, including one from one of the gorges through which the Project's OHTL passes, suggest that this species may be present, though rare, in the Project area. Nonetheless, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 62 individuals (criterion 2a).

Cinereous Vulture (IUCN NT, Kyrgyz NT) This is a very large vulture with a moderate level of OHTL collision and electrocution susceptibility and moderate conservation sensitivity. This species primarily occurs in the Project region as a migrant, but it may also be present as a scarce breeder, or even in winter, as evidenced by observation of a pair of birds in Boom Gorge, right along the Project's OHTL route, from January, 2024. During the Project's baseline surveys, 31 observations of this species were collected, with roughly equal numbers of observations in spring and autumn migratory periods (Table 4), indicating that it is a regular migrant through the Project area. Nonetheless, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 168 individuals (criterion 4).

Himalayan Griffon (IUCN NT; Kyrgyz LC) Similar to the previous species with regard to presumed OHTL impact susceptibility and conservation sensitivity, this species is also common in the Project area, as reflected by the Project's baseline survey results (68 total observations, Table 4), numerous eBird observations, and summary information in the Kyrgyzstan Red Data Book. This species is a year-round resident in the Project region, and during the Project's baseline surveys, one active nest was found in the Project area in 2024, and a roost, possibly indicative of nesting activity, was found in the Project area in 2025 (Table 4). There is no potential CH trigger for this species, but it is considered to trigger PBF criterion iii due to its large size, iconic nature, and international red-listed status.

⁴⁵ Orta, J., G. M. Kirwan, D. A. Christie, E. Garcia, and J. S. Marks (2020). Egyptian Vulture (*Neophron percnopterus*), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.egyvu1.01> accessed 12 April, 2025

Eurasian Griffon (IUCN LC, Kyrgyz NT) This species is similar in most respects to the previous two species. The conservation sensitivity is one tick lower than Cinereous Vulture or Himalayan Griffon at the international level, but the same as Cinereous Vulture (NT) at the national level. Similar to Cinereous Vulture it primarily occurs in the region as a migrant, and it was recorded in smaller numbers during the Project's baseline surveys, and only during spring migration (10 observations, Table 4). These numbers are far below the minimum of 800 individuals that would be required to occur within the EAAA to trigger a CH determination under CH criterion 4, hence this species is assessed as not triggering CH.

Greater Spotted Eagle (IUCN VU Kyrgyz NT) This is a wetland-associated eagle that occurs in the Project region only as a rare migrant. Eagles are well-known to be susceptible to electrocution impacts from OHTL, though such impacts are generally less severe with high voltage OHTL than they are with lower voltage distribution lines⁴⁶. Eagles, including Greater Spotted Eagle, may also be susceptible to collisions with powerlines, though their excellent visual capabilities and lower wing-loading generally render them less susceptible to such impacts than are heavier bodied birds and birds with poorer vision⁴⁷. There are no eBird records of Greater Spotted Eagle in the immediate Project region, and only a small handful in the region north of Almaty, Kazakhstan, indicating that small numbers could pass through the Project region. It was not observed during the Project's baseline studies (Table 4). Therefore, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 390 individuals (criterion 4), and the Project is not likely to cause the species' uplisting to globally EN/CR (criterion 2b).

Steppe Eagle (IUCN EN, Kyrgyz NT) Similar to the previous species, this large, migratory eagle is generally present in the region only as an uncommon migrant, though Steppe Eagle is more common, has been recorded on several occasions in the Project region in the eBird database, and was observed during the Project's baseline studies both during spring (1 observation) and autumn (3 observations, Table 4). OHTL impact susceptibility is presumed to be similar to that of other eagles, and this species, specifically, is known to be susceptible to electrocution impacts on power lines in Kyrgyzstan⁴⁸. Based on this species' scarcity in the Project region, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 250 individuals (criterion 2a).

Imperial Eagle (IUCN VU, Kyrgyz VU) A congener of the previous species, this large eagle has a similar risk profile for the Project in most respects, including the likelihood that it will occur in the Project area exclusively during migration seasons, especially autumn, though eBird records in the Project region are far fewer than for Steppe Eagle, and there was only one observation of this species recorded during the Project's baseline surveys (a spring observation, Table 4). Based on

⁴⁶ Martín Martín, J., Garrido López, J. R., Clavero Sousa, H. and Barrios, V. (eds.) 2022. Wildlife and power lines. Guidelines for preventing and mitigating wildlife mortality associated with electricity distribution networks. Gland, Switzerland: IUCN.

⁴⁷ Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, F. Moreira, 2018. Bird collisions with power lines: State of the art and priority areas for research. Biological Conservation 222:1-13.

⁴⁸ Red Data Book of Kyrgyzstan, latest edition published in 2006.

this species' scarcity in the Project region, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain in excess of 25 individuals (criterion 4), and the Project is unlikely to result in this species' uplisting to globally CR/EN (criterion 2b).

Golden Eagle (IUCN LC, Kyrgyz NT) A congener of the previous two species, this is the most globally widespread of the three, with the largest global population size (85,000) and the lowest conservation sensitivity. However, unlike the previous two species, it is a year-round resident within the Project region, with two active nests in the Project region documented during the Project's baseline studies (Table 4), and it is also much more abundant, as reflected in the large number of eBird records for the Project region, and the larger number of baseline study observations (44 total observations, Table 4). In spite of its higher abundance, it is nonetheless assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain more than 850 individuals (criterion 4).

Saker Falcon (IUCN EN, Kyrgyz EN) This species has the highest conservation sensitivity of any falcon potentially occurring in the Project area, and it is a species with known susceptibility to power line electrocution impacts⁴⁹. This species is a year-round resident and also partially migratory in the Project region, and was represented by a single observation during the Project's baseline surveys, during autumn migration (Table 4). Due to this species' scarcity in the Project region, it is assessed as not triggering CH, as the Project's EAAA is unlikely to ever contain more than 61 individuals (criterion 2a), and the Project area does not contain a nationally important concentration of this species (criterion 2c).

Other migratory waterbirds. In addition to the migratory waterbird species individually considered as PBF for the Project and listed above, a wide variety of additional waterbird species could potentially occur within the Project area, and are collectively considered a PBF under EBRD PBF criterion iii, as substantial collision fatality levels would be of concern to a broad set of scientific and conservation stakeholders, were they to occur. Included in this multispecies category are many species of "waders" (British) or "shorebirds" (American), in the order Charadriiformes, as well as numerous ducks, geese and swans (order Anseriformes), gulls and terns (order Charadriiformes), grebes (order Podicipediformes), cormorants (order Pelecaniformes), rails and allies (order Gruiformes), and storks, herons, ibis and allies (order Pelecaniformes). Such species generally have high susceptibility to collisions with high-voltage power transmission lines⁵⁰. Most species in this category are restricted to, or highly associated with coastal habitats or wetlands and waterbodies, thus limiting exposure of this group to risk from the upland and inland habitats of the Project area, noting that the eastern terminus of the line is located 6.8 km from the western shore of Lake Issyk-Kul, hence the Lake, itself, is not included within the Project's EAAA for waterbird species. Nonetheless, the OHTL route generally follows a river, which may provide

⁴⁹ Orta, J., P. F. D. Boesman, C. J. Sharpe, and J. S. Marks (2020). Saker Falcon (*Falco cherrug*), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.sakfal1.01>

⁵⁰ Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, F. Moreira, 2018. Bird collisions with power lines: State of the art and priority areas for research. Biological Conservation 222:1-13.

habitat for some water birds, and many species' migratory flights can occur anywhere over land or water. The species in this category that have both high conservation sensitivity, and likely regular occurrence in the vicinity of the Project area have been identified individually as PBF for the Project and are discussed in species-specific sections above, but additional species, including some species with elevated conservation status (e.g., Common Pochard, Horned Grebe) could be subsequently added to the list of PBF for the Project if collision impacts are detected. The Project's baseline surveys included some bird survey elements conducted inside of the Project's EAAA for waterbirds, notably the VP surveys, and some survey elements that were conducted primarily or entirely outside of it, in habitats where water birds may occur along the shoreline habitats and the western waters of Lake Issyk-Kul, notably the breeding bird surveys and the winter water bird surveys. In surveys conducted along the OHTL route, very few water birds were observed. For example, in the autumn VP surveys at points 1-7 along the OHTL, a total of 36 observations of 8 species of waterbirds were collected, with a maximum of 9 observations for any one species, all pertaining to very abundant, widespread species with no red list status. By contrast, at a single VP (#8), located along the shore of Lake Issyk-Kul in the same season, 400 waterbird observations from 20 species were recorded, including one species with elevated red list status (Ferruginous Duck IUCN NT, Kyrgyz NT). A similar pattern occurred on the VP surveys in spring, when lakeshore VP #8 was surveyed along with 7 VP located along the OHTL route. In spring 2025, when VP surveys were conducted at 4 points all located along the OHTL, zero observations of waterbirds were collected. In the winter waterbird surveys conducted along the shore of Lake Issyk-Kul, a total of 4,339 observations of 29 waterbird species were collected, including observations of two additional red-listed species (Common Pochard IUCN VU, Kyrgyz unlisted; Horned Grebe IUCN VU, Kyrgyz unlisted). Based on these observations, it is clear that while a wide variety and high abundance of waterbirds occur in Lake Issyk-Kul, a much lower diversity and abundance of waterbirds is present in the upland and riparian habitats along the Project's OHTL, and within the Project's EAAA. Therefore, there are no species in this category that trigger a CH determination, which would require that at least 1% of the species' global population occurs within the EAAA (criterion 4). Nonetheless, because of the potential for the Project to generate impacts on this set of birds that could be of concern to a broad set of stakeholders, particularly during migratory flights, this set of birds is classified as a PBF under criterion iii.

4.1.5 Mammals

Two species of mammals were determined to be PBF for the Project, as a result of the CH/PBF assessment. No species triggered a CH determination. For both of these species, the EAAA used to evaluate them consisted of the entire OHTL buffered by 10 km, accounting for the widely dispersive nature and large home range sizes of both species (EAAA #1, Figure 5). Any mammal species occurring within this area could potentially be impacted by direct (e.g., fatality) or indirect (e.g., displacement or disturbance) impacts from the Project, especially during Project construction.

Marbled Polecat (IUCN VU, Kazakhstan NT) This member of the weasel family is widely distributed across the southern temperate latitudes of eastern Europe and central Asia, from Romania to

Mongolia. While its global population size is not well known, the very large size of its global range precludes the possibility that this Project could cause the species to be globally uplisted to CR/EN, thus precluding a CH determination under IFC criterion 1b. Furthermore, this species was not documented during the baseline surveys, indicating that it is not abundant within, and may be absent from the Project area. Nonetheless, it is considered a PBF based on its global VU status, and as a terrestrial species frequenting burrows and tunnels in which it hunts small mammal prey, it could be impacted through direct mortality, habitat loss, and/or displacement within the Project's soil/vegetation disturbance footprint, especially during construction.

Snow Leopard (IUCN VU, Kyrgyz CR) This well-known large cat species has a very high degree of conservation sensitivity, but a very low level of exposure to adverse impacts from the Project, primarily because it mostly occurs in higher elevation habitats (generally above 3,000m) and also because it is very scarce in this region. The baseline study method with the highest likelihood of documenting this species would be the camera traps, and no observations of Snow Leopards were recorded by the camera traps. Nonetheless, there are anecdotal reports of Snow Leopards occurring in the area (Snow Leopard Foundation, unpublished data), and it is possible for a small number of individuals to occur within the Project's EAAA. Nonetheless, it is assessed as not triggering CH, as the Project's EAAA does not contain a nationally important concentration of this species (criterion 2c), and the Project is not likely to cause this species' uplisting to globally EN/CR (criterion 2b).

Technical appendix 3: Noise and Air Quality baseline survey report



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Noise and Air quality report

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Disclaimer

The Noise and Air quality report (the "Report") has been prepared by Juru. Whilst the information contained in the Report reflects the current status, Juru makes no representation or warranty, express or implied, as to the accuracy of the information set forth in this Report and accepts no liability for any information that may have been misstated or omitted.

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Table of Contents

1. Introduction.....	4
2. Measurement methodology	5
2.1. Noise	5
2.2. Air quality	5
3. Measurement equipment	6
4. Monitoring results and standards.....	9
4.1. Summary tables noise and air	9
4.2. Summary graph results.....	14
4.3. Applicable standards	6
5. Conclusion	26
5.1. Noise	26
5.2. Air quality	26
Annex 1: Pictures of Air and Noise monitoring.....	28
Annex 2: Certificates of equipment	40
Certificate of calibration	40
Certificate of calibrated air monitoring system	42
Annex 3: Raw data.....	43

Table of Figures

<i>Figure 1: Noise and air monitoring locations.....</i>	<i>5</i>
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Table of Tables

Table 1: Location of nearest sensitive receptors.....	5
Table 3: The measurement equipment used for noise monitoring	6
Table 4: The measurement equipment used for air monitoring	6
Table 5: National noise limits	7
Table 6: WBG General EHS Guidelines: Environmental Noise Management (Table 1.7.1). 7	
Table 7: National Air quality standards.....	8
Table 8: WHO Ambient Air Quality Guidelines.....	8
Table 9: Summary of average noise values for 24 hr measurement per location, dBA ...	10
Table 10: 15-minute average concentrations for 24 hr measurement per location (in $\mu\text{g}/\text{m}^3$) (red cells indicate exceedance of the daily (24-hour) average MPC)	12

1. Introduction

1.1. Overview

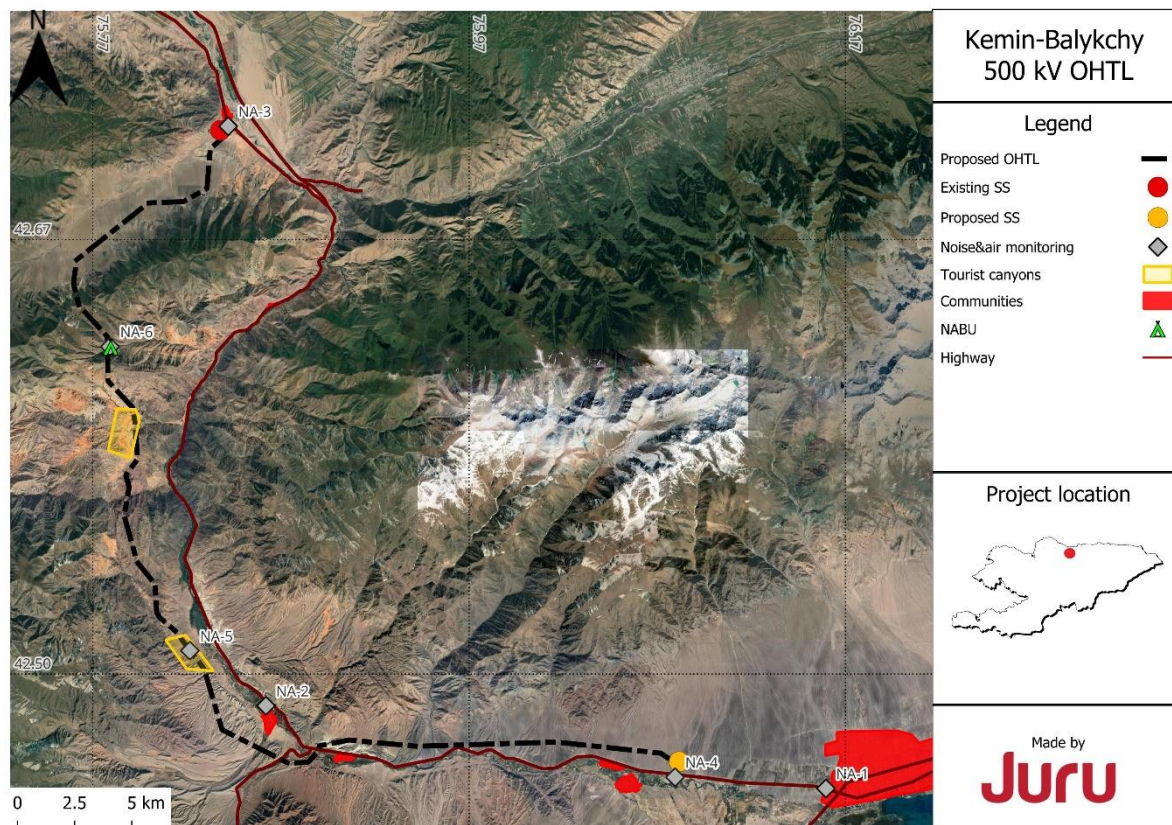
The Project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. The project route runs between the existing Kemin substation (near the village of Cholok) and ends at the planned Balykchy substation near the village of Kok-Moynok-1, 6 km from the town of Balykchy. The route passes through mountainous areas south of the Boom Gorge, where it runs 120 m from the NABU rehabilitation center and two touristic canyons – Kok-Moynok and Konorchek. The line then descends onto the plains near the village of Kok-Moynok-2, passing along its southern boundary, crosses the Chu River, and continues parallel to the EM-11 road to the north.

1.2. Sampling overview

In order to characterise the sound and air profile of the area of the proposed development to support future monitoring obligations or noise grievances, a continuous environmental noise and air quality (AQ) monitoring was carried out between 16 - 20 November 2024 at 3 nearest sensitive receptors (NSRs) and between 13-17 April 2025 at 3 NSRs and for daytime and night-time noise (24hr). In addition, wind speed and direction, were also measured.

Six monitoring locations were chosen based on proximity to the proposed OHTL area and to provide representative conditions for the NSR that may be affected by the Project. AQ and noise monitoring locations were at the same places (Figure 1). The sampling coordinates are provided in **Error! Reference source not found..**

Figure 1: Noise and air monitoring locations



2. Measurement methodology

2.1. Noise

For the noise measurement an unattended noise meter Class 1 (Type 1) per IEC 61672-1. It was placed in the vicinity of NSR's, at 1.7 m above the ground level with no nearby reflective surfaces in minimum 5 m distance. The following parameters were recorded: L_{Aeq} , L_{Amax} , L_{Amin} , L_{A10} , L_{A90} . The L_{Aeq} level is the equivalent continuous sound pressure level over at the measurement period 10 minutes. L_{Amax} is an indicator of the highest sound level during the measurement period; the L_{Amin} is the lowest level during the measurement period; L_{A90} is used as a descriptor of background noise levels and L_{A10} is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.

2.2. Air quality

For the air measurement AQ Mesh was used. It was placed in the vicinity of NSR's, at 2.5 m above the ground level with no nearby reflective surfaces in minimum 15 m distance. The following parameters were recorded: carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particular matter (PM_{2.5}, PM₁₀). The characteristics of the NSR's are described in Table 1.

Table 1: Location of nearest sensitive receptors

Location	Description	Coordinates Latitude	Coordinates Longitude
NA-1	EM-11 road on the western outskirts of the city of Balykchy	42.45508	76.15465
NA-2	EM-11 road near the Kok-Moynok-2 community	42.48752	75.85699
NA-3	M-036 road near Cholok community	42.71428	75.83692
NA-4	EM-11 road near planned substation location and Kok-Moynok-1 community	42.45951	76.07443
NA-5	The Kok-Moynok canyon (tourist site)	42.50912	75.81656
NA-6	Ground road near the NABU Wildlife Rehabilitation Centre	42.62813	75.77407

3. Measurement equipment

The following equipment was use for the monitoring exercise.

Table 2: The measurement equipment used for noise monitoring

Item	Meter Model	Serial Number
Sound Level Meter	Rion NL 52	00410151
Calibrator	Calibrator Rion NL 75	34313059
Microphone	All-weather windscreen WS-15	Does not have SN

Table 3: The measurement equipment used for air monitoring

Item	Meter Model
Air quality monitoring system	AQ Mesh
Accumulator	Solar panel pack
Anemometer	Scarlet Tech anemometer

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤ 0.5 dBA. Sound meter fitted with a protective windshield for the entire measurements period. UKAS certificates are attached in Annex 1.

4. Applicable standards

National noise standards are set out by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Sanitary Rules and Standards “Noise in Workplaces, Residential and Public Buildings, and Residential Areas” according to Appendix 14). The Table 4 presents the national Noise level standards.

Table 4: National noise limits

Receptor	L _{Aeq} (dBA)			
	Daytime 07.00-23.00		Night-time 23.00 – 07.00	
	Average	Max	Average	Max
Areas directly adjacent to residential buildings, polyclinics, dispensaries, rest homes, boarding houses, libraries, schools, etc.	55	70	45	60
Areas directly adjacent to hospitals and sanatoriums	45	60	35	50
Areas directly adjacent to hotels and dormitories	60	75	50	65
Recreational zones near hospitals and sanatoriums	35	50	35	50
Recreational zones in residential micro-districts, construction of cottages, rest homes, sanatoriums, schools, retirement homes, etc.	45	60	45	60
Industrial; commercial	70	-	70	-

The international standards for noise are presented by the WBG EHS Guidelines. The reference values are provided in Table 5.

Table 5: WBG General EHS Guidelines: Environmental Noise Management (Table 1.7.1)¹

Receptor	One-hour L _{Aeq} (dBA)	
	Daytime 07.00-22.00	Night-time 22.00 – 07.00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

National Ambient Air Quality Standards, or Maximum Permissible Concentrations (MPCs), are established by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards “Approximate Safe Levels of Pollutant Exposure in the Atmospheric Air of Populated Areas” according to Appendix 17). The standard is provided in Table 6

¹ Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

Table 6: National Air quality standards

Pollutant	MPC (µg/m ³)		
	One-time	24 hours	Working zone
Nitrogen Dioxide (NO ₂)	85	40	5000
Sulphur Dioxide (SO ₂)	500	50	10000
PM ₁₀	300	300	-
PM _{2.5}	160	160	-
Carbon Monoxide (CO)	5000	3000	20000

International standards are presented by the WHO Ambient Air Quality Guidelines. The standards are shown at Table 7.

Table 7: WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Concentration
PM _{2.5}	24 hours	15 µg/m ³
PM _{2.5}	Annual	5 µg/m ³
PM ₁₀	24 Hour	45 µg/m ³
PM ₁₀	Annual	15 µg/m ³
NO ₂	Hourly	200 µg/m ³
NO ₂	Annual	10 µg/m ³
NO ₂	24 hours	25 µg/m ³
SO ₂	24 hours	40 µg/m ³
CO	Maximum daily 8-hour mean	10 mg/m ³

5. Monitoring results and standards

5.1. Summary tables noise and air

The data provided in Table 8 outlines the summary of noise measurements obtained from six different locations during specific time periods. The measurements are categorized by two distinct time intervals: daytime (from 07:00 to 23:00) and night-time (from 23:00 to 07:00).

The data provided in Table 9 summarises the average and maximum concentrations at NA-1 – NA-6 for each parameter CO, SO₂, NO₂, PM_{2.5}, PM₁₀. measured in µg/m³ over a 24 hour period at 15-minute intervals and displayed for daytime and night-time (07:00-23:00 and 23:00-07:00).

Table 8: Summary of average noise values for 24 hr measurement per location, dBA

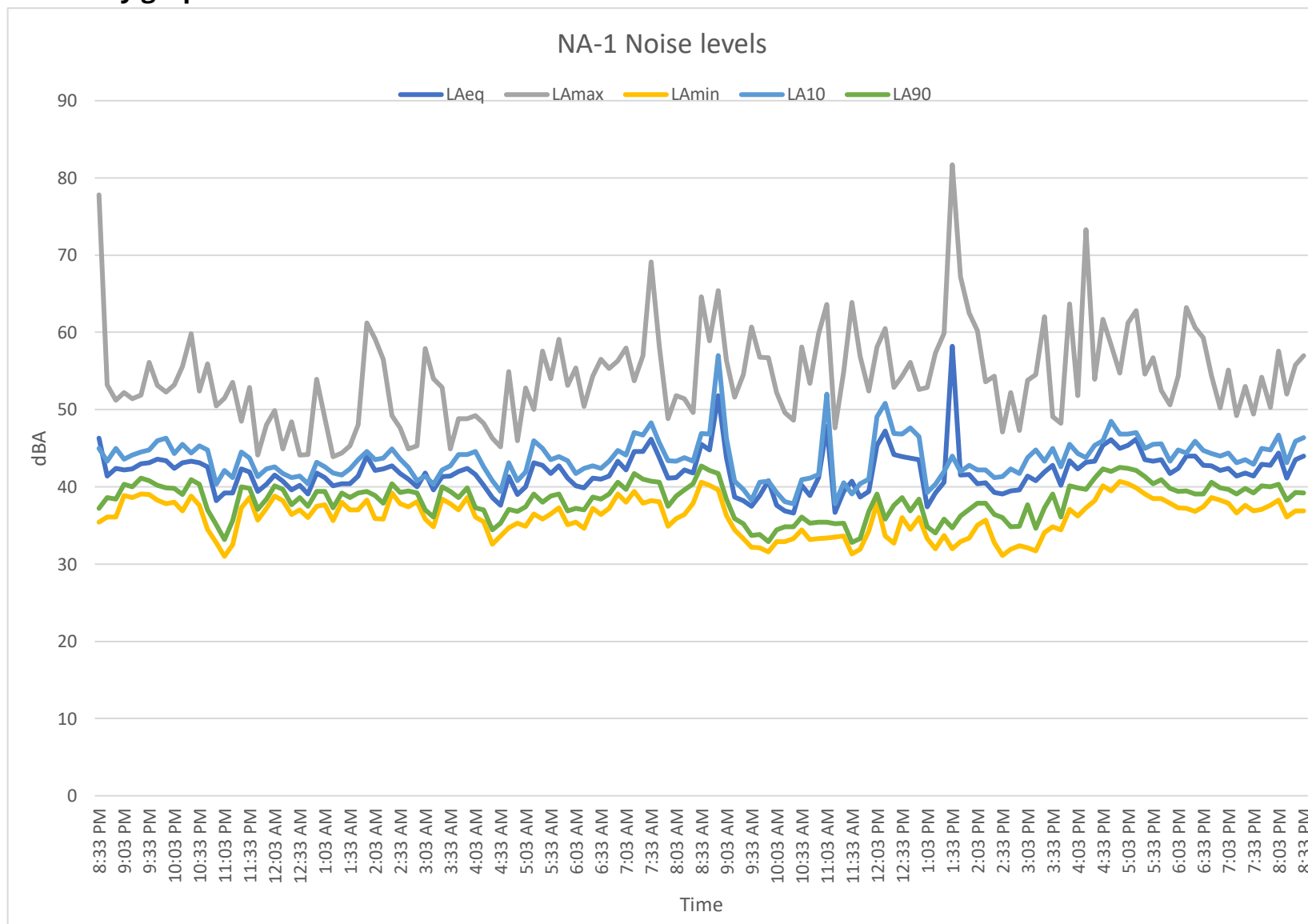
Location	Date	daytime	Time Period	L _{Aeq} , avg (55 – daytime; 45 – nighttime)	L _{Amax} avg	L _{Amin} avg	L _{A10} , min	L _{A10} , avg	L _{A10} , max	L _{A90} , min	L _{A90} , avg	L _{A90} , max
		night-time	Interval									
NA-1	November, 2024 19-20	07:00- 23:00	10 min	42.4	56.1	36.0	37.8	44.1	57.0	32.8	38.3	42.7
		23:00- 07:00		41.0	50.6	36.5	39.4	42.7	46.0	33.2	38.2	40.6
NA-2	November, 2024 17-18	07:00- 23:00	10 min	44.7	61.1	33.0	34.1	46.8	57.7	27.5	37.3	43.2
		23:00- 07:00		45.6	58.7	32.4	40.8	48.9	58.9	29.0	36.0	42.7
NA-3	November, 2024 18-19	07:00- 23:00	10 min	41.1	55.4	32.8	36.8	43.5	66.6	30.6	35.3	39.2
		23:00- 07:00		38.4	52.1	31.7	34.7	40.4	66.6	31.4	33.5	36.4
NA-4	April, 2025 14-15	07:00- 23:00	10 min	47.3	62.6	32.4	39.7	50.6	70.1	28.1	37.9	45.3
		23:00- 07:00		45.8	58.9	25.3	37.4	50.1	62.8	21.7	29.6	40.7
NA-5	April, 2025 16-17	07:00- 23:00	10 min	48.2	62.9	39.1	37.6	50.6	60.8	30.9	42.5	50.9
		23:00- 07:00		44.2	60.1	29.5	35.0	44.5	72.8	26.2	32.4	39.4
NA-6	April, 2025 13-14	07:00- 23:00	10 min	31.2	49.5	22.5	22.7	33.2	48.5	19.6	24.4	39.4
		23:00- 07:00		37.1	49.1	31.2	31.0	39.0	51.2	25.8	32.9	42.4

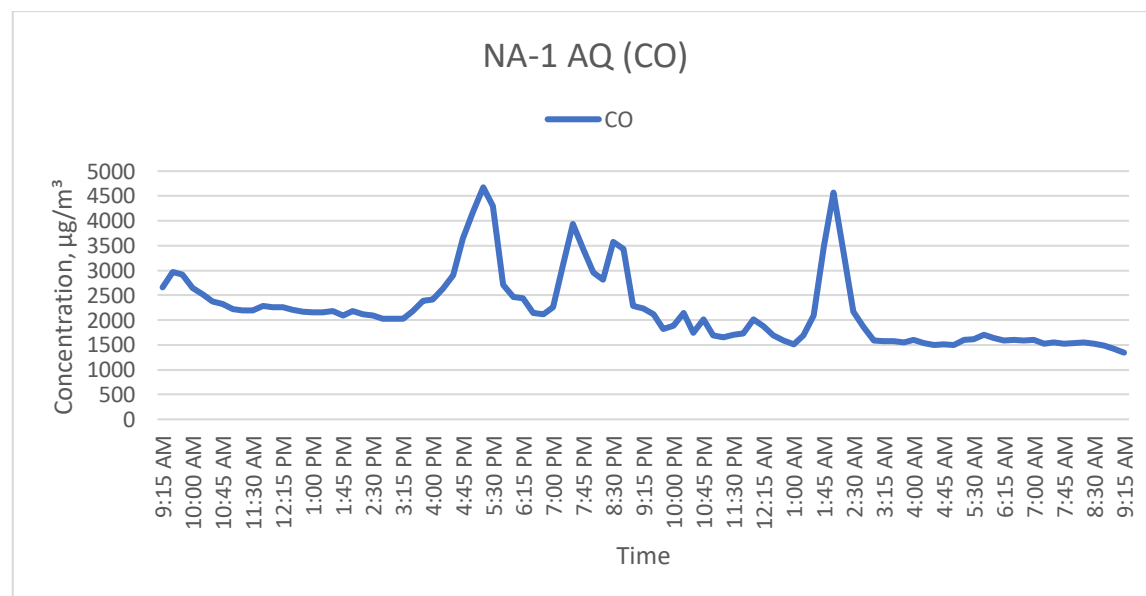
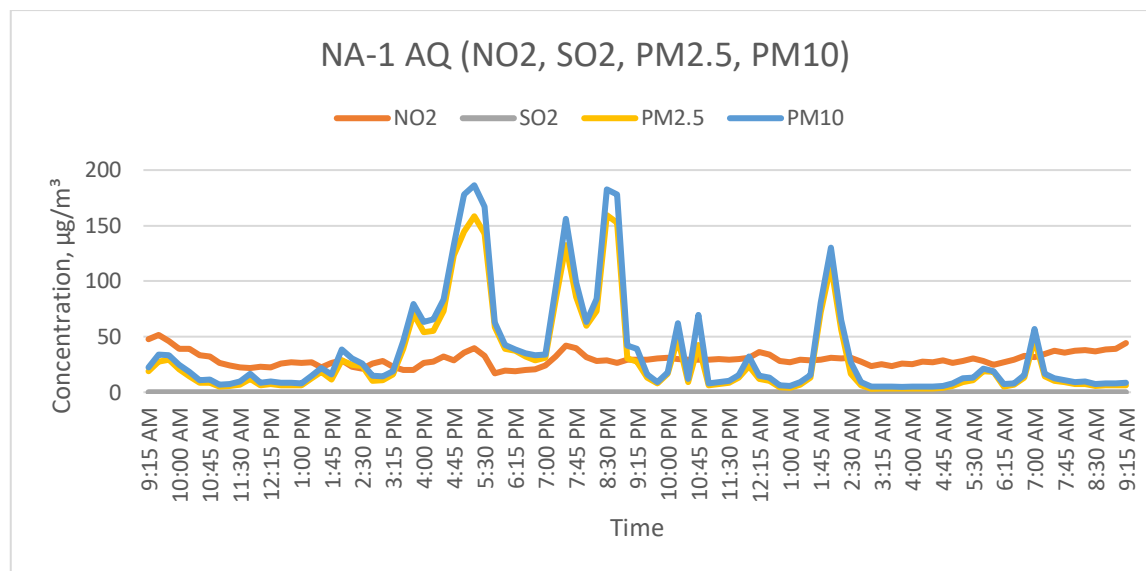
Table 9: 15-minute average concentrations for 24 hr measurement per location (in $\mu\text{g}/\text{m}^3$) (red cells indicate exceedance of the daily (24-hour) average MPC)

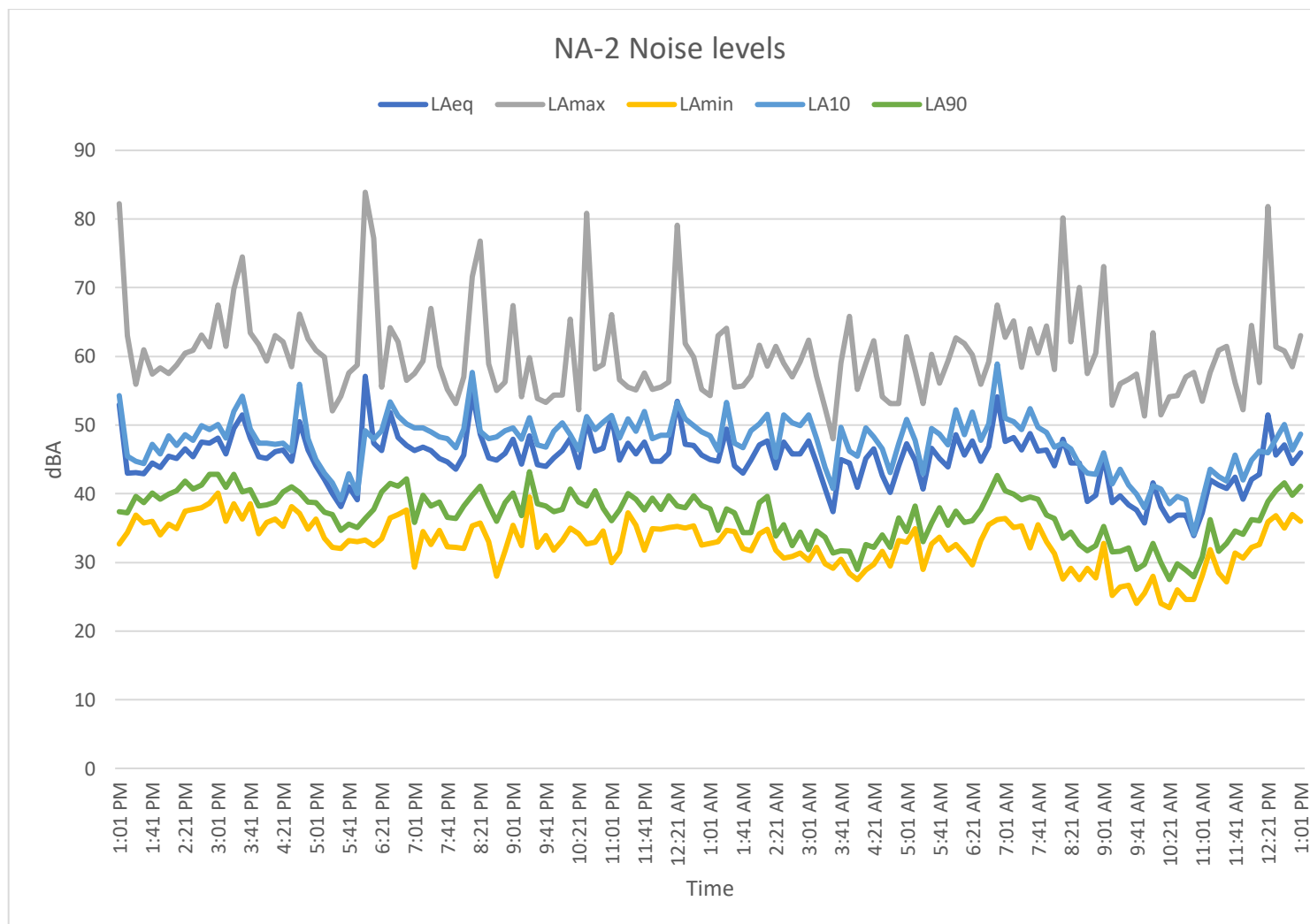
Location	Date	daytime	Time Period	CO		NO ₂		SO ₂		PM _{2.5}		PM ₁₀	
				avg	max	avg	max	avg	max	avg	max	avg	max
		night-time		Daily MPC – 3000 24hour (WHO) – 10,000		Daily MPC – 40 24hour (WHO) – 25		Daily MPC-50 24hour (WHO) – 40		Daily MPC- 160 24hour (WHO) - 15		Daily MPC – 300 24hour (WHO) - 45	
NA-1	November, 2024 16-17	07:00- 23:00	15 min	2388.4	4674.1	30.1	51.6	0.0	0.0	38.4	159.5	45.5	186.3
		23:00- 07:00		1873.3	4569.0	28.6	36.1	0.0	0.0	15.3	114.6	18.6	130.1
NA-2	November, 2024 17-18	07:00- 23:00	15 min	1336.9	2114.6	28.5	54.9	0.0	0.0	14.0	44.8	17.8	57.5
		23:00- 07:00		1773.7	2200.6	33.9	46.9	0.0	0.0	18.8	77.4	24.1	126.8
NA-3	November, 2024 18-19	07:00- 23:00	15 min	722.2	1575.2	25.9	40.8	0.0	0.0	7.6	28.3	10.4	33.9
		23:00- 07:00		699.4	1038.2	31.3	47.5	0.0	0.0	5.4	50.1	7.4	55.0
NA-4	April, 2025 14-15	07:00- 23:00	15 min	91.5	202.9	34.0	55.6	0.0	0.0	1.0	2.1	2.3	11.2
		23:00- 07:00		203.0	251.2	33.8	45.8	0.0	0.0	0.2	0.7	0.4	1.2
NA-5	April, 2025 16-17	07:00- 23:00	15 min	227.9	416.2	35.9	53.1	0.0	0.0	2.1	5.2	4.6	15.3
		23:00- 07:00		416.1	528.8	24.9	37.5	0.0	0.0	0.4	0.5	0.7	1.3

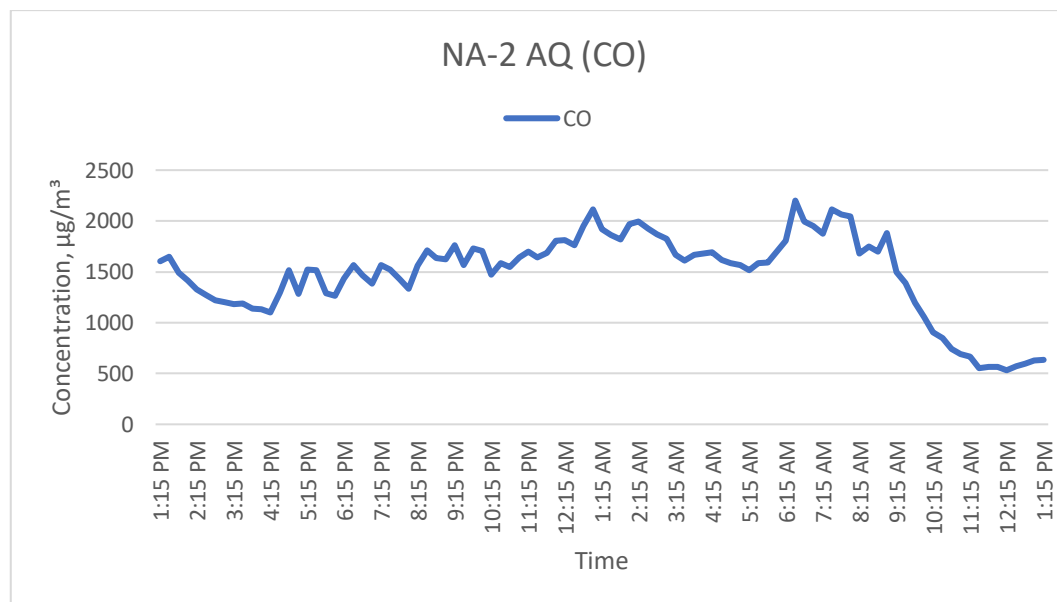
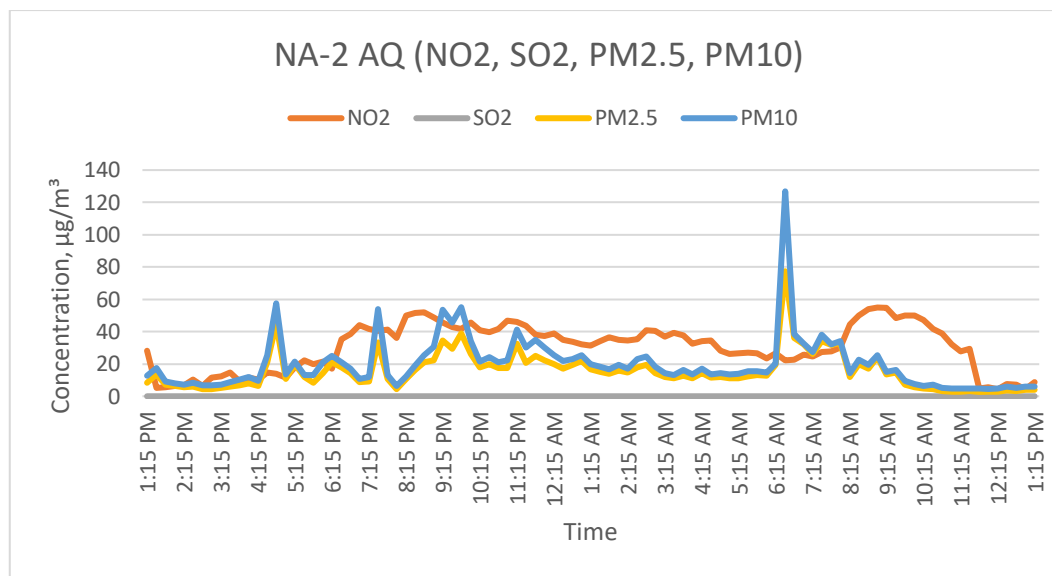
Location	Date	daytime	Time Period	CO		NO ₂		SO ₂		PM _{2.5}		PM ₁₀	
				avg	max	avg	max	avg	max	avg	max	avg	max
		night-time		Daily MPC – 3000 24hour (WHO) – 10,000		Daily MPC – 40 24hour (WHO) – 25		Daily MPC-50 24hour (WHO) – 40		Daily MPC- 160 24hour (WHO) – 15		Daily MPC – 300 24hour (WHO) – 45	
NA-6	April, 2025 13-14	07:00- 23:00	15 min	78.5	280.3	38.9	51.0	0.0	0.0	0.7	1.4	2.3	4.8
		23:00- 07:00		200.5	290.7	45.6	58.7	0.0	0.0	1.2	3.9	2.6	7.8

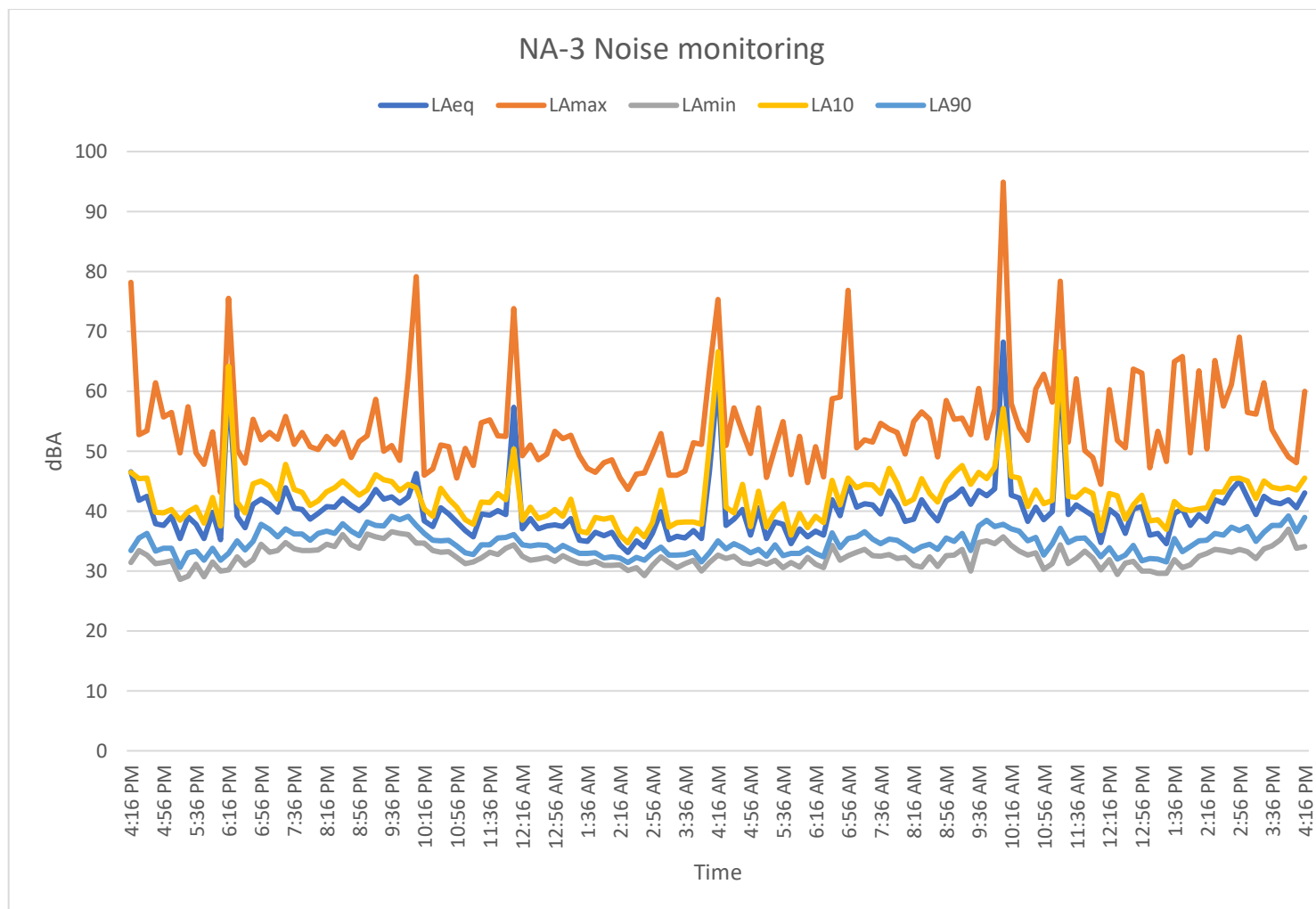
5.2.Summary graph results

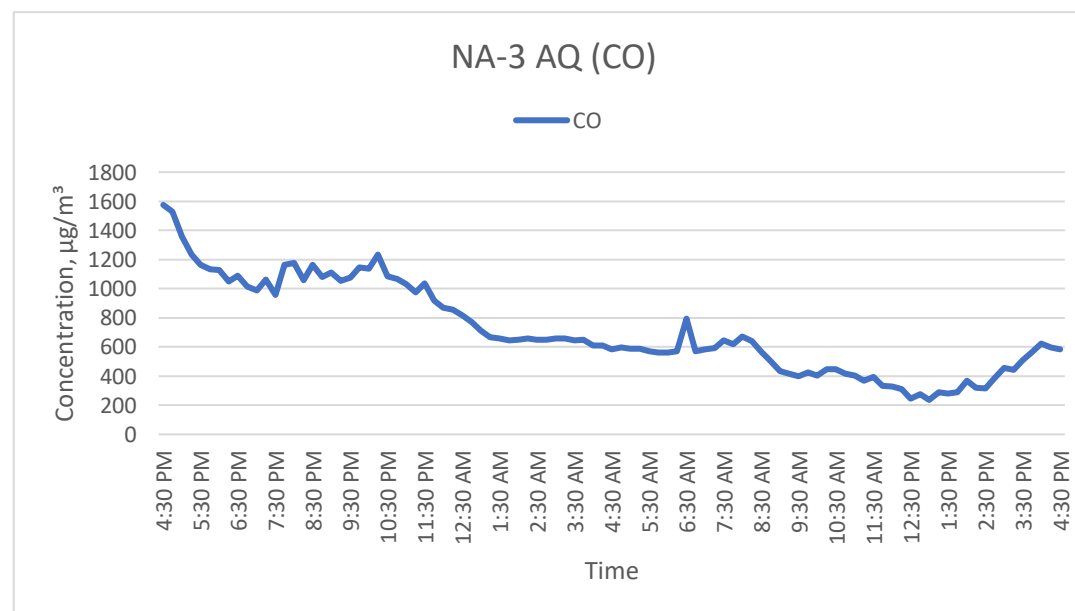
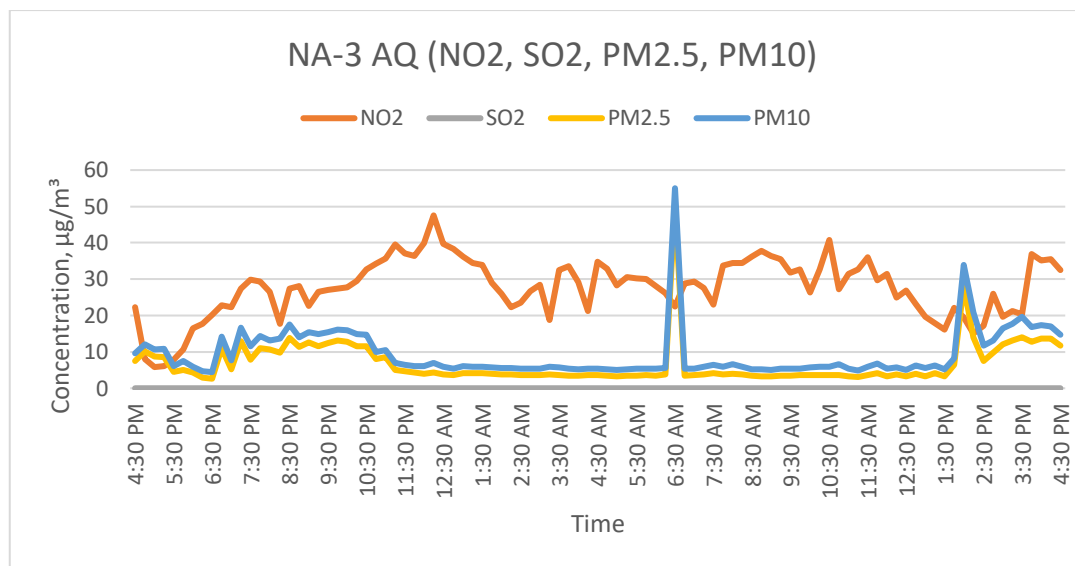


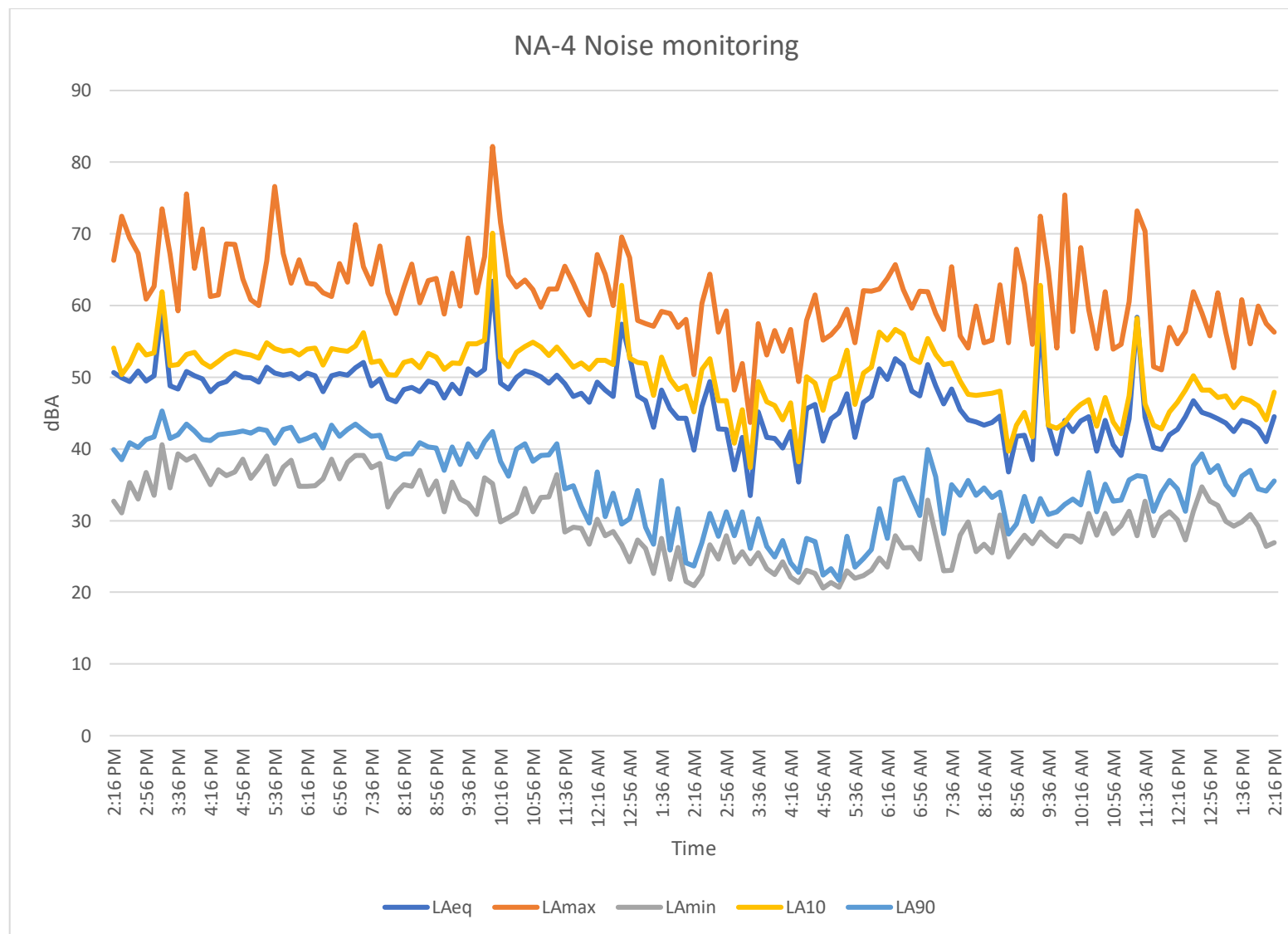


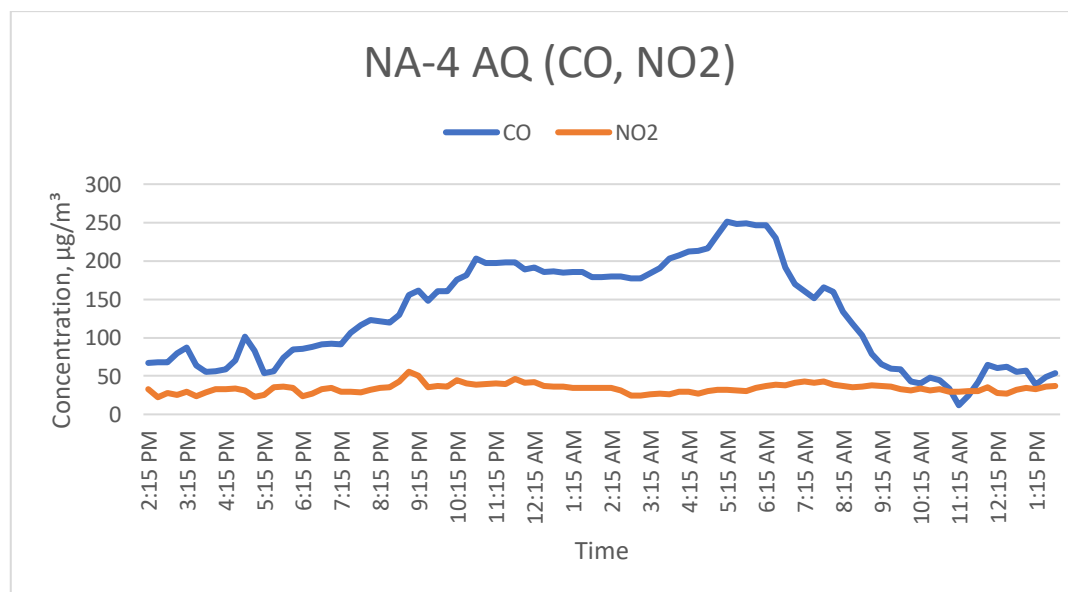
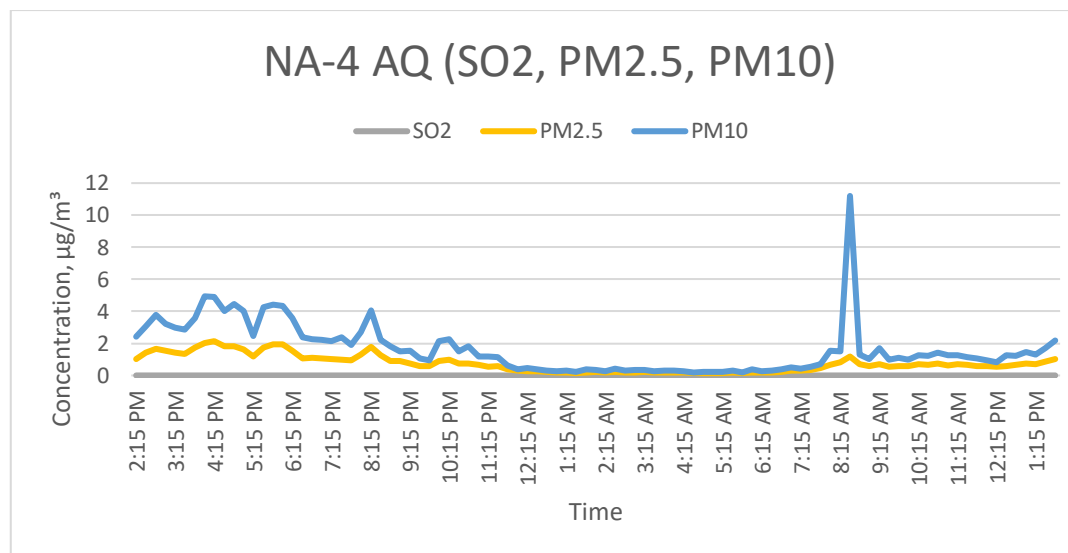


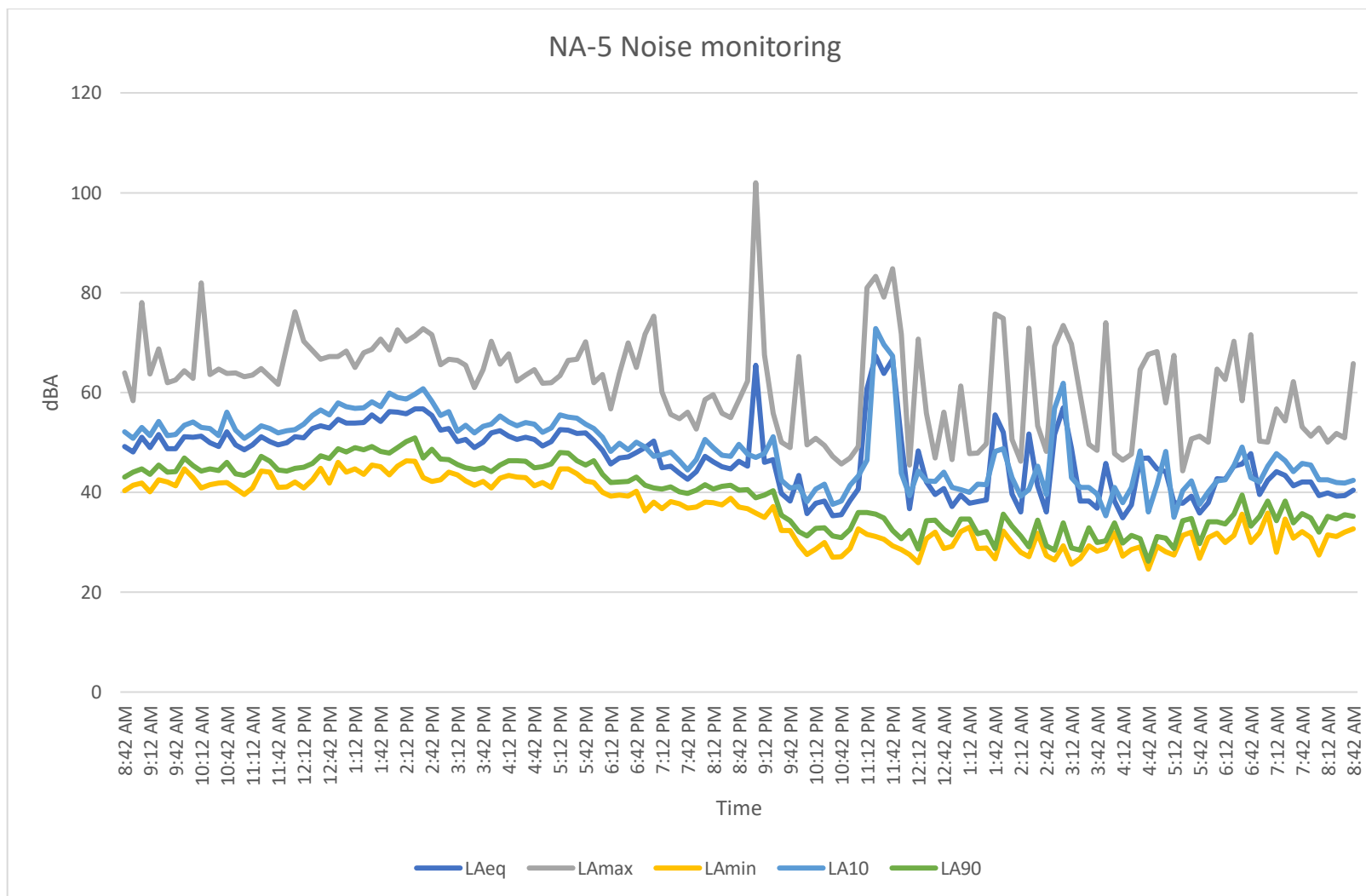


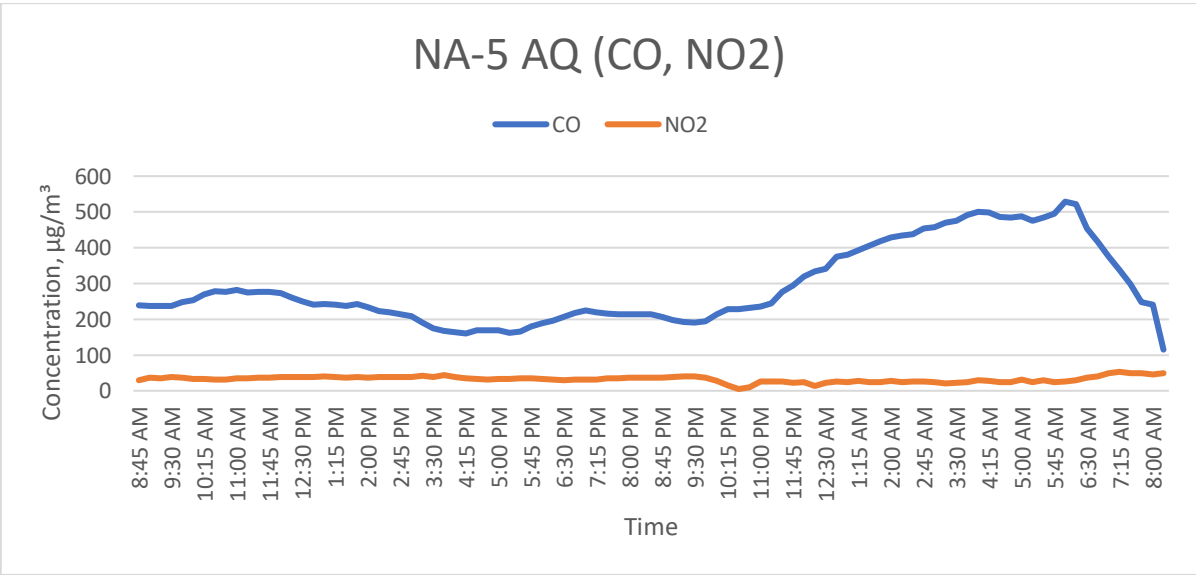
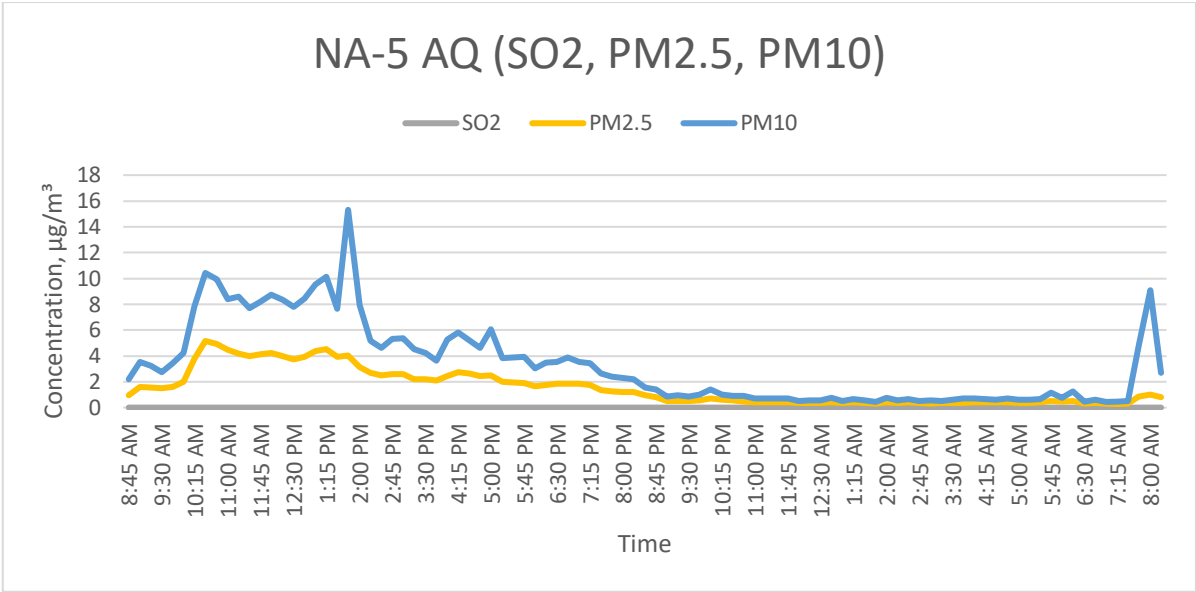


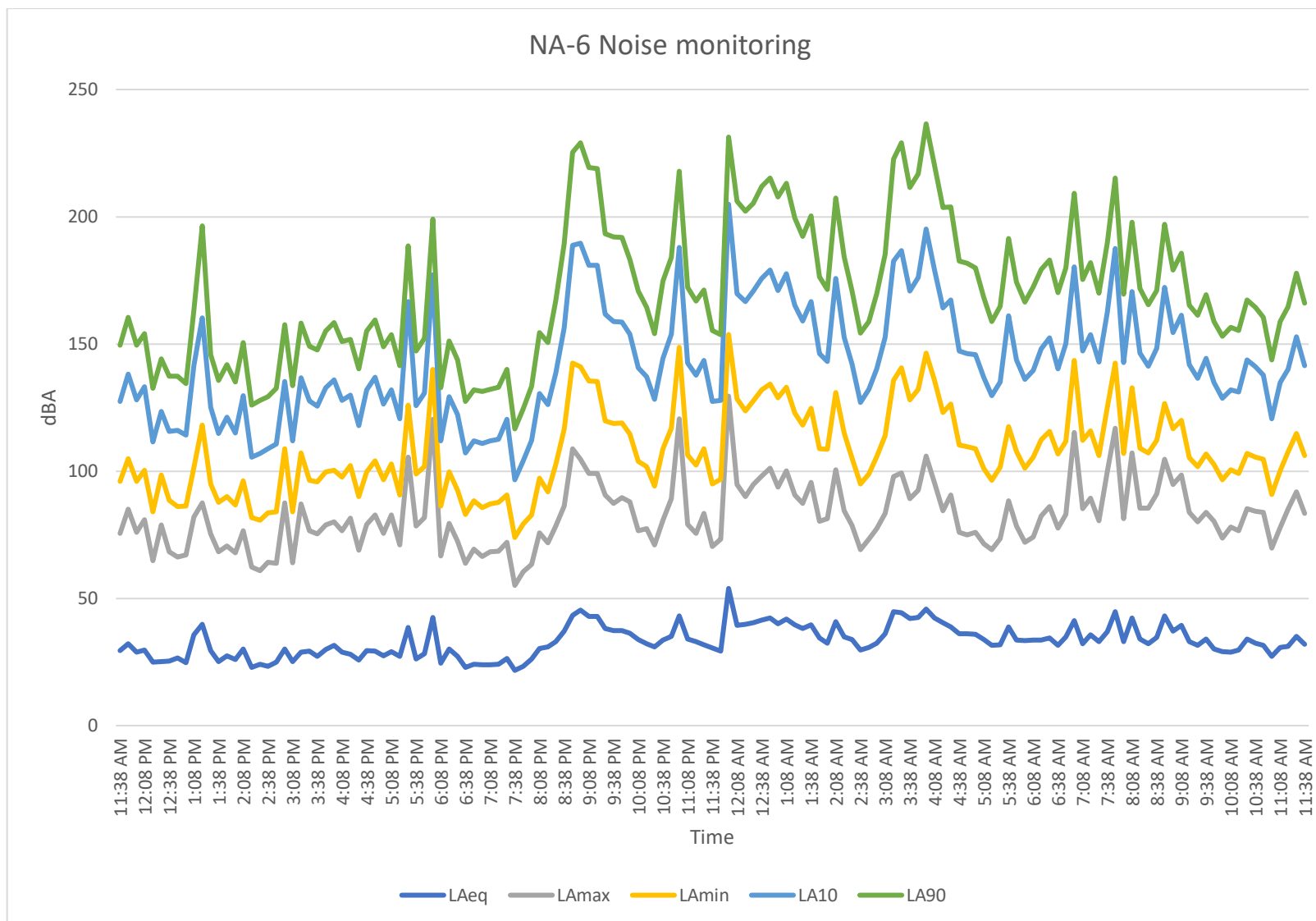


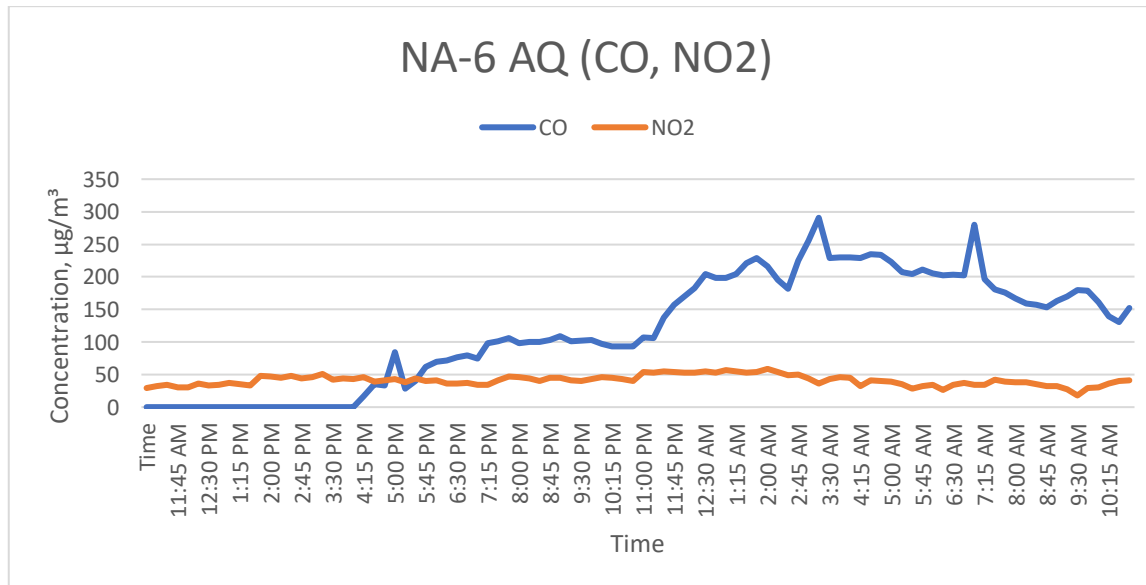
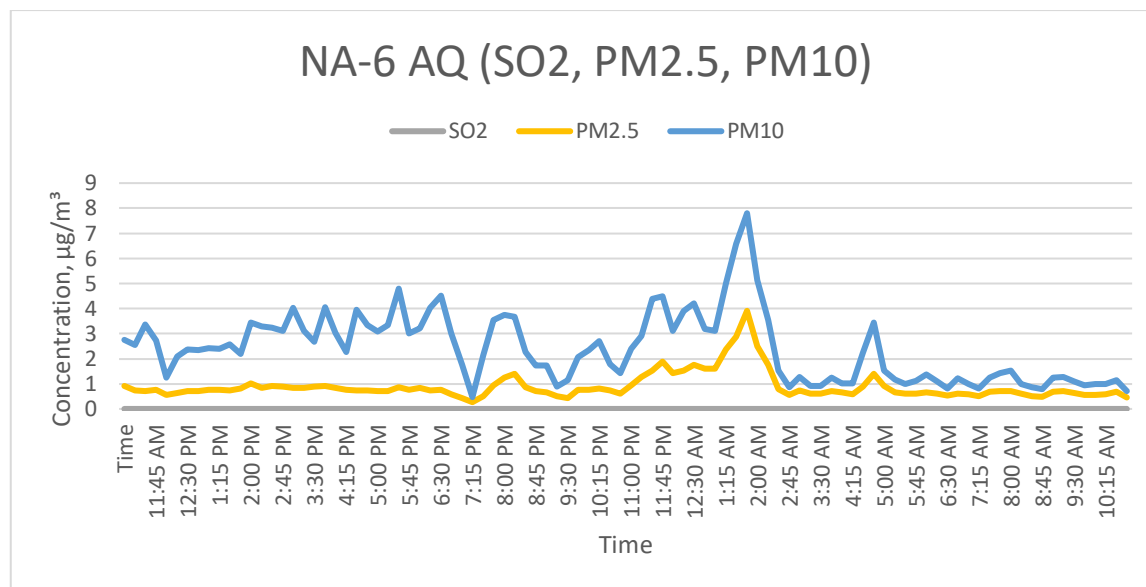












6. Conclusion

6.1. Noise

The average noise load (L_{Aeq} , avg.) at all six points during the day is quite low, not exceeding 48.2 dBA at the noisiest location. At points NA-1 and NA-4, there are two short-term increases in noise levels during the day – in the morning, from 7 to 9, and during lunchtime, from 12:30 to 14:00. At point NA-2, only the morning peak stands out at the same time, while at points NA-3, NA-5 and NA-6, the noise load remains consistent throughout the day. National and international standards of 55 dBA are not exceeded. The average maximum noise level (L_{Amax} , avg.) varied between 61.1 and 55.4 dBA.

The average noise load (L_{Aeq} , avg.) at night is almost the same as during the day – around 40 dBA and 45 dBA at the noisiest locations. At points NA-2 and NA-4, the average noise load at night (23:00 – 7:00) reach 45.6 and 45.8 dBA, respectively, which exceeds the established night-time standard of 45 dBA. This is due to a peak noise load between 6 am and 7 am in the morning. In all surveyed locations, the noise level at night is uniform and starts to rise in the early morning, around 6 am. The most favorable locations in terms of noise at night are points NA-3 and NA-6, with an average L_{Aeq} of 38.4 and 37.1 dBA, respectively. For the NA-3 this is most likely because this community is not located on the main road EM-11, like the other points, but on its branch M-036, which has lower traffic, as confirmed by a corresponding study. Point NA-6 is located far from the road, which ensures a favorable noise load. At point NA-5, inside the Kok-Moynok tourist canyon, L_{Aeq} nighttime noise level is 44.2 dBA, leaving only a small margin below the standard. Considering the absence of other noise sources, even at a distance of more than 800 m in open terrain, the road still had an impact on this location. The average maximum noise level (L_{Amax} , avg.) varied between 60.1 dBA and 49.1 dBA.

Thus, the study area can be characterized as contrasting: one part near the road experiences noise levels of around 48–45 dBA, while in the mountainous areas along the pastures the levels do not exceed 40 dBA. The main reason is the community's location on an international highway connecting the Kyrgyz capital with neighbouring regions and China, resulting in consistently high traffic. Nevertheless, the daytime situation is quite favourable, whereas at night, the noise levels reach the upper permissible limit or exceed it.

6.2. Air quality

When comparing air quality with the current regulations for a more detailed assessment, the daytime and nighttime average values were compared to the daily standard. The EM-11 highway is the defining factor for air quality in the study area. At points NA-1 and NA-2, air quality is moderate – average value of NO_2 slightly exceeds WHO standards, and $PM_{2.5}$ exceed the established international standard for average daily concentration by approximately 1.5-2 times. PM_{10} slightly exceeds international standards only at point NA-1 for daytime. The main contributing factor to these results is undoubtedly traffic, but the use of combustion for heating and proximity to the desert also play a role. At point NA-3, which is located off the main highway

on the bypass road M-036, concentrations of all parameters are lower, with no exceeding for PM_{2.5} and PM₁₀. SO₂ was not detected at any of the locations.

The spring season study at points NA-4 to NA-6 confirms the assumptions made during the autumn season. NO₂ concentrations, associated with traffic, remain elevated - at the same levels as at NA-1 to NA-3, while PM (2.5, 10) concentrations, which strongly depend on heating equipment (including combustion), have decreased and comply with the strictest WHO standards. At point NA-6, located higher in the mountains 4 km from the road near the NABU center, no improvement in NO₂ levels was observed compared to the other points for the same season. As with points NA-1 to NA-3, SO₂ concentrations in the air were below the detection limit. CO levels complied with the standards and were low.

It is important to note that national standards are less strict than international ones, and according to them, all indicators for both monitoring rounds remain within the permissible limits.

Thus, near the city of Balykchy and the villages of Kok-Moynok-1 and Kok-Moynok-2 (NA-1, NA-2, and NA4), air quality is moderate during the heating season and acceptable for the other part of the year. Near the Cholok community and in the mountainous part of the OHTL route, air quality is better but it may still remain unsatisfactory during heating activities.

Annex 1: Pictures of Air and Noise monitoring

Noise levels monitoring at NA-1



Air quality monitoring at NA-1



Noise levels monitoring at NA-2



Air quality monitoring at NA-2



Noise levels monitoring at NA-3



Air quality monitoring at NA-3



Noise levels monitoring at NA-4



Air quality monitoring at NA-4



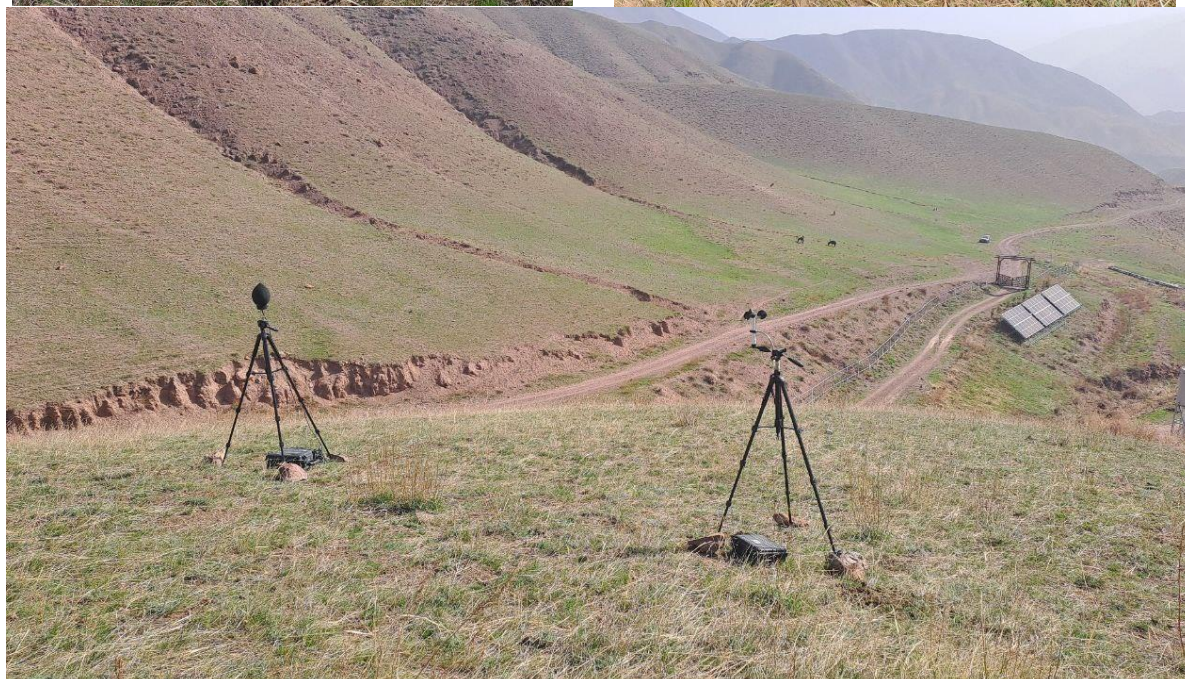
Noise levels monitoring at NA-5



Air quality monitoring at NA-5



Noise levels monitoring at NA-6



Air quality monitoring at NA-6



Annex 2: Certificates of equipment

Certificate of calibration



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 21 February 2023

Certificate Number: UCRT23/1245

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory
K. Mistry

Customer Juru Energy Ltd
Suite 1
One George Yard
London
United Kingdom
EC3V 9DF

Order No. JE1
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00410151
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	10591
Rion	Microphone	UC-59	19220
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 10. SLM 61672-3:2013
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2013 Yes
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013
Date Received 20 February 2023 **ANV Job No.** UKAS23/02116
Date Calibrated 21 February 2023

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	Dated	Certificate No.	Laboratory
	29 June 2021	UCRT21/1801	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION	Certificate Number UCRT23/1245
UKAS Accredited Calibration Laboratory No. 0653	Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		
	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes
Total expanded uncertainties within the requirements of IEC 61672-1:2013			YES
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	16 February 2023		
Calibrator cert. number	UCRT23/1227		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.04	dB	Calibration reference sound pressure level
Calibrator frequency	1001.97	Hz	Calibration check frequency
Reference level range	Single	dB	
Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15			
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.			

Environmental conditions during tests	Start	End	
Temperature	23.64	22.59	± 0.30 °C
Humidity	39.9	40.0	± 3.00 %RH
Ambient Pressure	100.84	100.84	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	94.0	dB	Adjusted indicated level 94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10 dB
Self Generated Noise			
Microphone installed -	Less Than	16.9	dB A Weighting
Microphone replaced with electrical input device - UR = Under Range indicated			
Weighting	A	C	Z
	11.9	15.8	21.4
	dB	dB	dB
	UR	UR	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

Certificate of calibrated air monitoring system



Tel. +44 (0)1789 207459
Email. info@aqmesh.com
www.aqmesh.com



Certificate of calibration

This is to certify that the sensors:

NO: 160410106

NO2: 202761658

CO2: 0330FF15

SO2: 164041109

CO: 162941352

AQMesh pod 2450963 have been calibrated against certified reference equipment for the following measurements:

NO, NO2	Thermo Scientific 42i
CO2	Comparison to AQMesh Gold pod, created via co-location with Licor CO2 analyser
SO2	Thermo Scientific 43i
CO	Ecotech Serinus 30

This is to certify that the AQMesh pod 2450963 has passed end of line testing for the following measurements:

PM 10, PM 2.5, PM 1, Particle count Fidas 200

Date of manufacture: 25th August 2022

A handwritten signature in black ink, appearing to read "Richard Handy".

Richard Handy
Operations Manager

Annex 3: Raw data

Provided In the separate file.

Annex 3: Raw data

NA-1 Noise load

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/19/2024	8:33 PM	46.3	77.8	35.4	45	37.2
11/19/2024	8:43 PM	41.4	53.2	36.1	43.3	38.6
11/19/2024	8:53 PM	42.4	51.2	36.1	45	38.4
11/19/2024	9:03 PM	42.2	52.2	38.9	43.6	40.3
11/19/2024	9:13 PM	42.3	51.4	38.6	44.1	40
11/19/2024	9:23 PM	43	51.9	39.1	44.5	41.1
11/19/2024	9:33 PM	43.1	56.1	39	44.8	40.8
11/19/2024	9:43 PM	43.6	53.1	38.3	46	40.2
11/19/2024	9:53 PM	43.4	52.3	37.8	46.3	39.9
11/19/2024	10:03 PM	42.4	53.2	38	44.3	39.8
11/19/2024	10:13 PM	43.1	55.6	36.9	45.5	39
11/19/2024	10:23 PM	43.3	59.8	38.8	44.4	40.9
11/19/2024	10:33 PM	43.1	52.4	37.6	45.3	40.3
11/19/2024	10:43 PM	42.6	55.9	34.5	44.8	37
11/19/2024	10:53 PM	38.2	50.5	32.8	40.3	35.1
11/19/2024	11:03 PM	39.2	51.5	31	42.1	33.2
11/19/2024	11:13 PM	39.2	53.5	32.5	41.2	35.6
11/19/2024	11:23 PM	42.3	48.5	37.3	44.5	40
11/19/2024	11:33 PM	41.9	52.9	38.6	43.7	39.8
11/19/2024	11:43 PM	39.4	44.1	35.7	41.3	37.1
11/19/2024	11:53 PM	40.3	48	37.2	42.3	38.4
11/20/2024	12:03 AM	41.5	49.9	38.8	42.6	40.1
11/20/2024	12:13 AM	40.7	44.9	38.2	41.7	39.7
11/20/2024	12:23 AM	39.6	48.4	36.4	41.2	37.7
11/20/2024	12:33 AM	40.2	44.1	37	41.4	38.6
11/20/2024	12:43 AM	39.1	44.2	36	40.4	37.5
11/20/2024	12:53 AM	41.8	53.9	37.5	43.2	39.4
11/20/2024	1:03 AM	41.2	48.9	37.7	42.6	39.4
11/20/2024	1:13 AM	40.1	43.9	35.6	41.8	37.3
11/20/2024	1:23 AM	40.4	44.4	38	41.5	39.2
11/20/2024	1:33 AM	40.4	45.3	37	42.3	38.6
11/20/2024	1:43 AM	41.4	48	37	43.5	39.2
11/20/2024	1:53 AM	44	61.2	38.3	44.6	39.4
11/20/2024	2:03 AM	42.1	59.2	35.9	43.5	38.9
11/20/2024	2:13 AM	42.3	56.5	35.8	43.7	37.9
11/20/2024	2:23 AM	42.7	49.2	39.2	44.9	40.4
11/20/2024	2:33 AM	41.7	47.6	37.8	43.6	39.3
11/20/2024	2:43 AM	41	44.9	37.4	42.5	39.5
11/20/2024	2:53 AM	40	45.3	38.1	40.8	39.2
11/20/2024	3:03 AM	41.8	57.9	35.8	41.4	37

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/20/2024	3:13 AM	39.6	54	34.8	40.3	36.1
11/20/2024	3:23 AM	41.3	52.9	38.4	42.2	40
11/20/2024	3:33 AM	41.4	44.9	37.8	42.7	39.4
11/20/2024	3:43 AM	42	48.8	37	44.2	38.6
11/20/2024	3:53 AM	42.4	48.8	38.6	44.2	39.9
11/20/2024	4:03 AM	41.6	49.2	36.1	44.6	37.3
11/20/2024	4:13 AM	40.2	48.2	35.5	42.6	37
11/20/2024	4:23 AM	38.6	46.3	32.6	40.8	34.4
11/20/2024	4:33 AM	37.6	45.2	33.6	39.4	35.3
11/20/2024	4:43 AM	41.3	54.9	34.7	43.1	37.1
11/20/2024	4:53 AM	39	46	35.3	40.8	36.8
11/20/2024	5:03 AM	40	52.8	34.9	41.9	37.4
11/20/2024	5:13 AM	43.1	50	36.5	46	39.1
11/20/2024	5:23 AM	42.8	57.6	35.8	45	38
11/20/2024	5:33 AM	41.7	54	36.5	43.5	38.8
11/20/2024	5:43 AM	42.7	59.1	37.3	43.9	39.1
11/20/2024	5:53 AM	41.1	53.1	35.1	43.4	36.9
11/20/2024	6:03 AM	40.1	55.4	35.4	41.7	37.2
11/20/2024	6:13 AM	39.9	50.4	34.6	42.4	37
11/20/2024	6:23 AM	41.1	54.3	37.2	42.7	38.7
11/20/2024	6:33 AM	41	56.5	36.4	42.4	38.4
11/20/2024	6:43 AM	41.4	55.3	37.2	43.3	39.1
11/20/2024	6:53 AM	43.3	56.3	39.1	44.7	40.6
11/20/2024	7:03 AM	42.2	58	38	44.1	39.7
11/20/2024	7:13 AM	44.6	53.7	39.4	47	41.7
11/20/2024	7:23 AM	44.6	57	37.9	46.7	41
11/20/2024	7:33 AM	46.2	69.1	38.2	48.3	40.7
11/20/2024	7:43 AM	43.8	58.2	38.1	45.7	40.6
11/20/2024	7:53 AM	41.1	48.8	34.9	43.4	37.5
11/20/2024	8:03 AM	41.2	51.8	35.9	43.3	38.8
11/20/2024	8:13 AM	42.2	51.4	36.4	43.8	39.6
11/20/2024	8:23 AM	41.8	49.6	37.9	43.3	40.4
11/20/2024	8:33 AM	45.5	64.6	40.6	46.9	42.7
11/20/2024	8:43 AM	44.8	58.9	40.2	46.8	42.1
11/20/2024	8:53 AM	51.8	65.4	39.6	57	41.7
11/20/2024	9:03 AM	43.8	56.4	36.3	46.3	38.4
11/20/2024	9:13 AM	38.7	51.6	34.4	40.7	35.9
11/20/2024	9:23 AM	38.2	54.5	33.3	39.7	35.2
11/20/2024	9:33 AM	37.5	60.7	32.2	38.3	33.7
11/20/2024	9:43 AM	38.9	56.8	32.1	40.6	33.8
11/20/2024	9:53 AM	40.8	56.7	31.6	40.7	32.9
11/20/2024	10:03 AM	37.6	52.2	32.9	39.3	34.4
11/20/2024	10:13 AM	36.9	49.6	32.9	38.1	34.8
11/20/2024	10:23 AM	36.6	48.6	33.3	37.8	34.8
11/20/2024	10:33 AM	40.2	58.1	34.4	40.9	36.1

Date	Time	LAeq	LAmaz	LAmín	LA10	LA90
11/20/2024	10:43 AM	38.9	53.4	33.2	41.1	35.3
11/20/2024	10:53 AM	41.2	59.8	33.3	41.6	35.4
11/20/2024	11:03 AM	47.8	63.6	33.4	52	35.4
11/20/2024	11:13 AM	36.7	47.6	33.5	37.8	35.2
11/20/2024	11:23 AM	39.4	54.9	33.6	40.5	35.3
11/20/2024	11:33 AM	40.7	63.9	31.3	39.1	32.8
11/20/2024	11:43 AM	38.7	56.9	31.9	40.4	33.3
11/20/2024	11:53 AM	39.4	52.4	34.3	41	36.8
11/20/2024	12:03 PM	45.4	58.1	37.9	49.1	39.1
11/20/2024	12:13 PM	47.2	60.5	33.6	50.8	35.8
11/20/2024	12:23 PM	44.2	52.9	32.7	46.9	37.6
11/20/2024	12:33 PM	43.9	54.3	36	46.8	38.6
11/20/2024	12:43 PM	43.7	56.1	34.5	47.6	36.9
11/20/2024	12:53 PM	43.5	52.6	36	46.5	38.4
11/20/2024	1:03 PM	37.4	52.9	33.3	39.3	34.8
11/20/2024	1:13 PM	39.2	57.3	32	40.3	34
11/20/2024	1:23 PM	40.6	59.9	33.7	42	35.8
11/20/2024	1:33 PM	58.2	81.7	32	44	34.7
11/20/2024	1:43 PM	41.5	67.2	32.9	42	36.2
11/20/2024	1:53 PM	41.6	62.5	33.4	42.8	37.1
11/20/2024	2:03 PM	40.4	60.2	35	42.2	37.9
11/20/2024	2:13 PM	40.5	53.6	35.7	42.2	37.9
11/20/2024	2:23 PM	39.3	54.3	32.8	41.2	36.4
11/20/2024	2:33 PM	39.1	47.1	31.1	41.3	36
11/20/2024	2:43 PM	39.5	52.2	31.9	42.3	34.8
11/20/2024	2:53 PM	39.6	47.3	32.4	41.7	34.9
11/20/2024	3:03 PM	41.4	53.8	32.1	43.8	37.7
11/20/2024	3:13 PM	40.8	54.5	31.7	44.8	34.6
11/20/2024	3:23 PM	41.9	62	34.1	43.3	37.3
11/20/2024	3:33 PM	42.8	49.1	34.8	45	39.1
11/20/2024	3:43 PM	40.2	48.2	34.4	42.6	36.1
11/20/2024	3:53 PM	43.4	63.7	37.1	45.5	40.1
11/20/2024	4:03 PM	42.3	51.8	36.2	44.3	39.9
11/20/2024	4:13 PM	43.2	73.3	37.3	43.8	39.7
11/20/2024	4:23 PM	43.3	53.9	38.2	45.4	41.1
11/20/2024	4:33 PM	45.4	61.7	40.1	46	42.3
11/20/2024	4:43 PM	46.1	58.4	39.5	48.5	42
11/20/2024	4:53 PM	45	54.7	40.7	46.8	42.5
11/20/2024	5:03 PM	45.4	61.2	40.4	46.8	42.4
11/20/2024	5:13 PM	46.2	62.8	39.9	47	42.1
11/20/2024	5:23 PM	43.5	54.6	39.1	45	41.3
11/20/2024	5:33 PM	43.3	56.7	38.5	45.5	40.4
11/20/2024	5:43 PM	43.5	52.5	38.5	45.6	40.9
11/20/2024	5:53 PM	41.7	50.6	37.9	43.3	39.8
11/20/2024	6:03 PM	42.4	54.3	37.3	44.8	39.4

Date	Time	LAeq	LAmay	LAmay	LA10	LA90
11/20/2024	6:13 PM	44	63.2	37.2	44.4	39.5
11/20/2024	6:23 PM	44	60.6	36.8	45.9	39.1
11/20/2024	6:33 PM	42.8	59.3	37.4	44.7	39.1
11/20/2024	6:43 PM	42.7	54.4	38.6	44.3	40.6
11/20/2024	6:53 PM	42.1	50.2	38.3	44	39.9
11/20/2024	7:03 PM	42.4	55.1	37.9	44.4	39.7
11/20/2024	7:13 PM	41.4	49.2	36.6	43.1	39.1
11/20/2024	7:23 PM	41.8	53	37.6	43.5	39.8
11/20/2024	7:33 PM	41.4	49.4	36.9	42.9	39.2
11/20/2024	7:43 PM	42.9	54.2	37.1	45	40.1
11/20/2024	7:53 PM	42.8	50.3	37.6	44.8	40
11/20/2024	8:03 PM	44.4	57.6	38.3	46.7	40.3
11/20/2024	8:13 PM	41.1	52	36.1	43.1	38.3
11/20/2024	8:23 PM	43.5	55.8	36.9	45.9	39.3
11/20/2024	8:33 PM	44	57	36.9	46.4	39.2

NA-1 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
11/19/2024	8:34 PM	0.8	1.4	315
11/19/2024	8:44 PM	0.5	0.9	262
11/19/2024	8:54 PM	0.7	1.2	324
11/19/2024	9:04 PM	0.2	0.8	193
11/19/2024	9:14 PM	0.5	0.7	342
11/19/2024	9:24 PM	0.7	1.3	329
11/19/2024	9:34 PM	0.8	1.1	331
11/19/2024	9:44 PM	1	1.4	335
11/19/2024	9:54 PM	0.9	1.2	341
11/19/2024	10:04 PM	0.8	1.2	330
11/19/2024	10:14 PM	0.4	0.9	1
11/19/2024	10:24 PM	0.6	1.1	341
11/19/2024	10:34 PM	0.9	1.3	338
11/19/2024	10:44 PM	1	1.4	329
11/19/2024	10:54 PM	1.1	1.4	320
11/19/2024	11:04 PM	1.1	1.7	320
11/19/2024	11:14 PM	1	1.7	318
11/19/2024	11:24 PM	0.6	1.1	187
11/19/2024	11:34 PM	0.4	1.1	181
11/19/2024	11:44 PM	0.5	1.1	247
11/19/2024	11:54 PM	0.3	0.8	321
11/20/2024	12:04 AM	0.3	0.8	347
11/20/2024	12:14 AM	0.6	0.9	341
11/20/2024	12:24 AM	0.7	1	330
11/20/2024	12:34 AM	0.8	1.1	340
11/20/2024	12:44 AM	0.8	0.9	351

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	12:54 AM	0.6	1	350
11/20/2024	1:04 AM	0.7	0.9	337
11/20/2024	1:14 AM	0.8	1.1	345
11/20/2024	1:24 AM	0.9	1.4	345
11/20/2024	1:34 AM	0.7	1	346
11/20/2024	1:44 AM	0.8	0.9	351
11/20/2024	1:54 AM	0.8	1.3	356
11/20/2024	2:04 AM	0.8	1.1	340
11/20/2024	2:14 AM	0.9	1.3	324
11/20/2024	2:24 AM	0.9	1.2	349
11/20/2024	2:34 AM	0.8	1.1	334
11/20/2024	2:44 AM	0.8	1.1	346
11/20/2024	2:54 AM	0.8	1.1	344
11/20/2024	3:04 AM	0.9	1.3	343
11/20/2024	3:14 AM	0.9	1.3	328
11/20/2024	3:24 AM	0.8	1.1	342
11/20/2024	3:34 AM	0.8	1.2	341
11/20/2024	3:44 AM	0.8	1.3	338
11/20/2024	3:54 AM	1	1.3	342
11/20/2024	4:04 AM	0.9	1.4	341
11/20/2024	4:14 AM	1.1	1.5	326
11/20/2024	4:24 AM	0.9	1.4	339
11/20/2024	4:34 AM	0.8	1.6	311
11/20/2024	4:44 AM	0.6	1.1	320
11/20/2024	4:54 AM	0.7	1.1	334
11/20/2024	5:04 AM	0.9	1.3	342
11/20/2024	5:14 AM	0.9	1.3	327
11/20/2024	5:24 AM	0.7	1.1	331
11/20/2024	5:34 AM	0.6	0.9	337
11/20/2024	5:44 AM	0.6	1	21
11/20/2024	5:54 AM	0.6	1	358
11/20/2024	6:04 AM	0.6	0.9	10
11/20/2024	6:14 AM	0.6	1	326
11/20/2024	6:24 AM	0.6	1.2	319
11/20/2024	6:34 AM	0.5	0.8	349
11/20/2024	6:44 AM	0.3	0.7	351
11/20/2024	6:54 AM	0.9	1.3	336
11/20/2024	7:04 AM	0.5	0.9	23
11/20/2024	7:14 AM	0.7	0.9	358
11/20/2024	7:24 AM	0.8	1.1	344
11/20/2024	7:34 AM	0.9	1.3	335
11/20/2024	7:44 AM	1	1.5	333
11/20/2024	7:54 AM	1.1	1.5	315
11/20/2024	8:04 AM	1	1.6	322
11/20/2024	8:14 AM	0.8	1.3	332

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	8:24 AM	0.6	0.9	349
11/20/2024	8:34 AM	0.6	1.5	157
11/20/2024	8:44 AM	0.4	0.8	203
11/20/2024	8:54 AM	0.3	0.9	298
11/20/2024	9:04 AM	0.3	0.8	186
11/20/2024	9:14 AM	0.7	1	308
11/20/2024	9:24 AM	1.1	1.7	336
11/20/2024	9:34 AM	0.8	1.3	9
11/20/2024	9:44 AM	0.7	1.3	29
11/20/2024	9:54 AM	0.7	1.1	28
11/20/2024	10:04 AM	0.8	1.6	110
11/20/2024	10:14 AM	0.8	1.3	110
11/20/2024	10:24 AM	0.7	1.2	143
11/20/2024	10:34 AM	1	1.8	154
11/20/2024	10:44 AM	0.7	1.3	148
11/20/2024	10:54 AM	0.6	1	126
11/20/2024	11:04 AM	0.7	1.1	100
11/20/2024	11:14 AM	0.7	1.1	93
11/20/2024	11:24 AM	0.6	1.4	157
11/20/2024	11:34 AM	0.7	1.1	133
11/20/2024	11:44 AM	0.5	1	286
11/20/2024	11:54 AM	0.8	1.7	119
11/20/2024	12:04 PM	0.8	1.4	140
11/20/2024	12:14 PM	0.7	1.4	166
11/20/2024	12:24 PM	0.7	1.3	180
11/20/2024	12:34 PM	0.6	1.3	175
11/20/2024	12:44 PM	0.9	1.6	183
11/20/2024	12:54 PM	0.9	1.6	191
11/20/2024	1:04 PM	0.9	1.6	192
11/20/2024	1:14 PM	0.5	1	293
11/20/2024	1:24 PM	0.7	1.2	220
11/20/2024	1:34 PM	0.6	1	10
11/20/2024	1:44 PM	0.4	0.9	43
11/20/2024	1:54 PM	0.8	1.4	110
11/20/2024	2:04 PM	0.9	1.6	137
11/20/2024	2:14 PM	0.9	1.4	149
11/20/2024	2:24 PM	0.6	1.5	145
11/20/2024	2:34 PM	0.7	1.3	71
11/20/2024	2:44 PM	0.8	1.7	32
11/20/2024	2:54 PM	0.9	1.8	107
11/20/2024	3:04 PM	0.7	1.5	65
11/20/2024	3:14 PM	0.9	1.7	57
11/20/2024	3:24 PM	1	2	111
11/20/2024	3:34 PM	0.8	1.8	89
11/20/2024	3:44 PM	0.8	1.4	99

Date	Time	Wind speed	Wind speed max	Wind direction
11/20/2024	3:54 PM	0.5	1.3	137
11/20/2024	4:04 PM	0.1	0.7	287
11/20/2024	4:14 PM	0.2	0.7	303
11/20/2024	4:24 PM	0.3	0.7	350
11/20/2024	4:34 PM	0.4	1	304
11/20/2024	4:44 PM	0.5	1.1	250
11/20/2024	4:54 PM	0.7	1.4	254
11/20/2024	5:04 PM	0.4	1.3	267
11/20/2024	5:14 PM	0.8	1.6	253
11/20/2024	5:24 PM	0.8	2.2	236
11/20/2024	5:34 PM	1.1	2.3	244
11/20/2024	5:44 PM	1.2	2.4	244
11/20/2024	5:54 PM	1.4	3.2	229
11/20/2024	6:04 PM	1.4	3	244
11/20/2024	6:14 PM	1.8	4.5	241
11/20/2024	6:24 PM	1.6	3.9	238
11/20/2024	6:34 PM	1.7	4	244
11/20/2024	6:44 PM	2	5.2	241
11/20/2024	6:54 PM	2	4.7	233
11/20/2024	7:04 PM	1.9	4.9	242
11/20/2024	7:14 PM	1.9	4.1	229
11/20/2024	7:24 PM	2.2	4.5	232
11/20/2024	7:34 PM	2.1	5.1	237
11/20/2024	7:44 PM	1.9	4.4	248
11/20/2024	7:54 PM	1.8	3.7	241
11/20/2024	8:04 PM	1.8	4.1	227
11/20/2024	8:14 PM	1.8	4.3	260
11/20/2024	8:24 PM	1.7	4.2	267
11/20/2024	8:34 PM	1.8	4.1	253

NA-1 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/16/2024	9:15 AM	2661.7	47.92	0	18.73	22.41
11/16/2024	9:30 AM	2968.4	51.59	0	27.72	33.81
11/16/2024	9:45 AM	2917.86	46.03	0	29.47	33.49
11/16/2024	10:00 AM	2651.1	39	0	20.76	24.9
11/16/2024	10:15 AM	2517.43	38.91	0	14.55	18.19
11/16/2024	10:30 AM	2375.22	33.42	0	8.48	10.96
11/16/2024	10:45 AM	2328.93	32.07	0	8.46	11.38
11/16/2024	11:00 AM	2220.99	26.64	0	4.83	6.72
11/16/2024	11:15 AM	2193.45	24.16	0	5.4	7.2
11/16/2024	11:30 AM	2191.23	22.1	0	6.8	9.66
11/16/2024	11:45 AM	2280.88	22.08	0	11.87	16.78
11/16/2024	12:00 PM	2254	22.94	0	6.53	8.73
11/16/2024	12:15 PM	2254.95	22.23	0	7.59	9.55
11/16/2024	12:30 PM	2200.84	25.63	0	6.24	8.63

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/16/2024	12:45 PM	2169.67	26.93	0	6.38	8.53
11/16/2024	1:00 PM	2151.59	26.63	0	6.03	8.21
11/16/2024	1:15 PM	2158.1	26.89	0	12.36	14.9
11/16/2024	1:30 PM	2183.27	22.58	0	18.16	21.84
11/16/2024	1:45 PM	2092.67	26.32	0	11.36	15.76
11/16/2024	2:00 PM	2182.27	28.94	0	28.67	38.57
11/16/2024	2:15 PM	2122.37	23.03	0	24.82	30.54
11/16/2024	2:30 PM	2085.36	20.95	0	23.4	26.09
11/16/2024	2:45 PM	2027.39	25.98	0	10.13	14.84
11/16/2024	3:00 PM	2024.53	28.12	0	10.89	14.49
11/16/2024	3:15 PM	2021.51	23.15	0	16.15	19.03
11/16/2024	3:30 PM	2186.17	19.88	0	39.22	45.77
11/16/2024	3:45 PM	2383.06	19.9	0	70.93	79.27
11/16/2024	4:00 PM	2413.97	26.19	0	53.98	63.16
11/16/2024	4:15 PM	2627.76	27.79	0	55.49	65.65
11/16/2024	4:30 PM	2909.25	32.13	0	73.22	83.59
11/16/2024	4:45 PM	3633.7	28.97	0	123.39	132.26
11/16/2024	5:00 PM	4179.15	35.87	0	144.42	177.85
11/16/2024	5:15 PM	4674.14	39.94	0	158.41	186.32
11/16/2024	5:30 PM	4297.69	32.53	0	143.11	167.21
11/16/2024	5:45 PM	2708.33	17.02	0	58.78	62.98
11/16/2024	6:00 PM	2464.61	19.48	0	39.2	42.61
11/16/2024	6:15 PM	2434.76	18.7	0	37.43	38.72
11/16/2024	6:30 PM	2147.99	20.07	0	32.15	34.9
11/16/2024	6:45 PM	2110.63	20.82	0	28.7	33.47
11/16/2024	7:00 PM	2258.35	24.31	0	31.2	33.98
11/16/2024	7:15 PM	3136.9	32.28	0	82.95	93.93
11/16/2024	7:30 PM	3937.41	42.08	0	132.26	155.94
11/16/2024	7:45 PM	3428.9	39.5	0	85.69	99.01
11/16/2024	8:00 PM	2960.44	31.42	0	59.91	63.5
11/16/2024	8:15 PM	2812.32	27.91	0	73.38	84.28
11/16/2024	8:30 PM	3569.18	28.88	0	159.46	182.75
11/16/2024	8:45 PM	3437.24	26.55	0	152.94	178.21
11/16/2024	9:00 PM	2278.5	29.39	0	30.71	41.94
11/16/2024	9:15 PM	2237.82	29.34	0	27.42	39.01
11/16/2024	9:30 PM	2117.31	29.43	0	12.88	16.01
11/16/2024	9:45 PM	1824.6	30.52	0	7.69	8.96
11/16/2024	10:00 PM	1881.98	31.15	0	16.58	17.84
11/16/2024	10:15 PM	2139.88	30.14	0	48.09	62.36
11/16/2024	10:30 PM	1745.87	29.43	0	9.4	11.79
11/16/2024	10:45 PM	2009.23	29.47	0	42.45	69.8
11/16/2024	11:00 PM	1688.25	29.13	0	6.21	8.26
11/16/2024	11:15 PM	1657.16	30.04	0	7.68	8.95
11/16/2024	11:30 PM	1703.25	29.22	0	8.55	10.21
11/16/2024	11:45 PM	1735.39	29.82	0	13.24	15.23
11/17/2024	12:00 AM	2019.71	31.17	0	23.6	32.14
11/17/2024	12:15 AM	1877.03	36.06	0	12	14.99
11/17/2024	12:30 AM	1687.48	33.65	0	10.03	13.07
11/17/2024	12:45 AM	1586.48	28.15	0	4.44	6.5

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
11/17/2024	1:00 AM	1514.85	27.1	0	3.84	5.51
11/17/2024	1:15 AM	1696.92	29.59	0	6.58	8.87
11/17/2024	1:30 AM	2085.82	28.97	0	13.02	15.62
11/17/2024	1:45 AM	3483.98	29.32	0	71.89	80.38
11/17/2024	2:00 AM	4569	31.3	0	114.56	130.1
11/17/2024	2:15 AM	3337.24	30.33	0	56.25	64.9
11/17/2024	2:30 AM	2170.57	31.3	0	16.85	26.76
11/17/2024	2:45 AM	1864.54	27.5	0	6.53	9.24
11/17/2024	3:00 AM	1587.83	23.26	0	3.1	4.86
11/17/2024	3:15 AM	1574.57	25	0	3.27	5.01
11/17/2024	3:30 AM	1570.32	23.36	0	3.42	5.05
11/17/2024	3:45 AM	1545.06	26.03	0	3.14	4.83
11/17/2024	4:00 AM	1606.26	25.52	0	3.18	4.93
11/17/2024	4:15 AM	1538.42	27.6	0	3.33	4.97
11/17/2024	4:30 AM	1502.67	27.16	0	3.64	5.3
11/17/2024	4:45 AM	1505.26	28.9	0	3.8	5.47
11/17/2024	5:00 AM	1502.14	26.26	0	5.71	8.23
11/17/2024	5:15 AM	1600.99	27.89	0	9.23	12.45
11/17/2024	5:30 AM	1619.46	30.2	0	10.8	13.37
11/17/2024	5:45 AM	1703.81	28.4	0	19.18	21
11/17/2024	6:00 AM	1645.29	24.68	0	18.32	19.01
11/17/2024	6:15 AM	1585.09	27.27	0	4.82	7.45
11/17/2024	6:30 AM	1594.86	29.55	0	6.67	8.07
11/17/2024	6:45 AM	1584.61	32.62	0	13.32	15.3
11/17/2024	7:00 AM	1596.94	31.73	0	47.57	57.12
11/17/2024	7:15 AM	1524.04	34.65	0	14.26	16.62
11/17/2024	7:30 AM	1548.49	37.59	0	10.31	12.32
11/17/2024	7:45 AM	1528.08	35.39	0	8.85	10.95
11/17/2024	8:00 AM	1538	37.23	0	7.65	9.36
11/17/2024	8:15 AM	1547.8	38.07	0	7.34	9.92
11/17/2024	8:30 AM	1521.63	37	0	5.82	7.51
11/17/2024	8:45 AM	1490.9	38.58	0	5.99	7.93
11/17/2024	9:00 AM	1424.19	38.89	0	6.2	7.92
11/17/2024	9:15 AM	1343.24	44.45	0	6.12	8.38

NA-2 Noise load

Date	Time	LAeq	LAm _{ax}	LAm _{in}	LA10	LA90
11/17/2024	1:01 PM	53	82.2	32.7	54.3	37.4
11/17/2024	1:11 PM	43	63	34.3	45.5	37.2
11/17/2024	1:21 PM	43.1	55.9	36.9	44.7	39.6
11/17/2024	1:31 PM	42.9	61	35.7	44.4	38.7
11/17/2024	1:41 PM	44.5	57.4	36	47.2	40.1
11/17/2024	1:51 PM	43.8	58.3	34	45.8	39.2
11/17/2024	2:01 PM	45.5	57.5	35.6	48.4	39.9
11/17/2024	2:11 PM	45.1	58.7	34.9	47	40.4
11/17/2024	2:21 PM	46.5	60.5	37.5	48.6	41.8
11/17/2024	2:31 PM	45.4	60.9	37.7	47.8	40.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/17/2024	2:41 PM	47.5	63.1	38	49.9	41.3
11/17/2024	2:51 PM	47.4	61.4	38.6	49.3	42.8
11/17/2024	3:01 PM	48.1	67.5	40.1	50.1	42.8
11/17/2024	3:11 PM	45.8	61.5	36	48.1	40.9
11/17/2024	3:21 PM	49.5	69.8	38.5	52	42.8
11/17/2024	3:31 PM	51.5	74.5	36.3	54.2	40.3
11/17/2024	3:41 PM	48.1	63.4	38.5	49.4	40.6
11/17/2024	3:51 PM	45.4	61.7	34.2	47.4	38.2
11/17/2024	4:01 PM	45.1	59.3	35.8	47.4	38.4
11/17/2024	4:11 PM	46.1	63	36.3	47.2	38.8
11/17/2024	4:21 PM	46.4	62.1	35.2	47.4	40.3
11/17/2024	4:31 PM	44.7	58.5	38.1	46.2	41
11/17/2024	4:41 PM	50.5	66.2	37.1	55.9	40.2
11/17/2024	4:51 PM	46.4	62.5	34.8	48	38.8
11/17/2024	5:01 PM	44.1	60.9	36.3	45	38.7
11/17/2024	5:11 PM	42.1	59.9	33.5	43	37.3
11/17/2024	5:21 PM	40	52.1	32.2	41.6	37
11/17/2024	5:31 PM	38.1	54.2	32	39.1	34.7
11/17/2024	5:41 PM	41	57.6	33.2	42.9	35.6
11/17/2024	5:51 PM	39.1	58.7	33	40	35.1
11/17/2024	6:01 PM	57.1	83.9	33.3	49.2	36.4
11/17/2024	6:11 PM	47.4	77.2	32.4	47.9	37.7
11/17/2024	6:21 PM	46.3	55.5	33.4	49.2	40.3
11/17/2024	6:31 PM	51.8	64.2	36.5	53.4	41.5
11/17/2024	6:41 PM	48.2	62.1	37	51.3	41.1
11/17/2024	6:51 PM	47	56.5	37.6	50.2	42.2
11/17/2024	7:01 PM	46.3	57.5	29.3	49.6	35.8
11/17/2024	7:11 PM	46.8	59.3	34.5	49.6	39.8
11/17/2024	7:21 PM	46.3	67	32.6	49	38.2
11/17/2024	7:31 PM	45.1	58.6	34.7	48.3	38.8
11/17/2024	7:41 PM	44.6	55.2	32.3	48	36.6
11/17/2024	7:51 PM	43.6	53.1	32.2	46.7	36.4
11/17/2024	8:01 PM	45.6	57	32	49.4	38.2
11/17/2024	8:11 PM	54.6	71.6	35.3	57.7	39.8
11/17/2024	8:21 PM	48.7	76.8	35.7	49.1	41.1
11/17/2024	8:31 PM	45.2	58.9	33	48	38.3
11/17/2024	8:41 PM	44.9	55	28	48.3	36
11/17/2024	8:51 PM	45.9	56.3	31.7	49.2	38.7
11/17/2024	9:01 PM	47.9	67.4	35.4	49.6	40.1
11/17/2024	9:11 PM	44.3	54.1	32.4	47.9	36.8
11/17/2024	9:21 PM	48.4	59.8	39.5	51.1	43.2
11/17/2024	9:31 PM	44.2	53.9	32.2	47.1	38.5
11/17/2024	9:41 PM	44	53.3	33.9	46.8	38.2
11/17/2024	9:51 PM	45.2	54.4	31.8	49.1	37.4
11/17/2024	10:01 PM	46.3	54.4	33.2	50.3	37.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/17/2024	10:11 PM	48	65.4	35	48.6	40.7
11/17/2024	10:21 PM	43.8	52.2	34.2	46.4	38.8
11/17/2024	10:31 PM	50.6	80.8	32.7	51.2	38.2
11/17/2024	10:41 PM	46.2	58.2	32.9	49.3	40.4
11/17/2024	10:51 PM	46.6	58.8	34.6	50.4	37.9
11/17/2024	11:01 PM	51.2	66.1	30	51.4	36.1
11/17/2024	11:11 PM	44.9	56.6	31.5	48.1	37.6
11/17/2024	11:21 PM	47.4	55.5	37.2	50.9	40
11/17/2024	11:31 PM	45.8	55.1	35.4	49.1	39.2
11/17/2024	11:41 PM	47.5	57.6	31.8	52	37.6
11/17/2024	11:51 PM	44.7	55.2	34.9	48	39.4
11/18/2024	12:01 AM	44.7	55.5	34.8	48.5	37.7
11/18/2024	12:11 AM	45.9	56.3	35.1	48.5	39.7
11/18/2024	12:21 AM	53.5	79.1	35.2	53.3	38.2
11/18/2024	12:31 AM	47.2	61.9	35	50.9	38
11/18/2024	12:41 AM	47	59.9	35.3	49.9	39.7
11/18/2024	12:51 AM	45.6	55.2	32.5	49	38.3
11/18/2024	1:01 AM	45	54.3	32.8	48.4	37.8
11/18/2024	1:11 AM	44.7	63	33	46.3	34.7
11/18/2024	1:21 AM	49.4	64.1	34.7	53.3	37.8
11/18/2024	1:31 AM	44.1	55.5	34.5	47.4	37.2
11/18/2024	1:41 AM	43	55.7	32	46.7	34.3
11/18/2024	1:51 AM	44.9	57.2	31.7	49.2	34.3
11/18/2024	2:01 AM	47.1	61.6	34.2	50.2	38.7
11/18/2024	2:11 AM	47.7	58.6	34.8	51.6	39.6
11/18/2024	2:21 AM	43.7	61.5	31.8	45.3	33.8
11/18/2024	2:31 AM	47.5	59	30.6	51.5	35.5
11/18/2024	2:41 AM	45.8	57	30.9	50.3	32.4
11/18/2024	2:51 AM	45.8	59.2	31.4	49.9	34.4
11/18/2024	3:01 AM	47.7	62.4	30.3	51.5	31.9
11/18/2024	3:11 AM	44.5	57.1	32.2	48	34.6
11/18/2024	3:21 AM	40.8	52.5	29.8	43.8	33.7
11/18/2024	3:31 AM	37.4	48	29.1	40.8	31.4
11/18/2024	3:41 AM	45	59.1	30.5	49.7	31.7
11/18/2024	3:51 AM	44.5	65.8	28.4	46.2	31.6
11/18/2024	4:01 AM	40.9	55.2	27.5	45.5	29
11/18/2024	4:11 AM	45.1	59	28.9	49.6	32.6
11/18/2024	4:21 AM	46.5	62.3	29.7	48.3	32.2
11/18/2024	4:31 AM	42.7	54.1	31.6	46.5	34
11/18/2024	4:41 AM	40.2	53.1	29.5	43.1	32.2
11/18/2024	4:51 AM	44.1	53.1	33.2	47.3	36.5
11/18/2024	5:01 AM	47.3	62.9	32.9	50.8	34.5
11/18/2024	5:11 AM	44.9	58	34.9	47.8	38.2
11/18/2024	5:21 AM	40.7	53.1	29	42.9	33
11/18/2024	5:31 AM	46.6	60.3	32.7	49.5	35.7

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
11/18/2024	5:41 AM	45.1	56.1	33.7	48.7	38
11/18/2024	5:51 AM	43.9	59.3	31.8	47.1	35.4
11/18/2024	6:01 AM	48.6	62.7	32.6	52.2	37.5
11/18/2024	6:11 AM	45.6	61.9	31.2	48.6	35.8
11/18/2024	6:21 AM	47.7	60.2	29.6	51.9	36.1
11/18/2024	6:31 AM	44.7	55.9	33.2	47.8	37.7
11/18/2024	6:41 AM	46.9	59.2	35.5	50.2	40
11/18/2024	6:51 AM	54.1	67.5	36.2	58.9	42.7
11/18/2024	7:01 AM	47.6	62.8	36.4	51	40.4
11/18/2024	7:11 AM	48.2	65.2	35.1	50.5	39.9
11/18/2024	7:21 AM	46.4	58.4	35.3	49.3	39.1
11/18/2024	7:31 AM	48.8	64	32.1	52.4	39.5
11/18/2024	7:41 AM	46.2	60.5	35.5	49.7	39.2
11/18/2024	7:51 AM	46.4	64.4	33	48.9	36.9
11/18/2024	8:01 AM	44.1	58.1	31.3	46.8	36.4
11/18/2024	8:11 AM	47.9	80.2	27.6	47.4	33.5
11/18/2024	8:21 AM	44.5	62.1	29.1	46.5	34.4
11/18/2024	8:31 AM	44.5	70	27.5	44.2	32.6
11/18/2024	8:41 AM	38.9	57.5	29.1	43	31.7
11/18/2024	8:51 AM	39.8	60.5	27.7	42.8	32.4
11/18/2024	9:01 AM	45.5	73.1	32.8	46	35.2
11/18/2024	9:11 AM	38.7	52.9	25.2	41.4	31.5
11/18/2024	9:21 AM	39.7	56	26.4	43.6	31.6
11/18/2024	9:31 AM	38.4	56.7	26.7	41.3	32.1
11/18/2024	9:41 AM	37.6	57.4	24	39.9	29
11/18/2024	9:51 AM	35.7	51.3	25.5	38	29.7
11/18/2024	10:01 AM	41.6	63.4	28	41.2	32.8
11/18/2024	10:11 AM	38.1	51.5	24	40.7	30
11/18/2024	10:21 AM	36.1	54.1	23.4	38.5	27.5
11/18/2024	10:31 AM	36.9	54.3	26	39.6	29.8
11/18/2024	10:41 AM	36.9	57	24.6	39.1	28.9
11/18/2024	10:51 AM	33.9	57.7	24.6	34.1	27.9
11/18/2024	11:01 AM	37.2	53.5	28.1	39	30.8
11/18/2024	11:11 AM	42	57.7	31.9	43.6	36.2
11/18/2024	11:21 AM	41.3	60.9	28.5	42.5	31.6
11/18/2024	11:31 AM	40.8	61.5	27.2	41.8	32.8
11/18/2024	11:41 AM	42.4	56.2	31.4	45.6	34.6
11/18/2024	11:51 AM	39.2	52.2	30.6	42	34.1
11/18/2024	12:01 PM	42.1	64.5	32.2	44.9	36.2
11/18/2024	12:11 PM	42.8	56.2	32.6	46.2	36.1
11/18/2024	12:21 PM	51.5	81.8	35.9	46	38.9
11/18/2024	12:31 PM	45.6	61.4	36.8	47.9	40.4
11/18/2024	12:41 PM	47.1	60.8	35	50.1	41.6
11/18/2024	12:51 PM	44.4	58.5	37	46.4	39.8
11/18/2024	1:01 PM	46	63	36	48.7	41.1

NA-2 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
11/17/2024	12:58 PM	1,5	4,8	64
11/17/2024	1:08 PM	1,4	3,9	80
11/17/2024	1:18 PM	1,4	3,6	118
11/17/2024	1:28 PM	1,3	4,9	44
11/17/2024	1:38 PM	1,5	4,5	40
11/17/2024	1:48 PM	1,4	4,9	96
11/17/2024	1:58 PM	1,6	3,9	127
11/17/2024	2:08 PM	1,6	3,6	101
11/17/2024	2:18 PM	1,5	4,4	77
11/17/2024	2:28 PM	1,8	4,3	115
11/17/2024	2:38 PM	1,5	3,9	122
11/17/2024	2:48 PM	1,5	4,1	113
11/17/2024	2:58 PM	1,6	3,8	100
11/17/2024	3:08 PM	1,7	5,1	118
11/17/2024	3:18 PM	1,4	4,4	92
11/17/2024	3:28 PM	1,5	4,5	62
11/17/2024	3:38 PM	1,4	3,8	44
11/17/2024	3:48 PM	1,4	4,7	180
11/17/2024	3:58 PM	1,3	3,7	176
11/17/2024	4:08 PM	1,3	2,5	173
11/17/2024	4:18 PM	1,4	3,9	168
11/17/2024	4:28 PM	1,1	2,4	193
11/17/2024	4:38 PM	0,9	2,2	212
11/17/2024	4:48 PM	1,1	3,1	166
11/17/2024	4:58 PM	0,9	1,8	185
11/17/2024	5:08 PM	0,9	2,0	181
11/17/2024	5:18 PM	1,1	2,0	170
11/17/2024	5:28 PM	1,1	2,0	183
11/17/2024	5:38 PM	1,0	1,7	177
11/17/2024	5:48 PM	0,8	1,4	177
11/17/2024	5:58 PM	0,8	1,5	174
11/17/2024	6:08 PM	0,5	1,3	181
11/17/2024	6:18 PM	0,5	0,9	187
11/17/2024	6:28 PM	0,4	1,1	177
11/17/2024	6:38 PM	0,5	1,1	148
11/17/2024	6:48 PM	0,6	1,1	179
11/17/2024	6:58 PM	0,7	1,2	150
11/17/2024	7:08 PM	0,6	1,2	128
11/17/2024	7:18 PM	0,8	1,5	141
11/17/2024	7:28 PM	0,8	1,6	107
11/17/2024	7:38 PM	1,0	1,9	114
11/17/2024	7:48 PM	0,9	1,8	162
11/17/2024	7:58 PM	1,0	2,2	122

Date	Time	Wind speed	Wind speed max	Wind direction
11/17/2024	8:08 PM	0,9	1,8	155
11/17/2024	8:18 PM	0,8	1,8	148
11/17/2024	8:28 PM	0,8	1,7	144
11/17/2024	8:38 PM	0,9	1,8	125
11/17/2024	8:48 PM	0,9	1,8	113
11/17/2024	8:58 PM	0,7	1,7	186
11/17/2024	9:08 PM	0,6	1,0	136
11/17/2024	9:18 PM	0,5	1,4	162
11/17/2024	9:28 PM	0,7	1,3	111
11/17/2024	9:38 PM	0,6	1,3	141
11/17/2024	9:48 PM	0,6	1,6	131
11/17/2024	9:58 PM	0,7	1,3	114
11/17/2024	10:08 PM	0,5	1,2	163
11/17/2024	10:18 PM	0,4	1,0	152
11/17/2024	10:28 PM	0,2	1,2	73
11/17/2024	10:38 PM	0,5	1,1	149
11/17/2024	10:48 PM	0,4	1,2	177
11/17/2024	10:58 PM	0,8	1,6	170
11/17/2024	11:08 PM	0,6	1,2	166
11/17/2024	11:18 PM	0,6	1,1	160
11/17/2024	11:28 PM	0,8	1,2	183
11/17/2024	11:38 PM	0,4	1,0	36
11/17/2024	11:48 PM	0,5	1,3	184
11/17/2024	11:58 PM	0,6	1,3	211
11/18/2024	12:08 AM	0,5	0,9	151
11/18/2024	12:18 AM	0,6	1,3	157
11/18/2024	12:28 AM	0,8	1,7	180
11/18/2024	12:38 AM	0,9	1,6	157
11/18/2024	12:48 AM	0,3	1,1	163
11/18/2024	12:58 AM	0,6	1,3	196
11/18/2024	1:08 AM	0,5	1,3	219
11/18/2024	1:18 AM	0,5	1,4	147
11/18/2024	1:28 AM	0,8	1,3	240
11/18/2024	1:38 AM	0,9	1,6	163
11/18/2024	1:48 AM	0,6	1,5	161
11/18/2024	1:58 AM	0,8	1,9	169
11/18/2024	2:08 AM	0,9	1,3	148
11/18/2024	2:18 AM	0,6	1,0	157
11/18/2024	2:28 AM	0,8	1,6	142
11/18/2024	2:38 AM	0,6	1,2	142
11/18/2024	2:48 AM	0,6	1,2	157
11/18/2024	2:58 AM	0,7	1,2	142
11/18/2024	3:08 AM	0,7	1,4	141
11/18/2024	3:18 AM	0,8	1,4	283

Date	Time	Wind speed	Wind speed max	Wind direction
11/18/2024	3:28 AM	0,8	1,3	180
11/18/2024	3:38 AM	0,8	1,4	151
11/18/2024	3:48 AM	0,6	1,1	167
11/18/2024	3:58 AM	0,3	1,4	167
11/18/2024	4:08 AM	0,6	1,2	153
11/18/2024	4:18 AM	0,7	1,3	142
11/18/2024	4:28 AM	0,8	1,4	152
11/18/2024	4:38 AM	0,6	1,1	176
11/18/2024	4:48 AM	0,4	1,0	156
11/18/2024	4:58 AM	0,4	0,9	230
11/18/2024	5:08 AM	0,8	1,4	143
11/18/2024	5:18 AM	0,6	1,2	167
11/18/2024	5:28 AM	0,6	1,1	154
11/18/2024	5:38 AM	0,6	1,1	158
11/18/2024	5:48 AM	0,6	1,0	147
11/18/2024	5:58 AM	0,5	1,1	182
11/18/2024	6:08 AM	0,6	0,9	151
11/18/2024	6:18 AM	0,6	1,0	135
11/18/2024	6:28 AM	0,7	1,4	149
11/18/2024	6:38 AM	0,7	1,1	211
11/18/2024	6:48 AM	0,7	1,4	150
11/18/2024	6:58 AM	0,6	1,3	164
11/18/2024	7:08 AM	0,3	0,7	182
11/18/2024	7:18 AM	0,5	1,0	144
11/18/2024	7:28 AM	0,4	0,9	187
11/18/2024	7:38 AM	0,4	0,9	164
11/18/2024	7:48 AM	0,4	1,1	193
11/18/2024	7:58 AM	0,4	0,9	214
11/18/2024	8:08 AM	0,3	0,7	285
11/18/2024	8:18 AM	0,2	0,9	184
11/18/2024	8:28 AM	0,3	0,7	112
11/18/2024	8:38 AM	0,1	0,6	232
11/18/2024	8:48 AM	0,4	0,8	116
11/18/2024	8:58 AM	0,3	0,7	203
11/18/2024	9:08 AM	0,3	0,9	21
11/18/2024	9:18 AM	0,5	1,0	19
11/18/2024	9:28 AM	0,6	1,3	255
11/18/2024	9:38 AM	0,5	1,2	206
11/18/2024	9:48 AM	0,6	1,8	163
11/18/2024	9:58 AM	0,9	2,3	85
11/18/2024	10:08 AM	0,7	2,0	338
11/18/2024	10:18 AM	1,1	2,0	149
11/18/2024	10:28 AM	0,8	1,6	204
11/18/2024	10:38 AM	0,9	3,1	185

Date	Time	Wind speed	Wind speed max	Wind direction
11/18/2024	10:48 AM	1,1	2,4	166
11/18/2024	10:58 AM	1,0	2,2	168
11/18/2024	11:08 AM	1,1	3,0	196
11/18/2024	11:18 AM	1,5	4,3	50
11/18/2024	11:28 AM	1,4	4,2	147
11/18/2024	11:38 AM	1,5	3,2	101
11/18/2024	11:48 AM	1,1	4,0	182
11/18/2024	11:58 AM	1,4	3,6	180
11/18/2024	12:08 PM	1,3	3,8	184
11/18/2024	12:18 PM	1,5	3,8	139
11/18/2024	12:28 PM	1,5	4,1	99
11/18/2024	12:38 PM	1,6	3,9	137
11/18/2024	12:48 PM	1,6	3,4	126
11/18/2024	12:58 PM	1,8	4,5	114

NA-2 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/17/2024	1:15 PM	1602.94	28.19	0	8.33	12.72
11/17/2024	1:30 PM	1646.05	5.08	0	13.4	17.64
11/17/2024	1:45 PM	1493.14	5.73	0	7.32	9.11
11/17/2024	2:00 PM	1417.86	6.47	0	6.21	8.08
11/17/2024	2:15 PM	1328.44	6.76	0	5.43	7.22
11/17/2024	2:30 PM	1267.71	10.41	0	5.99	8.34
11/17/2024	2:45 PM	1222.15	6.38	0	4.52	6.79
11/17/2024	3:00 PM	1203.42	11.69	0	4.37	6.88
11/17/2024	3:15 PM	1184.81	12.22	0	5.11	7.26
11/17/2024	3:30 PM	1191.5	14.52	0	5.84	8.85
11/17/2024	3:45 PM	1139.92	9	0	6.87	10.18
11/17/2024	4:00 PM	1130.03	11.52	0	8.16	11.99
11/17/2024	4:15 PM	1103.42	10.33	0	6.47	9.42
11/17/2024	4:30 PM	1296.09	14.52	0	20.87	25.32
11/17/2024	4:45 PM	1519.02	13.83	0	44.78	57.48
11/17/2024	5:00 PM	1281.82	11.5	0	10.77	13.48
11/17/2024	5:15 PM	1519.39	18.03	0	20.03	21.59
11/17/2024	5:30 PM	1514.49	22.18	0	12.03	13.27
11/17/2024	5:45 PM	1291.63	19.69	0	8.46	13.3
11/17/2024	6:00 PM	1261.59	21.37	0	14.42	21.01
11/17/2024	6:15 PM	1437.13	16.94	0	21.04	24.9
11/17/2024	6:30 PM	1564.75	35.18	0	17.95	21.22
11/17/2024	6:45 PM	1464.14	38.31	0	14.16	17.26
11/17/2024	7:00 PM	1386.72	44.06	0	8.93	10.67
11/17/2024	7:15 PM	1568.67	41.81	0	9.25	11.81
11/17/2024	7:30 PM	1524.51	40.38	0	33.18	54
11/17/2024	7:45 PM	1424.63	41.45	0	10.55	13.22
11/17/2024	8:00 PM	1331.78	35.97	0	4.57	6.3
11/17/2024	8:15 PM	1556.98	50.14	0	10.87	12.17

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
11/17/2024	8:30 PM	1710.45	51.63	0	16.28	18.99
11/17/2024	8:45 PM	1635.51	51.93	0	21.15	25.49
11/17/2024	9:00 PM	1622.98	48.63	0	22.07	30.71
11/17/2024	9:15 PM	1761.29	45.52	0	34.69	53.4
11/17/2024	9:30 PM	1564.58	42.98	0	29.27	45.77
11/17/2024	9:45 PM	1728.07	41.6	0	38.93	55.06
11/17/2024	10:00 PM	1704.18	45.74	0	26.38	34.22
11/17/2024	10:15 PM	1469.99	40.87	0	17.68	21.33
11/17/2024	10:30 PM	1586.39	39.82	0	20.05	24.12
11/17/2024	10:45 PM	1549.99	41.6	0	17.42	21
11/17/2024	11:00 PM	1641.92	46.87	0	17.39	22.37
11/17/2024	11:15 PM	1700.06	46.01	0	32.69	41.29
11/17/2024	11:30 PM	1642.31	43.76	0	20.71	30.08
11/17/2024	11:45 PM	1685.68	37.99	0	25.07	34.88
11/18/2024	12:00 AM	1807.26	37.17	0	22.2	30.01
11/18/2024	12:15 AM	1814.62	38.85	0	19.92	25.43
11/18/2024	12:30 AM	1763.39	35.07	0	17.06	21.91
11/18/2024	12:45 AM	1953.48	33.65	0	19.51	22.98
11/18/2024	1:00 AM	2112.86	32.16	0	21.96	25.28
11/18/2024	1:15 AM	1916.65	31.17	0	16.55	19.87
11/18/2024	1:30 AM	1859.22	34.3	0	15.21	18.17
11/18/2024	1:45 AM	1815.47	36.58	0	14	16.63
11/18/2024	2:00 AM	1971.46	34.78	0	15.78	19.43
11/18/2024	2:15 AM	1991.66	34.61	0	14.83	17.26
11/18/2024	2:30 AM	1922.95	35.28	0	17.9	23.14
11/18/2024	2:45 AM	1869.12	40.89	0	19.4	24.44
11/18/2024	3:00 AM	1824.03	40.28	0	14.44	18.26
11/18/2024	3:15 AM	1664.16	36.88	0	11.92	14.3
11/18/2024	3:30 AM	1611.48	39.31	0	11.24	13.31
11/18/2024	3:45 AM	1664.47	37.72	0	12.55	16.26
11/18/2024	4:00 AM	1680.49	32.36	0	11.19	13.7
11/18/2024	4:15 AM	1689.4	33.94	0	14.25	17.11
11/18/2024	4:30 AM	1615.23	34.46	0	11.41	13.35
11/18/2024	4:45 AM	1582.38	28.34	0	11.98	14.23
11/18/2024	5:00 AM	1569.18	26.15	0	11.28	13.51
11/18/2024	5:15 AM	1515.83	26.74	0	11.19	13.85
11/18/2024	5:30 AM	1584.51	26.97	0	12.36	15.57
11/18/2024	5:45 AM	1591.59	26.55	0	13.05	15.4
11/18/2024	6:00 AM	1697.71	23.61	0	12.74	14.68
11/18/2024	6:15 AM	1806.14	26.43	0	19.32	20.37
11/18/2024	6:30 AM	2200.63	22.37	0	77.38	126.83
11/18/2024	6:45 AM	1993.96	22.5	0	36.02	38.47
11/18/2024	7:00 AM	1952.58	25.61	0	32.12	32.58
11/18/2024	7:15 AM	1875.53	24.7	0	26.19	27.47
11/18/2024	7:30 AM	2114.63	27.22	0	34.09	38
11/18/2024	7:45 AM	2063.55	27.94	0	31.85	32.21
11/18/2024	8:00 AM	2043.16	30.35	0	33.12	34.24
11/18/2024	8:15 AM	1679.25	44.24	0	12.12	14.2
11/18/2024	8:30 AM	1752.02	49.89	0	19.91	22.64

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/18/2024	8:45 AM	1696.64	53.9	0	17.25	19.3
11/18/2024	9:00 AM	1878.49	54.93	0	24.37	25.4
11/18/2024	9:15 AM	1494.69	54.68	0	13.54	15.17
11/18/2024	9:30 AM	1391.46	48.46	0	14.89	16.17
11/18/2024	9:45 AM	1195.17	50.1	0	7.22	9.47
11/18/2024	10:00 AM	1058.49	49.83	0	5.62	7.75
11/18/2024	10:15 AM	903.88	47.2	0	4.67	6.54
11/18/2024	10:30 AM	845.29	41.68	0	4.33	6.99
11/18/2024	10:45 AM	740.66	38.72	0	3.27	5.19
11/18/2024	11:00 AM	692.48	31.95	0	2.79	4.79
11/18/2024	11:15 AM	668.12	27.91	0	2.95	4.8
11/18/2024	11:30 AM	552.05	29.53	0	3.05	4.87
11/18/2024	11:45 AM	564.26	4.93	0	2.7	4.6
11/18/2024	12:00 PM	566.64	5.48	0	2.71	4.54
11/18/2024	12:15 PM	531.67	4.34	0	2.96	4.79
11/18/2024	12:30 PM	573.39	7.47	0	3.73	5.81
11/18/2024	12:45 PM	595.6	7.14	0	3.22	5.02
11/18/2024	1:00 PM	629.2	4.34	0	4.07	6.15
11/18/2024	1:15 PM	633.91	8.75	0	4.07	5.81

NA-3 Noise load

Date	Time	LAeq	LAmay	LAmay	LA10	LA90
11/18/2024	4:16 PM	46.6	78.2	31.4	46.5	33.4
11/18/2024	4:26 PM	41.8	52.8	33.4	45.4	35.5
11/18/2024	4:36 PM	42.5	53.4	32.7	45.5	36.3
11/18/2024	4:46 PM	37.9	61.4	31.2	39.8	33.3
11/18/2024	4:56 PM	37.6	55.7	31.4	39.7	33.8
11/18/2024	5:06 PM	39.1	56.5	31.7	40.3	33.8
11/18/2024	5:16 PM	35.4	49.7	28.6	38.5	30.6
11/18/2024	5:26 PM	39	57.4	29.1	39.9	33
11/18/2024	5:36 PM	37.8	49.7	31.1	40.7	33.3
11/18/2024	5:46 PM	35.4	47.8	29	38	31.8
11/18/2024	5:56 PM	39.8	53.2	31.5	42.3	33.8
11/18/2024	6:06 PM	35.2	43.1	30	37.5	31.8
11/18/2024	6:16 PM	61.2	75.5	30.2	64.2	32.9
11/18/2024	6:26 PM	39.1	50.3	32.4	41.5	35
11/18/2024	6:36 PM	37.2	48	30.9	39.7	33.5
11/18/2024	6:46 PM	41.1	55.3	31.9	44.6	34.9
11/18/2024	6:56 PM	42	51.9	34.5	45	37.8
11/18/2024	7:06 PM	41.1	53.1	33.1	44.2	36.9
11/18/2024	7:16 PM	39.8	52	33.4	42	35.7
11/18/2024	7:26 PM	43.9	55.8	34.8	47.8	37
11/18/2024	7:36 PM	40.5	51.1	33.7	43.6	36.2
11/18/2024	7:46 PM	40.3	53.1	33.4	43.1	36.2
11/18/2024	7:56 PM	38.7	50.8	33.4	40.9	35.1
11/18/2024	8:06 PM	39.6	50.3	33.5	41.7	36.3

Date	Time	LAeq	LAmaz	L Amin	LA10	LA90
11/18/2024	8:16 PM	40.8	52.5	34.5	43.2	36.7
11/18/2024	8:26 PM	40.7	51.1	34.1	43.9	36.3
11/18/2024	8:36 PM	42.1	53.1	36.1	45	37.9
11/18/2024	8:46 PM	40.9	48.9	34.4	43.8	36.7
11/18/2024	8:56 PM	40.1	51.6	33.8	42.7	35.9
11/18/2024	9:06 PM	41.3	52.6	36.2	43.5	38.2
11/18/2024	9:16 PM	43.6	58.7	35.7	46.1	37.6
11/18/2024	9:26 PM	42	50	35.4	45.2	37.5
11/18/2024	9:36 PM	42.4	50.9	36.6	44.9	39.1
11/18/2024	9:46 PM	41.3	48.5	36.3	43.4	38.6
11/18/2024	9:56 PM	42.4	62.7	36.1	44.5	39.1
11/18/2024	10:06 PM	46.3	79.1	34.7	43.9	37.6
11/18/2024	10:16 PM	38.4	46	34.7	40.4	36.3
11/18/2024	10:26 PM	37.4	47	33.4	39.1	35.1
11/18/2024	10:36 PM	40.6	51	33.1	43.8	35
11/18/2024	10:46 PM	39.5	50.8	33.2	42	35.1
11/18/2024	10:56 PM	38.2	45.5	32.3	40.7	34.2
11/18/2024	11:06 PM	36.8	50.5	31.2	38.6	33
11/18/2024	11:16 PM	35.7	47.6	31.5	37.8	32.8
11/18/2024	11:26 PM	39.5	54.8	32.2	41.5	34.4
11/18/2024	11:36 PM	39.3	55.2	33.1	41.4	34.4
11/18/2024	11:46 PM	40.1	52.6	32.8	42.9	35.5
11/18/2024	11:56 PM	39.4	52.5	33.8	41.9	35.6
11/19/2024	12:06 AM	57.3	73.8	34.4	50.4	36.1
11/19/2024	12:16 AM	37	49.2	32.5	38.5	34.4
11/19/2024	12:26 AM	38.8	51	31.8	40.7	34.2
11/19/2024	12:36 AM	37	48.6	32	38.8	34.4
11/19/2024	12:46 AM	37.5	49.5	32.3	39.2	34.3
11/19/2024	12:56 AM	37.7	53.3	31.6	40.3	33.3
11/19/2024	1:06 AM	37.4	52.1	32.6	39.1	34.3
11/19/2024	1:16 AM	38.8	52.7	31.9	42	33.6
11/19/2024	1:26 AM	35.1	49.2	31.3	36.7	32.9
11/19/2024	1:36 AM	34.9	47.1	31.2	36.4	32.9
11/19/2024	1:46 AM	36.5	46.5	31.6	38.9	33
11/19/2024	1:56 AM	35.9	48.1	30.9	38.7	32.2
11/19/2024	2:06 AM	36.5	48.6	30.9	38.9	32.4
11/19/2024	2:16 AM	34.4	45.6	31	36	32.2
11/19/2024	2:26 AM	33.1	43.6	30.1	34.7	31.4
11/19/2024	2:36 AM	35	46.2	30.6	37	32.3
11/19/2024	2:46 AM	34	46.4	29.2	35.7	31.8
11/19/2024	2:56 AM	36.3	49.4	30.9	38.1	33
11/19/2024	3:06 AM	39.9	52.9	32.4	43.5	34
11/19/2024	3:16 AM	35.2	46	31.4	37.3	32.7
11/19/2024	3:26 AM	35.8	46	30.6	38.1	32.7
11/19/2024	3:36 AM	35.5	46.7	31.2	38.2	32.8

Date	Time	LAeq	LAmaz	Lamin	LA10	LA90
11/19/2024	3:46 AM	36.8	51.4	31.8	38.2	33.2
11/19/2024	3:56 AM	35.4	51.1	30	37.8	31.5
11/19/2024	4:06 AM	46.7	63.4	31.4	50.9	33
11/19/2024	4:16 AM	62.1	75.3	32.7	66.6	35
11/19/2024	4:26 AM	37.6	50.9	32.1	40.7	33.7
11/19/2024	4:36 AM	38.7	57.2	32.5	39.7	34.6
11/19/2024	4:46 AM	40.3	53.1	31.3	44.5	33.9
11/19/2024	4:56 AM	36	49.6	31.1	37.4	33
11/19/2024	5:06 AM	40.6	57.2	31.7	43.3	33.6
11/19/2024	5:16 AM	35.4	45.6	31.1	37.3	32.5
11/19/2024	5:26 AM	38.2	50.6	31.8	39.9	34.4
11/19/2024	5:36 AM	37.8	54.9	30.6	41.2	32.6
11/19/2024	5:46 AM	34.6	46.1	31.4	36	32.9
11/19/2024	5:56 AM	37	52.5	30.7	39.6	32.9
11/19/2024	6:06 AM	35.7	44.8	32.3	37.2	33.8
11/19/2024	6:16 AM	36.7	50.8	31.1	39.1	32.9
11/19/2024	6:26 AM	36	45.7	30.6	38.1	32.4
11/19/2024	6:36 AM	41.9	58.8	34.3	45.1	36.4
11/19/2024	6:46 AM	39.2	59	31.8	41	33.9
11/19/2024	6:56 AM	44.6	76.8	32.6	45.5	35.4
11/19/2024	7:06 AM	40.7	50.6	33.1	43.9	35.7
11/19/2024	7:16 AM	41.2	51.9	33.6	44.5	36.6
11/19/2024	7:26 AM	41	51.5	32.6	44.4	35.3
11/19/2024	7:36 AM	39.5	54.7	32.5	42.9	34.6
11/19/2024	7:46 AM	43.3	53.7	32.8	47.1	35.3
11/19/2024	7:56 AM	41.2	53.1	32.1	44.7	35.1
11/19/2024	8:06 AM	38.3	49.5	32.3	41.2	34.3
11/19/2024	8:16 AM	38.7	54.9	30.9	42	33.3
11/19/2024	8:26 AM	41.9	56.6	30.7	45.4	34.1
11/19/2024	8:36 AM	39.9	55.3	32.4	42.9	34.5
11/19/2024	8:46 AM	38.4	49	30.8	41.5	33.6
11/19/2024	8:56 AM	41.7	58.5	32.6	44.8	35.5
11/19/2024	9:06 AM	42.5	55.3	32.7	46.4	34.9
11/19/2024	9:16 AM	43.7	55.5	33.6	47.6	36.3
11/19/2024	9:26 AM	41.1	52.8	30	44.5	33.4
11/19/2024	9:36 AM	43.4	60.5	34.8	46.5	37.5
11/19/2024	9:46 AM	42.6	52.2	35	45.4	38.5
11/19/2024	9:56 AM	43.7	57	34.6	47.3	37.4
11/19/2024	10:06 AM	68.2	94.9	35.7	57.1	37.8
11/19/2024	10:16 AM	42.7	58	34.3	45.8	37
11/19/2024	10:26 AM	42.2	53.9	33.3	45.5	36.7
11/19/2024	10:36 AM	38.3	51.8	32.7	40.8	35
11/19/2024	10:46 AM	40.7	60.4	33	43.5	35.6
11/19/2024	10:56 AM	38.6	62.8	30.3	41.2	32.7
11/19/2024	11:06 AM	39.9	58.2	31.2	41.8	34.6

Date	Time	LAeq	LAmaz	Lamin	LA10	LA90
11/19/2024	11:16 AM	63.4	78.4	34.4	66.6	37.1
11/19/2024	11:26 AM	39.4	51.5	31.2	42.5	34.8
11/19/2024	11:36 AM	41	62.1	32.1	42.3	35.4
11/19/2024	11:46 AM	40.1	50.1	33.3	43.6	35.5
11/19/2024	11:56 AM	39.2	48.9	32.2	42.9	34.1
11/19/2024	12:06 PM	34.8	44.5	30.2	36.8	32.4
11/19/2024	12:16 PM	40.3	60.3	31.9	42.9	33.9
11/19/2024	12:26 PM	39.2	51.8	29.4	42.6	32
11/19/2024	12:36 PM	36.3	50.6	31.3	38.7	32.7
11/19/2024	12:46 PM	40.4	63.7	31.6	41	34.3
11/19/2024	12:56 PM	40.8	63	30	42.7	31.7
11/19/2024	1:06 PM	36	47.2	30	38.4	32.1
11/19/2024	1:16 PM	36.3	53.3	29.6	38.6	32
11/19/2024	1:26 PM	34.6	48.3	29.6	36.9	31.5
11/19/2024	1:36 PM	39.6	64.9	31.9	41.6	35.4
11/19/2024	1:46 PM	40.4	65.8	30.6	40.4	33.2
11/19/2024	1:56 PM	37.6	49.7	31	40.1	34.1
11/19/2024	2:06 PM	39.4	63.4	32.5	40.4	35
11/19/2024	2:16 PM	38.3	50.4	32.9	40.6	35.1
11/19/2024	2:26 PM	41.9	65.1	33.6	43.2	36.3
11/19/2024	2:36 PM	41.3	57.5	33.4	43.1	36
11/19/2024	2:46 PM	43.5	61.1	33.1	45.4	37.3
11/19/2024	2:56 PM	45	69	33.6	45.5	36.8
11/19/2024	3:06 PM	42.3	56.5	33.2	45	37.4
11/19/2024	3:16 PM	39.4	56.2	32.1	42.1	34.9
11/19/2024	3:26 PM	42.5	61.4	33.7	45	36.5
11/19/2024	3:36 PM	41.5	53.6	34.2	44	37.6
11/19/2024	3:46 PM	41.2	51.1	35.2	43.7	37.6
11/19/2024	3:56 PM	41.9	49	37	44	39.2
11/19/2024	4:06 PM	40.6	48.1	33.8	43.5	36.6
11/19/2024	4:16 PM	43	60	34.1	45.5	38.9

NA-3 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
18/11/24 16:16	16:16:51	0,8	1,6	241
18/11/24 16:26	16:26:51	1,2	2,2	26
18/11/24 16:36	16:36:51	1,0	2,8	124
18/11/24 16:46	16:46:51	1,4	4,4	248
18/11/24 16:56	16:56:51	1,3	2,8	254
18/11/24 17:06	17:06:51	2,0	3,6	277
18/11/24 17:16	17:16:51	1,4	2,9	284
18/11/24 17:26	17:26:51	1,9	3,6	254
18/11/24 17:36	17:36:51	0,8	2,4	263
18/11/24 17:46	17:46:51	1,2	4,1	179

Date	Time	Wind speed	Wind speed max	Wind direction
18/11/24 17:56	17:56:51	1,7	3,8	235
18/11/24 18:06	18:06:51	1,4	3,7	288
18/11/24 18:16	18:16:51	2,3	5,4	237
18/11/24 18:26	18:26:51	2,1	4,5	239
18/11/24 18:36	18:36:51	1,5	4,8	250
18/11/24 18:46	18:46:51	1,3	4,0	167
18/11/24 18:56	18:56:51	1,4	2,6	114
18/11/24 19:06	19:06:51	1,1	1,9	24
18/11/24 19:16	19:16:51	1,2	2,8	348
18/11/24 19:26	19:26:51	1,4	2,7	23
18/11/24 19:36	19:36:51	1,3	2,2	347
18/11/24 19:46	19:46:51	0,8	1,8	89
18/11/24 19:56	19:56:51	1,3	2,4	202
18/11/24 20:06	20:06:51	1,1	2,2	211
18/11/24 20:16	20:16:51	0,9	2,1	286
18/11/24 20:26	20:26:51	0,7	1,8	209
18/11/24 20:36	20:36:51	0,9	1,3	212
18/11/24 20:46	20:46:51	1,3	1,8	182
18/11/24 20:56	20:56:51	1,6	2,6	217
18/11/24 21:06	21:06:51	1,5	2,4	205
18/11/24 21:16	21:16:51	1,4	2,4	203
18/11/24 21:26	21:26:51	1,6	2,5	205
18/11/24 21:36	21:36:51	1,3	3,0	206
18/11/24 21:46	21:46:51	1,8	2,8	209
18/11/24 21:56	21:56:51	1,8	2,7	209
18/11/24 22:06	22:06:51	1,2	2,4	226
18/11/24 22:16	22:16:51	1,5	3,4	201
18/11/24 22:26	22:26:51	1,6	3,0	214
18/11/24 22:36	22:36:51	1,0	2,2	199
18/11/24 22:46	22:46:51	1,3	2,7	244
18/11/24 22:56	22:56:51	0,8	1,7	234
18/11/24 23:06	23:06:51	1,1	3,2	244
18/11/24 23:16	23:16:51	1,1	2,7	240
18/11/24 23:26	23:26:51	1,3	2,6	238
18/11/24 23:36	23:36:51	1,5	2,4	223
18/11/24 23:46	23:46:51	1,2	2,5	165
18/11/24 23:56	23:56:51	1,2	2,6	120
19/11/24 00:06	00:06:51	2,1	5,2	353
19/11/24 00:16	00:16:51	1,8	4,4	42
19/11/24 00:26	00:26:51	2,5	5,4	66
19/11/24 00:36	00:36:51	2,6	5,8	86
19/11/24 00:46	00:46:51	2,3	5,6	73
19/11/24 00:56	00:56:51	2,3	6,7	79
19/11/24 01:06	01:06:51	1,1	3,1	12
19/11/24 01:16	01:16:51	1,7	4,5	78

Date	Time	Wind speed	Wind speed max	Wind direction
19/11/24 01:26	01:26:51	1,9	4,3	86
19/11/24 01:36	01:36:51	1,2	2,6	173
19/11/24 01:46	01:46:51	1,2	2,7	248
19/11/24 01:56	01:56:51	1,2	3,5	104
19/11/24 02:06	02:06:51	1,0	1,9	181
19/11/24 02:16	02:16:51	1,5	3,4	169
19/11/24 02:26	02:26:51	1,4	3,8	220
19/11/24 02:36	02:36:51	1,5	3,3	194
19/11/24 02:46	02:46:51	2,4	5,3	129
19/11/24 02:56	02:56:51	1,4	4,9	178
19/11/24 03:06	03:06:51	0,8	1,6	201
19/11/24 03:16	03:16:51	1,1	3,0	177
19/11/24 03:26	03:26:51	2,0	4,8	70
19/11/24 03:36	03:36:51	2,3	6,4	62
19/11/24 03:46	03:46:51	1,8	3,8	44
19/11/24 03:56	03:56:51	1,7	4,1	36
19/11/24 04:06	04:06:51	1,4	2,6	262
19/11/24 04:16	04:16:51	1,3	3,7	213
19/11/24 04:26	04:26:51	2,2	5,7	86
19/11/24 04:36	04:36:51	2,9	7,3	97
19/11/24 04:46	04:46:51	2,9	5,6	100
19/11/24 04:56	04:56:51	2,0	6,3	94
19/11/24 05:06	05:06:51	2,6	5,4	116
19/11/24 05:16	05:16:51	2,8	5,4	109
19/11/24 05:26	05:26:51	1,9	5,3	137
19/11/24 05:36	05:36:51	3,2	5,3	101
19/11/24 05:46	05:46:51	2,3	6,5	160
19/11/24 05:56	05:56:51	1,9	5,2	113
19/11/24 06:06	06:06:51	1,3	4,1	64
19/11/24 06:16	06:16:51	1,5	2,6	295
19/11/24 06:26	06:26:51	0,7	1,3	247
19/11/24 06:36	06:36:51	1,3	3,5	335
19/11/24 06:46	06:46:51	0,9	4,1	358
19/11/24 06:56	06:56:51	1,4	3,6	91
19/11/24 07:06	07:06:51	1,3	2,8	254
19/11/24 07:16	07:16:51	1,2	2,0	293
19/11/24 07:26	07:26:51	0,9	1,5	292
19/11/24 07:36	07:36:51	1,4	3,3	27
19/11/24 07:46	07:46:51	2,1	4,9	92
19/11/24 07:56	07:56:51	1,2	2,5	148
19/11/24 08:06	08:06:51	1,3	2,6	338
19/11/24 08:16	08:16:51	1,0	1,6	296
19/11/24 08:26	08:26:51	1,4	2,8	11
19/11/24 08:36	08:36:51	1,9	4,7	47
19/11/24 08:46	08:46:51	2,6	6,0	82

Date	Time	Wind speed	Wind speed max	Wind direction
19/11/24 08:56	08:56:51	3,1	5,3	81
19/11/24 09:06	09:06:51	3,6	7,2	85
19/11/24 09:16	09:16:51	2,6	5,1	71
19/11/24 09:26	09:26:51	3,3	7,9	82
19/11/24 09:36	09:36:51	1,9	3,9	45
19/11/24 09:46	09:46:51	2,2	5,9	56
19/11/24 09:56	09:56:51	2,7	7,4	64
19/11/24 10:06	10:06:51	2,6	5,3	70
19/11/24 10:16	10:16:51	3,0	7,5	93
19/11/24 10:26	10:26:51	3,3	7,0	69
19/11/24 10:36	10:36:51	3,3	6,7	69
19/11/24 10:46	10:46:51	2,3	6,0	35
19/11/24 10:56	10:56:51	1,8	4,6	64
19/11/24 11:06	11:06:51	1,9	4,2	41
19/11/24 11:16	11:16:51	2,4	5,1	47
19/11/24 11:26	11:26:51	2,5	4,9	55
19/11/24 11:36	11:36:51	2,0	4,0	2
19/11/24 11:46	11:46:51	1,8	3,6	354
19/11/24 11:56	11:56:51	1,7	3,6	315
19/11/24 12:06	12:06:51	1,3	2,4	307
19/11/24 12:16	12:16:51	1,4	2,8	318
19/11/24 12:26	12:26:51	1,7	3,9	325
19/11/24 12:36	12:36:51	1,1	2,2	221
19/11/24 12:46	12:46:51	1,3	3,4	4
19/11/24 12:56	12:56:51	1,5	2,9	340
19/11/24 13:06	13:06:51	1,8	3,6	329
19/11/24 13:16	13:16:51	1,7	2,8	331
19/11/24 13:26	13:26:51	1,9	3,3	298
19/11/24 13:36	13:36:51	1,7	3,0	298
19/11/24 13:46	13:46:51	1,4	2,4	308
19/11/24 13:56	13:56:51	1,9	3,0	296
19/11/24 14:06	14:06:51	1,9	3,5	295
19/11/24 14:16	14:16:51	1,5	2,8	283
19/11/24 14:26	14:26:51	1,1	2,4	349
19/11/24 14:36	14:36:51	1,1	2,4	13
19/11/24 14:46	14:46:51	1,8	3,2	358
19/11/24 14:56	14:56:51	2,1	4,5	353
19/11/24 15:06	15:06:51	1,9	3,6	9
19/11/24 15:16	15:16:51	1,6	3,2	358
19/11/24 15:26	15:26:51	1,5	2,7	327
19/11/24 15:36	15:36:51	1,3	2,5	12
19/11/24 15:46	15:46:51	0,7	2,0	29
19/11/24 15:56	15:56:51	1,1	2,4	24
19/11/24 16:06	16:06:51	0,7	1,6	308
19/11/24 16:16	16:16:51	0,6	1,6	233

NA-3 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
11/18/2024	4:30:00 PM	1575.17	22.23	0	7.42	9.61
11/18/2024	4:45:00 PM	1527.98	8.02	0	10.06	12.11
11/18/2024	5:00:00 PM	1357.8	5.83	0	8.8	10.74
11/18/2024	5:15:00 PM	1233.98	6.05	0	8.59	10.9
11/18/2024	5:30:00 PM	1164.31	7.79	0	4.42	6.06
11/18/2024	5:45:00 PM	1134.12	10.66	0	4.95	7.51
11/18/2024	6:00:00 PM	1128.34	16.46	0	4.37	5.98
11/18/2024	6:15:00 PM	1047.48	17.8	0	2.86	4.69
11/18/2024	6:30:00 PM	1089.49	20.21	0	2.63	4.44
11/18/2024	6:45:00 PM	1012.19	22.77	0	11.09	14.24
11/18/2024	7:00:00 PM	987.26	22.25	0	5.21	7.68
11/18/2024	7:15:00 PM	1060.73	27.41	0	12.92	16.58
11/18/2024	7:30:00 PM	958.25	29.87	0	7.91	11.6
11/18/2024	7:45:00 PM	1164.02	29.26	0	11.02	14.34
11/18/2024	8:00:00 PM	1178.12	26.45	0	10.71	13.18
11/18/2024	8:15:00 PM	1058.36	17.78	0	9.72	13.71
11/18/2024	8:30:00 PM	1162	27.48	0	13.86	17.51
11/18/2024	8:45:00 PM	1080.13	28.17	0	11.4	14.07
11/18/2024	9:00:00 PM	1109.87	22.67	0	12.57	15.39
11/18/2024	9:15:00 PM	1052.95	26.55	0	11.61	14.95
11/18/2024	9:30:00 PM	1075.1	27.05	0	12.42	15.44
11/18/2024	9:45:00 PM	1145.68	27.31	0	13.19	16.06
11/18/2024	10:00:00 PM	1137.29	27.71	0	12.74	15.96
11/18/2024	10:15:00 PM	1235.17	29.55	0	11.55	14.86
11/18/2024	10:30:00 PM	1083.55	32.76	0	11.59	14.79
11/18/2024	10:45:00 PM	1064.74	34.23	0	7.99	9.97
11/18/2024	11:00:00 PM	1033.39	35.64	0	8.51	10.51
11/18/2024	11:15:00 PM	973.86	39.58	0	5.07	7.04
11/18/2024	11:30:00 PM	1038.23	37.05	0	4.65	6.42
11/18/2024	11:45:00 PM	915.28	36.37	0	4.39	6.16
11/19/2024	12:00:00 AM	870.47	39.84	0	4.04	6.08
11/19/2024	12:15:00 AM	857.43	47.54	0	4.38	6.93
11/19/2024	12:30:00 AM	818.03	39.71	0	3.88	5.92
11/19/2024	12:45:00 AM	770.57	38.3	0	3.7	5.45
11/19/2024	1:00:00 AM	709.9	36.12	0	4.14	6.13
11/19/2024	1:15:00 AM	665.71	34.38	0	4.13	5.86
11/19/2024	1:30:00 AM	659.25	33.86	0	4.1	5.94
11/19/2024	1:45:00 AM	644.65	28.96	0	3.95	5.7
11/19/2024	2:00:00 AM	650.22	26.05	0	3.83	5.62
11/19/2024	2:15:00 AM	656.88	22.25	0	3.82	5.6
11/19/2024	2:30:00 AM	647.48	23.45	0	3.63	5.36
11/19/2024	2:45:00 AM	650.8	26.61	0	3.64	5.46
11/19/2024	3:00:00 AM	658.32	28.44	0	3.64	5.41
11/19/2024	3:15:00 AM	656.95	18.83	0	3.75	5.85
11/19/2024	3:30:00 AM	645.75	32.58	0	3.65	5.68
11/19/2024	3:45:00 AM	649.33	33.56	0	3.52	5.4
11/19/2024	4:00:00 AM	611.84	29.18	0	3.4	5.14

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
11/19/2024	4:15:00 AM	610	21.24	0	3.56	5.32
11/19/2024	4:30:00 AM	583.2	34.74	0	3.54	5.31
11/19/2024	4:45:00 AM	596.58	32.81	0	3.51	5.23
11/19/2024	5:00:00 AM	586.23	28.34	0	3.27	4.95
11/19/2024	5:15:00 AM	589.19	30.56	0	3.51	5.2
11/19/2024	5:30:00 AM	570.78	30.18	0	3.49	5.43
11/19/2024	5:45:00 AM	562.83	30.06	0	3.6	5.32
11/19/2024	6:00:00 AM	563.13	28.13	0	3.43	5.37
11/19/2024	6:15:00 AM	569.61	26.19	0	3.72	5.55
11/19/2024	6:30:00 AM	792.66	22.42	0	50.12	55.01
11/19/2024	6:45:00 AM	571.59	28.86	0	3.5	5.32
11/19/2024	7:00:00 AM	583.32	29.41	0	3.59	5.43
11/19/2024	7:15:00 AM	593.66	27.54	0	3.81	5.98
11/19/2024	7:30:00 AM	643.73	22.94	0	4.13	6.5
11/19/2024	7:45:00 AM	618.11	33.69	0	3.74	5.96
11/19/2024	8:00:00 AM	670.68	34.48	0	4.01	6.57
11/19/2024	8:15:00 AM	642.08	34.46	0	3.82	5.91
11/19/2024	8:30:00 AM	567.63	36.23	0	3.37	5.15
11/19/2024	8:45:00 AM	502.19	37.72	0	3.25	5.14
11/19/2024	9:00:00 AM	433.68	36.46	0	3.32	5.1
11/19/2024	9:15:00 AM	415.74	35.45	0	3.47	5.43
11/19/2024	9:30:00 AM	400.82	31.73	0	3.44	5.31
11/19/2024	9:45:00 AM	424.87	32.64	0	3.55	5.3
11/19/2024	10:00:00 AM	403.16	26.3	0	3.66	5.69
11/19/2024	10:15:00 AM	447.14	32.68	0	3.7	5.87
11/19/2024	10:30:00 AM	445.29	40.76	0	3.59	5.88
11/19/2024	10:45:00 AM	416.1	27.14	0	3.71	6.59
11/19/2024	11:00:00 AM	404.16	31.42	0	3.27	5.32
11/19/2024	11:15:00 AM	367.68	32.64	0	3.1	4.94
11/19/2024	11:30:00 AM	394.35	36.04	0	3.62	5.91
11/19/2024	11:45:00 AM	331.73	29.68	0	4.21	6.78
11/19/2024	12:00:00 PM	326.48	31.46	0	3.3	5.43
11/19/2024	12:15:00 PM	311.69	25.02	0	3.86	5.68
11/19/2024	12:30:00 PM	245.21	26.82	0	3.19	5.1
11/19/2024	12:45:00 PM	275.79	23.21	0	3.94	6.31
11/19/2024	1:00:00 PM	236.13	19.67	0	3.22	5.56
11/19/2024	1:15:00 PM	288.03	17.82	0	4.21	6.19
11/19/2024	1:30:00 PM	279.47	16.18	0	3.26	5.16
11/19/2024	1:45:00 PM	288.4	22.08	0	6.46	8.15
11/19/2024	2:00:00 PM	368.14	19.48	0	28.3	33.89
11/19/2024	2:15:00 PM	318.19	15.05	0	13.97	20.89
11/19/2024	2:30:00 PM	314.89	17.13	0	7.42	11.64
11/19/2024	2:45:00 PM	385.84	26.05	0	9.81	13.14
11/19/2024	3:00:00 PM	454.5	19.71	0	12.08	16.45
11/19/2024	3:15:00 PM	444.11	21.26	0	13.22	17.76
11/19/2024	3:30:00 PM	508.32	20.32	0	14.09	19.58
11/19/2024	3:45:00 PM	566.49	36.98	0	12.82	16.81
11/19/2024	4:00:00 PM	623.5	35.11	0	13.61	17.42
11/19/2024	4:15:00 PM	597.66	35.55	0	13.67	16.95

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
11/19/2024	4:30:00 PM	582.4	32.43	0	11.79	14.7

NA-4 Noise load

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/14/2025	2:16 PM	50.7	66.3	32.7	54.1	39.9
4/14/2025	2:26 PM	49.9	72.5	31.1	50.4	38.5
4/14/2025	2:36 PM	49.4	69.4	35.3	51.9	40.9
4/14/2025	2:46 PM	50.9	67.3	33	54.5	40.2
4/14/2025	2:56 PM	49.5	60.9	36.7	53.1	41.3
4/14/2025	3:06 PM	50.2	62.7	33.5	53.4	41.7
4/14/2025	3:16 PM	59.8	73.5	40.6	61.9	45.3
4/14/2025	3:26 PM	48.8	67.2	34.6	51.6	41.5
4/14/2025	3:36 PM	48.4	59.3	39.3	51.8	42
4/14/2025	3:46 PM	50.8	75.6	38.4	53.2	43.5
4/14/2025	3:56 PM	50.2	65.2	39	53.5	42.5
4/14/2025	4:06 PM	49.8	70.7	37.1	52.1	41.3
4/14/2025	4:16 PM	48	61.3	35	51.4	41.2
4/14/2025	4:26 PM	49	61.5	37.1	52.2	42
4/14/2025	4:36 PM	49.4	68.6	36.3	53.1	42.1
4/14/2025	4:46 PM	50.6	68.5	36.8	53.6	42.3
4/14/2025	4:56 PM	50	63.7	38.6	53.3	42.5
4/14/2025	5:06 PM	49.9	60.8	35.9	53.1	42.2
4/14/2025	5:16 PM	49.3	60	37.3	52.7	42.8
4/14/2025	5:26 PM	51.4	66.2	39	54.8	42.6
4/14/2025	5:36 PM	50.6	76.6	35.1	54	40.8
4/14/2025	5:46 PM	50.3	67.3	37.5	53.6	42.7
4/14/2025	5:56 PM	50.5	63.1	38.4	53.8	43
4/14/2025	6:06 PM	49.8	66.4	34.8	53.1	41.1
4/14/2025	6:16 PM	50.6	63.1	34.8	53.9	41.5
4/14/2025	6:26 PM	50.2	63	34.9	54.1	42
4/14/2025	6:36 PM	48	61.8	35.8	51.7	40.1
4/14/2025	6:46 PM	50.2	61.3	38.6	54	43.3
4/14/2025	6:56 PM	50.5	65.9	35.8	53.8	41.8
4/14/2025	7:06 PM	50.3	63.3	38.1	53.6	42.7
4/14/2025	7:16 PM	51.3	71.3	39.1	54.4	43.5
4/14/2025	7:26 PM	52.1	65.4	39.1	56.2	42.6
4/14/2025	7:36 PM	48.8	63	37.4	52.1	41.8
4/14/2025	7:46 PM	49.8	68.3	38	52.3	41.9
4/14/2025	7:56 PM	47	61.8	31.9	50.4	38.9
4/14/2025	8:06 PM	46.6	58.9	33.8	50.3	38.6
4/14/2025	8:16 PM	48.3	62.5	35	52.1	39.3
4/14/2025	8:26 PM	48.6	65.8	34.8	52.4	39.3
4/14/2025	8:36 PM	48	60.4	37	51.3	40.9
4/14/2025	8:46 PM	49.5	63.5	33.6	53.3	40.3
4/14/2025	8:56 PM	49.1	63.8	35.5	52.8	40.1

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/14/2025	9:06 PM	47.1	58.8	31.2	51.1	37
4/14/2025	9:16 PM	49	64.5	35.4	52	40.3
4/14/2025	9:26 PM	47.7	59.9	33	51.9	37.8
4/14/2025	9:36 PM	51.2	69.4	32.4	54.7	40.7
4/14/2025	9:46 PM	50.3	61.8	30.9	54.7	38.9
4/14/2025	9:56 PM	51.1	66.8	36	55.2	41
4/14/2025	10:06 PM	63.4	82.2	35.2	70.1	42.4
4/14/2025	10:16 PM	49.2	71.6	29.8	52.7	38.3
4/14/2025	10:26 PM	48.4	64.2	30.4	51.5	36.2
4/14/2025	10:36 PM	50	62.6	31.1	53.5	40
4/14/2025	10:46 PM	50.9	63.6	34.5	54.3	40.7
4/14/2025	10:56 PM	50.6	62.2	31.2	54.9	38.3
4/14/2025	11:06 PM	50.1	59.8	33.2	54.2	39.1
4/14/2025	11:16 PM	49.2	62.3	33.3	53	39.2
4/14/2025	11:26 PM	50.3	62.3	36.4	54.2	40.7
4/14/2025	11:36 PM	49.1	65.5	28.4	52.9	34.4
4/14/2025	11:46 PM	47.3	63.1	29.1	51.4	34.9
4/14/2025	11:56 PM	47.8	60.6	28.9	52	32
4/15/2025	12:06 AM	46.5	58.7	26.7	51.1	29.7
4/15/2025	12:16 AM	49.3	67.1	30.2	52.4	36.8
4/15/2025	12:26 AM	48.2	64.4	27.9	52.4	30.6
4/15/2025	12:36 AM	47.3	60	28.5	51.8	33.8
4/15/2025	12:46 AM	57.4	69.6	26.6	62.8	29.5
4/15/2025	12:56 AM	53	66.7	24.3	52.7	30.3
4/15/2025	1:06 AM	47.4	57.9	27.3	52.1	34.2
4/15/2025	1:16 AM	46.7	57.5	26.1	51.9	29.1
4/15/2025	1:26 AM	43	57.1	22.6	47.5	26.7
4/15/2025	1:36 AM	48.2	59.2	27.5	52.8	35.6
4/15/2025	1:46 AM	45.6	58.9	21.8	49.8	25.9
4/15/2025	1:56 AM	44.3	57	26.3	48.3	31.7
4/15/2025	2:06 AM	44.3	58.1	21.5	48.8	24.1
4/15/2025	2:16 AM	39.8	50.4	20.9	45.2	23.7
4/15/2025	2:26 AM	45.9	60.3	22.5	51.1	26.9
4/15/2025	2:36 AM	49.4	64.4	26.6	52.6	31
4/15/2025	2:46 AM	42.8	56.3	24.6	46.7	27.8
4/15/2025	2:56 AM	42.7	59.3	27.9	46.7	31.2
4/15/2025	3:06 AM	37.1	48.2	24.2	40.8	27.9
4/15/2025	3:16 AM	41.6	51.9	25.7	45.5	31.2
4/15/2025	3:26 AM	33.5	43.7	24	37.4	26.1
4/15/2025	3:36 AM	45.2	57.5	25.5	49.4	30.3
4/15/2025	3:46 AM	41.6	53.1	23.3	46.6	26.4
4/15/2025	3:56 AM	41.5	56.5	22.5	46.1	24.9
4/15/2025	4:06 AM	40.1	53.6	24.3	44.1	27.2
4/15/2025	4:16 AM	42.4	56.7	22.1	46.4	24.1
4/15/2025	4:26 AM	35.4	49.4	21.4	38.2	22.8

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/15/2025	4:36 AM	45.6	57.9	23.1	50.1	27.5
4/15/2025	4:46 AM	46.2	61.5	22.6	49.2	27.1
4/15/2025	4:56 AM	41.1	55.2	20.6	45.4	22.4
4/15/2025	5:06 AM	44.2	55.9	21.4	49.6	23.3
4/15/2025	5:16 AM	45	57.2	20.7	50.2	21.7
4/15/2025	5:26 AM	47.7	59.5	23	53.8	27.8
4/15/2025	5:36 AM	41.6	54.8	22	46.2	23.5
4/15/2025	5:46 AM	46.5	62.1	22.3	50.6	24.7
4/15/2025	5:56 AM	47.3	62	23.1	51.4	26
4/15/2025	6:06 AM	51.2	62.3	24.8	56.3	31.7
4/15/2025	6:16 AM	49.7	63.8	23.5	55.2	27.5
4/15/2025	6:26 AM	52.6	65.7	27.9	56.7	35.6
4/15/2025	6:36 AM	51.7	62.2	26.2	56	36
4/15/2025	6:46 AM	48.1	59.6	26.3	52.7	33.2
4/15/2025	6:56 AM	47.4	62	24.6	52.1	30.7
4/15/2025	7:06 AM	51.8	61.9	32.9	55.4	39.9
4/15/2025	7:16 AM	48.8	58.9	28	53.2	36.1
4/15/2025	7:26 AM	46.3	56.7	23	51.8	28.2
4/15/2025	7:36 AM	48.4	65.4	23.1	52	35
4/15/2025	7:46 AM	45.5	55.8	28	49.5	33.5
4/15/2025	7:56 AM	44.1	54.1	29.8	47.6	35.6
4/15/2025	8:06 AM	43.8	59.9	25.7	47.5	33.5
4/15/2025	8:16 AM	43.3	54.8	26.7	47.6	34.6
4/15/2025	8:26 AM	43.7	55.2	25.5	47.8	33.2
4/15/2025	8:36 AM	44.6	62.9	30.8	48.1	34
4/15/2025	8:46 AM	36.8	54.8	24.9	39.7	28.1
4/15/2025	8:56 AM	41.8	67.9	26.5	43.3	29.5
4/15/2025	9:06 AM	41.9	63	28	45.1	33.4
4/15/2025	9:16 AM	38.5	54.6	26.8	41.7	29.9
4/15/2025	9:26 AM	58.2	72.5	28.4	62.8	33.1
4/15/2025	9:36 AM	43.3	64.9	27.3	43.3	30.9
4/15/2025	9:46 AM	39.3	54.1	26.4	42.9	31.2
4/15/2025	9:56 AM	44	75.4	27.9	43.7	32.3
4/15/2025	10:06 AM	42.4	56.4	27.8	45.2	33
4/15/2025	10:16 AM	43.9	68.1	27	46.2	32.2
4/15/2025	10:26 AM	44.5	59.4	31	46.9	36.7
4/15/2025	10:36 AM	39.7	54	28	43.2	31.2
4/15/2025	10:46 AM	44	61.9	31	47.2	35.1
4/15/2025	10:56 AM	40.6	53.9	28.2	43.8	32.7
4/15/2025	11:06 AM	39.1	54.6	29.3	42.1	32.9
4/15/2025	11:16 AM	44.2	60.5	31.3	47.4	35.7
4/15/2025	11:26 AM	58.4	73.2	27.9	58.2	36.3
4/15/2025	11:36 AM	44.4	70.4	32.7	46.3	36.1
4/15/2025	11:46 AM	40.2	51.5	27.9	43.3	31.3
4/15/2025	11:56 AM	39.9	51	30.4	42.8	33.9

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/15/2025	12:06 PM	42	57	31.2	45.2	35.6
4/15/2025	12:16 PM	42.7	54.7	30.1	46.5	34.4
4/15/2025	12:26 PM	44.5	56.4	27.3	48.2	31.3
4/15/2025	12:36 PM	46.7	61.9	31.3	50.2	37.7
4/15/2025	12:46 PM	45.1	59	34.7	48.2	39.3
4/15/2025	12:56 PM	44.7	55.8	32.7	48.2	36.7
4/15/2025	1:06 PM	44.2	61.8	32.1	47.2	37.7
4/15/2025	1:16 PM	43.6	56.2	29.9	47.4	35
4/15/2025	1:26 PM	42.4	51.3	29.2	45.8	33.6
4/15/2025	1:36 PM	44	60.8	29.8	47.1	36.2
4/15/2025	1:46 PM	43.6	54.7	30.9	46.7	37
4/15/2025	1:56 PM	42.8	59.9	29.2	46	34.4
4/15/2025	2:06 PM	41	57.5	26.4	44.1	34.1
4/15/2025	2:16 PM	44.5	56.3	26.9	47.9	35.5

NA-4 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
4/14/2025	14:15:07	1,5	38,1	132
4/14/2025	14:25:07	1,2	2,2	183
4/14/2025	14:35:07	1,1	2,2	195
4/14/2025	14:45:07	0,9	1,7	161
4/14/2025	14:55:07	2,4	5,2	52
4/14/2025	15:05:07	2,3	4,9	27
4/14/2025	15:15:07	2,1	4,0	2
4/14/2025	15:25:07	2,1	6,2	14
4/14/2025	15:35:07	2,8	5,9	1
4/14/2025	15:45:07	2,9	7,6	1
4/14/2025	15:55:07	3,3	8,5	356
4/14/2025	16:05:07	3,4	6,9	357
4/14/2025	16:15:07	3,4	9,3	0
4/14/2025	16:25:07	2,9	5,8	--
4/14/2025	16:35:07	3,1	8,3	355
4/14/2025	16:45:07	3,8	8,5	353
4/14/2025	16:55:07	3,8	10,4	8
4/14/2025	17:05:07	3,9	10,1	4
4/14/2025	17:15:07	4,3	7,9	3
4/14/2025	17:25:07	4,2	8,3	7
4/14/2025	17:35:07	3,7	9,5	7
4/14/2025	17:45:07	3,9	8,0	7
4/14/2025	17:55:07	4,0	7,9	4
4/14/2025	18:05:07	3,8	8,5	5
4/14/2025	18:15:07	3,2	6,5	10
4/14/2025	18:25:07	3,4	6,0	13
4/14/2025	18:35:07	4,1	8,9	7

Date	Time	Wind speed	Wind speed max	Wind direction
4/14/2025	18:45:07	3,6	6,4	2
4/14/2025	18:55:07	3,6	7,8	--
4/14/2025	19:05:07	3,6	7,9	0
4/14/2025	19:15:07	4,0	7,5	5
4/14/2025	19:25:07	3,3	6,4	12
4/14/2025	19:35:07	3,2	7,7	17
4/14/2025	19:45:07	3,5	7,7	6
4/14/2025	19:55:07	2,7	5,4	4
4/14/2025	20:05:07	3,1	7,2	1
4/14/2025	20:15:07	2,6	5,7	356
4/14/2025	20:25:07	2,8	6,5	357
4/14/2025	20:35:07	2,8	6,2	2
4/14/2025	20:45:07	2,7	5,4	6
4/14/2025	20:55:07	3,1	6,7	6
4/14/2025	21:05:07	3,2	6,5	9
4/14/2025	21:15:07	3,5	7,6	9
4/14/2025	21:25:07	3,9	7,6	12
4/14/2025	21:35:07	3,3	7,8	14
4/14/2025	21:45:07	2,7	7,0	19
4/14/2025	21:55:07	2,3	4,9	24
4/14/2025	22:05:07	2,3	4,9	19
4/14/2025	22:15:07	2,3	4,3	20
4/14/2025	22:25:07	2,3	4,5	41
4/14/2025	22:35:07	2,8	4,7	48
4/14/2025	22:45:07	2,4	4,2	57
4/14/2025	22:55:07	2,3	4,3	113
4/14/2025	23:05:07	2,9	5,6	160
4/14/2025	23:15:07	3,7	6,8	165
4/14/2025	23:25:07	3,9	7,0	166
4/14/2025	23:35:07	3,3	6,0	168
4/14/2025	23:45:07	2,6	5,5	172
4/14/2025	23:55:07	3,3	6,2	175
4/15/2025	00:05:07	3,1	5,5	176
4/15/2025	00:15:07	3,0	5,6	173
4/15/2025	00:25:07	3,2	5,7	177
4/15/2025	00:35:07	3,1	6,0	179
4/15/2025	00:45:07	2,6	5,8	184
4/15/2025	00:55:07	2,3	4,2	184
4/15/2025	01:05:07	2,2	4,9	184
4/15/2025	01:15:07	2,2	4,5	185
4/15/2025	01:25:07	2,6	4,9	187
4/15/2025	01:35:07	1,8	3,7	194
4/15/2025	01:45:07	2,0	3,6	194
4/15/2025	01:55:07	2,0	3,5	188
4/15/2025	02:05:07	1,6	3,4	188

Date	Time	Wind speed	Wind speed max	Wind direction
4/15/2025	02:15:07	1,6	3,6	194
4/15/2025	02:25:07	1,3	2,5	197
4/15/2025	02:35:07	1,4	2,6	187
4/15/2025	02:45:07	1,3	2,2	214
4/15/2025	02:55:07	1,4	2,4	254
4/15/2025	03:05:07	1,4	2,4	249
4/15/2025	03:15:07	1,7	2,8	251
4/15/2025	03:25:07	1,3	2,8	251
4/15/2025	03:35:07	1,5	2,4	256
4/15/2025	03:45:07	1,1	2,1	230
4/15/2025	03:55:07	0,9	1,9	220
4/15/2025	04:05:07	0,8	1,3	181
4/15/2025	04:15:07	1,1	1,8	175
4/15/2025	04:25:07	1,1	1,9	188
4/15/2025	04:35:07	1,0	1,5	189
4/15/2025	04:45:07	1,0	1,9	196
4/15/2025	04:55:07	0,6	1,0	211
4/15/2025	05:05:07	0,8	1,5	187
4/15/2025	05:15:07	1,1	1,7	159
4/15/2025	05:25:07	1,1	1,5	149
4/15/2025	05:35:07	1,0	1,7	171
4/15/2025	05:45:07	0,9	1,3	146
4/15/2025	05:55:07	1,1	1,8	152
4/15/2025	06:05:07	1,1	1,7	140
4/15/2025	06:15:07	1,8	2,9	127
4/15/2025	06:25:07	1,4	2,7	134
4/15/2025	06:35:07	1,6	2,5	138
4/15/2025	06:45:07	1,5	2,1	133
4/15/2025	06:55:07	1,6	2,4	134
4/15/2025	07:05:07	1,5	2,5	135
4/15/2025	07:15:07	1,5	2,4	135
4/15/2025	07:25:07	1,6	2,8	139
4/15/2025	07:35:07	1,3	2,5	156
4/15/2025	07:45:07	1,4	2,7	186
4/15/2025	07:55:07	1,4	2,4	205
4/15/2025	08:05:07	1,6	2,6	216
4/15/2025	08:15:07	1,6	2,7	217
4/15/2025	08:25:07	1,7	3,3	218
4/15/2025	08:35:07	1,8	3,9	223
4/15/2025	08:45:07	1,9	3,3	228
4/15/2025	08:55:07	1,9	3,6	236
4/15/2025	09:05:07	1,5	2,8	221
4/15/2025	09:15:07	1,7	3,8	219
4/15/2025	09:25:07	1,9	3,9	227
4/15/2025	09:35:07	1,8	4,1	216

Date	Time	Wind speed	Wind speed max	Wind direction
4/15/2025	09:45:07	1,8	3,8	224
4/15/2025	09:55:07	1,9	3,6	221
4/15/2025	10:05:07	2,2	4,3	220
4/15/2025	10:15:07	2,4	5,2	221
4/15/2025	10:25:07	2,3	4,3	222
4/15/2025	10:35:07	3,0	5,6	203
4/15/2025	10:45:07	2,6	5,1	213
4/15/2025	10:55:07	2,9	4,9	214
4/15/2025	11:05:07	3,1	5,7	219
4/15/2025	11:15:07	2,9	5,7	219
4/15/2025	11:25:07	2,9	5,7	222
4/15/2025	11:35:07	2,8	5,8	229
4/15/2025	11:45:07	2,8	5,8	221
4/15/2025	11:55:07	2,8	5,5	220
4/15/2025	12:05:07	2,9	5,1	213
4/15/2025	12:15:07	2,8	5,3	209
4/15/2025	12:25:07	2,9	5,2	214
4/15/2025	12:35:07	2,8	4,9	207
4/15/2025	12:45:07	2,8	5,4	195
4/15/2025	12:55:07	2,4	4,8	198
4/15/2025	13:05:07	3,2	5,4	207
4/15/2025	13:15:07	2,8	5,1	196
4/15/2025	13:25:07	3,0	5,2	193
4/15/2025	13:35:07	3,1	5,5	211
4/15/2025	13:45:07	2,8	5,1	209
4/15/2025	13:55:07	3,0	5,6	212
4/15/2025	14:05:07	2,9	5,3	195
4/15/2025	14:15:07	3,0	5,1	192

NA-4 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
4/14/2025	2:15 PM	65.59	41.58	0	0.94	2.56
4/14/2025	2:30 PM	67.44	32.83	0	1.04	2.44
4/14/2025	2:45 PM	68.09	22.31	0	1.41	3.06
4/14/2025	3:00 PM	68.27	28.23	0	1.66	3.79
4/14/2025	3:15 PM	79.42	25.73	0	1.56	3.21
4/14/2025	3:30 PM	87.45	29.7	0	1.43	2.98
4/14/2025	3:45 PM	63.93	23.99	0	1.33	2.86
4/14/2025	4:00 PM	55.19	28.59	0	1.73	3.56
4/14/2025	4:15 PM	56.41	33.08	0	2.02	4.92
4/14/2025	4:30 PM	58.44	32.83	0	2.14	4.89
4/14/2025	4:45 PM	70.2	33.67	0	1.84	4.02
4/14/2025	5:00 PM	101.42	31.57	0	1.84	4.45
4/14/2025	5:15 PM	83.12	23.24	0	1.63	4.03
4/14/2025	5:30 PM	53.84	25.15	0	1.17	2.45
4/14/2025	5:45 PM	56.25	35.74	0	1.73	4.25

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
4/14/2025	6:00 PM	73.94	36.5	0	1.93	4.41
4/14/2025	6:15 PM	84.43	34.84	0	1.96	4.32
4/14/2025	6:30 PM	85.22	23.7	0	1.55	3.57
4/14/2025	6:45 PM	88.29	26.7	0	1.08	2.38
4/14/2025	7:00 PM	91.47	32.85	0	1.1	2.28
4/14/2025	7:15 PM	92.3	34.19	0	1.05	2.21
4/14/2025	7:30 PM	91.56	29.13	0	1.04	2.15
4/14/2025	7:45 PM	106.48	29.93	0	1	2.39
4/14/2025	8:00 PM	116.24	28.84	0	0.95	1.91
4/14/2025	8:15 PM	123.39	32.2	0	1.29	2.69
4/14/2025	8:30 PM	121.43	34.65	0	1.78	4.05
4/14/2025	8:45 PM	120.03	35.66	0	1.26	2.21
4/14/2025	9:00 PM	129.86	42.48	0	0.92	1.83
4/14/2025	9:15 PM	155.47	55.6	0	0.89	1.5
4/14/2025	9:30 PM	160.97	50.23	0	0.73	1.55
4/14/2025	9:45 PM	147.77	35.18	0	0.6	1.05
4/14/2025	10:00 PM	160.55	37.26	0	0.58	0.96
4/14/2025	10:15 PM	160.44	36.16	0	0.92	2.14
4/14/2025	10:30 PM	175.52	44.31	0	0.98	2.27
4/14/2025	10:45 PM	181.44	40.15	0	0.74	1.52
4/14/2025	11:00 PM	202.94	38.73	0	0.74	1.81
4/14/2025	11:15 PM	196.93	39.33	0	0.66	1.17
4/14/2025	11:30 PM	197.09	40.74	0	0.54	1.19
4/14/2025	11:45 PM	198.27	39.8	0	0.6	1.14
4/15/2025	12:00 AM	197.84	45.82	0	0.4	0.64
4/15/2025	12:15 AM	188.99	41.01	0	0.29	0.38
4/15/2025	12:30 AM	191.48	41.91	0	0.27	0.47
4/15/2025	12:45 AM	185.75	37.21	0	0.25	0.38
4/15/2025	1:00 AM	186.26	36.5	0	0.23	0.31
4/15/2025	1:15 AM	184.88	36.44	0	0.2	0.28
4/15/2025	1:30 AM	185.89	34.32	0	0.2	0.29
4/15/2025	1:45 AM	185.88	34.27	0	0.16	0.23
4/15/2025	2:00 AM	178.82	34.65	0	0.2	0.38
4/15/2025	2:15 AM	179.29	34.7	0	0.21	0.33
4/15/2025	2:30 AM	179.84	34.44	0	0.19	0.26
4/15/2025	2:45 AM	180	31.48	0	0.23	0.42
4/15/2025	3:00 AM	177.57	24.89	0	0.2	0.32
4/15/2025	3:15 AM	177.48	24.93	0	0.2	0.34
4/15/2025	3:30 AM	183.57	26.4	0	0.21	0.33
4/15/2025	3:45 AM	190.37	26.8	0	0.19	0.27
4/15/2025	4:00 AM	203.49	26.55	0	0.19	0.3
4/15/2025	4:15 AM	207.02	29.93	0	0.2	0.32
4/15/2025	4:30 AM	212.16	29.74	0	0.18	0.25
4/15/2025	4:45 AM	213	26.68	0	0.15	0.2
4/15/2025	5:00 AM	216.1	30.66	0	0.16	0.24
4/15/2025	5:15 AM	233.93	31.9	0	0.16	0.24
4/15/2025	5:30 AM	251.15	31.65	0	0.16	0.22
4/15/2025	5:45 AM	248.4	31.59	0	0.19	0.3
4/15/2025	6:00 AM	249.22	30.56	0	0.15	0.19

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
4/15/2025	6:15 AM	246.07	34.46	0	0.2	0.38
4/15/2025	6:30 AM	246.17	36.69	0	0.18	0.25
4/15/2025	6:45 AM	229.87	38.87	0	0.2	0.31
4/15/2025	7:00 AM	191.67	37.89	0	0.24	0.37
4/15/2025	7:15 AM	169.3	41.05	0	0.32	0.51
4/15/2025	7:30 AM	160.37	42.65	0	0.3	0.43
4/15/2025	7:45 AM	151.27	41.43	0	0.35	0.54
4/15/2025	8:00 AM	165.88	42.65	0	0.45	0.72
4/15/2025	8:15 AM	159.48	38.75	0	0.66	1.54
4/15/2025	8:30 AM	133.66	36.67	0	0.81	1.5
4/15/2025	8:45 AM	117.81	35.74	0	1.2	11.2
4/15/2025	9:00 AM	102.94	35.98	0	0.72	1.29
4/15/2025	9:15 AM	78.85	37.74	0	0.59	1.02
4/15/2025	9:30 AM	65.39	36.96	0	0.72	1.69
4/15/2025	9:45 AM	59.53	36.35	0	0.53	0.98
4/15/2025	10:00 AM	58.42	33.2	0	0.57	1.1
4/15/2025	10:15 AM	42.73	31.02	0	0.59	1
4/15/2025	10:30 AM	40.68	33.56	0	0.7	1.25
4/15/2025	10:45 AM	48.09	31.44	0	0.68	1.24
4/15/2025	11:00 AM	44.62	32.7	0	0.74	1.41
4/15/2025	11:15 AM	33.91	29.83	0	0.63	1.25
4/15/2025	11:30 AM	11.85	29.47	0	0.71	1.28
4/15/2025	11:45 AM	24.78	30.22	0	0.65	1.16
4/15/2025	12:00 PM	41.65	30.31	0	0.58	1.06
4/15/2025	12:15 PM	64.39	34.97	0	0.6	0.96
4/15/2025	12:30 PM	60.49	28.12	0	0.54	0.82
4/15/2025	12:45 PM	62.41	27.18	0	0.6	1.25
4/15/2025	1:00 PM	55.35	32.07	0	0.66	1.21
4/15/2025	1:15 PM	57.34	34.88	0	0.76	1.46
4/15/2025	1:30 PM	38.74	32.89	0	0.72	1.3
4/15/2025	1:45 PM	48.37	36.23	0	0.87	1.69
4/15/2025	2:00 PM	53.77	37.38	0	1.01	2.18

NA-5 Noise load

Date	Time	LAeq	LAm _{ax}	LAm _{in}	LA10	LA90
4/16/2025	8:42 AM	49.2	63.9	40.3	52.1	43.1
4/16/2025	8:52 AM	48.1	58.4	41.4	50.8	44
4/16/2025	9:02 AM	51	78	41.8	53	44.7
4/16/2025	9:12 AM	48.9	63.7	40.1	51.4	43.6
4/16/2025	9:22 AM	51.6	68.7	42.5	54.2	45.5
4/16/2025	9:32 AM	48.7	62	42.1	51.4	44
4/16/2025	9:42 AM	48.7	62.5	41.3	51.6	44.2
4/16/2025	9:52 AM	51.1	64.3	44.7	53.4	46.9
4/16/2025	10:02 AM	51	62.8	42.9	54.1	45.3
4/16/2025	10:12 AM	51.3	81.9	40.9	53	44.3
4/16/2025	10:22 AM	49.9	63.6	41.5	52.8	44.7
4/16/2025	10:32 AM	49.2	64.7	41.9	51.4	44.4

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/16/2025	10:42 AM	52.1	63.8	42	56	46
4/16/2025	10:52 AM	49.5	63.9	40.8	52.5	43.7
4/16/2025	11:02 AM	48.5	63.1	39.6	50.8	43.4
4/16/2025	11:12 AM	49.5	63.5	40.9	51.9	44.3
4/16/2025	11:22 AM	51.1	64.8	44.3	53.3	47.2
4/16/2025	11:32 AM	50.2	63.1	44	52.8	46.2
4/16/2025	11:42 AM	49.5	61.6	41	51.9	44.5
4/16/2025	11:52 AM	49.9	69.3	41.1	52.3	44.3
4/16/2025	12:02 PM	51.1	76.2	42.1	52.6	44.8
4/16/2025	12:12 PM	50.9	70.3	40.9	53.6	45
4/16/2025	12:22 PM	52.8	68.4	42.5	55.4	45.8
4/16/2025	12:32 PM	53.3	66.6	44.8	56.5	47.3
4/16/2025	12:42 PM	52.9	67.2	41.9	55.5	46.8
4/16/2025	12:52 PM	54.6	67.2	46	57.9	48.7
4/16/2025	1:02 PM	53.9	68.3	44	57.1	48.1
4/16/2025	1:12 PM	53.9	65	44.7	56.8	49
4/16/2025	1:22 PM	54	68	43.6	56.9	48.5
4/16/2025	1:32 PM	55.5	68.6	45.5	58.1	49.2
4/16/2025	1:42 PM	54.2	70.7	45.1	57.2	48.2
4/16/2025	1:52 PM	56.2	68.5	43.5	59.9	47.9
4/16/2025	2:02 PM	56	72.5	45.2	59	49
4/16/2025	2:12 PM	55.7	70.3	46.3	58.7	50.2
4/16/2025	2:22 PM	56.7	71.3	46.2	59.7	50.9
4/16/2025	2:32 PM	56.7	72.8	43	60.8	46.9
4/16/2025	2:42 PM	55.4	71.6	42.2	58.2	48.6
4/16/2025	2:52 PM	52.4	65.6	42.5	55.4	46.7
4/16/2025	3:02 PM	52.8	66.7	44	56.2	46.6
4/16/2025	3:12 PM	50.2	66.4	43.5	52.2	45.6
4/16/2025	3:22 PM	50.6	65.4	42.3	53.4	44.9
4/16/2025	3:32 PM	49	61	41.4	51.9	44.6
4/16/2025	3:42 PM	50.1	64.6	42.2	53.2	44.9
4/16/2025	3:52 PM	51.9	70.3	40.9	53.6	44.1
4/16/2025	4:02 PM	52.3	65.7	42.8	55.3	45.5
4/16/2025	4:12 PM	51.3	67.7	43.4	54.1	46.3
4/16/2025	4:22 PM	50.6	62.3	43.1	53.3	46.3
4/16/2025	4:32 PM	51	63.5	42.9	54	46.2
4/16/2025	4:42 PM	50.6	64.6	41.3	53.6	44.9
4/16/2025	4:52 PM	49.3	61.8	42	52	45.1
4/16/2025	5:02 PM	50.2	62	41	52.9	45.7
4/16/2025	5:12 PM	52.6	63.4	44.7	55.5	48
4/16/2025	5:22 PM	52.4	66.4	44.7	55.1	47.9
4/16/2025	5:32 PM	51.8	66.6	43.7	54.8	46.3
4/16/2025	5:42 PM	51.9	70.1	42.3	53.7	45.5
4/16/2025	5:52 PM	50.4	61.9	42	52.8	46.3
4/16/2025	6:02 PM	48.4	63.6	40	51	43.6

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/16/2025	6:12 PM	45.7	56.7	39.2	48.2	42
4/16/2025	6:22 PM	46.9	63.8	39.4	49.8	42.1
4/16/2025	6:32 PM	47.1	69.9	39.2	48.5	42.2
4/16/2025	6:42 PM	48	65	40.2	50.1	43.1
4/16/2025	6:52 PM	49	71.7	36.3	49.1	41.4
4/16/2025	7:02 PM	50.3	75.3	38	47.2	40.9
4/16/2025	7:12 PM	44.9	60.1	36.7	47.5	40.7
4/16/2025	7:22 PM	45.2	55.6	38.1	48.1	41.1
4/16/2025	7:32 PM	43.8	54.7	37.7	46.3	40.1
4/16/2025	7:42 PM	42.6	56.1	36.8	44.5	39.8
4/16/2025	7:52 PM	44.2	52.7	37	46.6	40.4
4/16/2025	8:02 PM	47.2	58.6	38	50.6	41.5
4/16/2025	8:12 PM	46.1	59.5	37.9	49	40.7
4/16/2025	8:22 PM	45.1	55.8	37.5	47.4	41.2
4/16/2025	8:32 PM	44.7	55	38.8	47.2	41.4
4/16/2025	8:42 PM	46.2	58.5	37.1	49.6	40.4
4/16/2025	8:52 PM	45.2	62.3	36.7	47.6	40.5
4/16/2025	9:02 PM	65.4	102	35.8	47	38.9
4/16/2025	9:12 PM	46	67.5	35	47.7	39.4
4/16/2025	9:22 PM	46.5	55.8	37.2	51.1	40.3
4/16/2025	9:32 PM	39.8	50	32.3	42.4	35.4
4/16/2025	9:42 PM	38.3	48.9	32.3	40.9	34.3
4/16/2025	9:52 PM	43.4	67.2	29.5	41.2	32.1
4/16/2025	10:02 PM	35.7	49.5	27.6	38.1	31.3
4/16/2025	10:12 PM	37.8	50.8	28.6	40.6	32.8
4/16/2025	10:22 PM	38.2	49.4	29.9	41.6	32.9
4/16/2025	10:32 PM	35.3	47.2	27	37.6	31.3
4/16/2025	10:42 PM	35.5	45.7	27.1	38.2	30.9
4/16/2025	10:52 PM	38.4	46.9	28.7	41.4	32.6
4/16/2025	11:02 PM	40.6	49.2	32.7	43.3	36
4/16/2025	11:12 PM	60.8	81	31.6	46.4	36
4/16/2025	11:22 PM	67.3	83.2	31.1	72.8	35.6
4/16/2025	11:32 PM	63.8	79.1	30.6	69.6	34.9
4/16/2025	11:42 PM	66.6	84.8	29.3	67.3	32.3
4/16/2025	11:52 PM	50.4	71.7	28.5	43.8	30.7
4/17/2025	12:02 AM	36.7	45.5	27.6	39.3	32.3
4/17/2025	12:12 AM	48.3	70.7	25.9	44.3	28.6
4/17/2025	12:22 AM	42.1	55.8	30.7	42.3	34.3
4/17/2025	12:32 AM	39.6	46.9	32	42.2	34.4
4/17/2025	12:42 AM	40.8	56.1	28.7	44	32.6
4/17/2025	12:52 AM	37.2	46.6	29.2	41	31.5
4/17/2025	1:02 AM	39.4	61.3	32.1	40.5	34.7
4/17/2025	1:12 AM	37.8	47.7	33	40	34.7
4/17/2025	1:22 AM	38.1	47.9	28.7	41.6	31.7
4/17/2025	1:32 AM	38.5	49.7	28.9	41.5	32.1

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/17/2025	1:42 AM	55.5	75.7	26.7	48.2	28.8
4/17/2025	1:52 AM	52	74.8	32.2	48.7	35.6
4/17/2025	2:02 AM	39.7	50.6	29.9	43	33.2
4/17/2025	2:12 AM	36.1	46.2	28	39.2	31.3
4/17/2025	2:22 AM	51.7	72.9	27.1	40.5	29.1
4/17/2025	2:32 AM	41.3	53.3	31.8	45.2	34.4
4/17/2025	2:42 AM	36.1	48.2	27.3	39.6	29.3
4/17/2025	2:52 AM	51.6	69.3	26.5	56.8	28.4
4/17/2025	3:02 AM	56.9	73.4	29.3	61.8	33.9
4/17/2025	3:12 AM	48.8	69.7	25.6	42.9	28.9
4/17/2025	3:22 AM	38.2	59.6	26.8	41	28.4
4/17/2025	3:32 AM	38.2	49.6	29.3	41	32.9
4/17/2025	3:42 AM	36.8	48.4	28.2	39.7	30
4/17/2025	3:52 AM	45.8	74	28.8	35.3	30.3
4/17/2025	4:02 AM	38.2	47.7	31.9	41	33.9
4/17/2025	4:12 AM	34.9	46.4	27.2	37.9	29.8
4/17/2025	4:22 AM	37.5	47.6	28.5	41	31.4
4/17/2025	4:32 AM	46.8	64.6	29.1	48.3	30.7
4/17/2025	4:42 AM	46.9	67.6	24.6	36.1	26.2
4/17/2025	4:52 AM	44.7	68.2	29.2	41.5	31.2
4/17/2025	5:02 AM	44.2	57.9	28.1	48.2	30.8
4/17/2025	5:12 AM	37.9	67.4	27.4	35	28.7
4/17/2025	5:22 AM	37.8	44.3	31.4	40.3	34.3
4/17/2025	5:32 AM	39.2	50.7	32	42.3	34.8
4/17/2025	5:42 AM	35.8	51.2	26.8	37.6	29.7
4/17/2025	5:52 AM	37.9	50.1	30.9	40.1	34.1
4/17/2025	6:02 AM	42.7	64.7	31.8	42.3	34.1
4/17/2025	6:12 AM	42.6	62.6	30	42.5	33.7
4/17/2025	6:22 AM	45.2	70.2	31.4	45.3	35.6
4/17/2025	6:32 AM	45.7	58.4	35.6	49.1	39.4
4/17/2025	6:42 AM	47.7	71.6	30	42.9	33.2
4/17/2025	6:52 AM	39.6	50.3	31.9	42.1	35.2
4/17/2025	7:02 AM	42.4	50	35.8	45.2	38.3
4/17/2025	7:12 AM	44.2	56.7	28	47.8	34.3
4/17/2025	7:22 AM	43.4	54.3	34.7	46.3	38.2
4/17/2025	7:32 AM	41.3	62.2	30.8	44.1	33.9
4/17/2025	7:42 AM	42.1	53.1	32.1	45.8	35.7
4/17/2025	7:52 AM	42.1	51.2	30.9	45.5	34.9
4/17/2025	8:02 AM	39.3	52.9	27.4	42.5	32
4/17/2025	8:12 AM	39.9	50.1	31.5	42.5	35.2
4/17/2025	8:22 AM	39.2	51.8	31.1	42	34.7
4/17/2025	8:32 AM	39.3	50.9	32	41.9	35.5
4/17/2025	8:42 AM	40.4	65.8	32.7	42.4	35.2

NA-5 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
4/16/2025	8:41 AM	5,3	10,8	63
4/16/2025	8:51 AM	5,6	11,2	60
4/16/2025	9:01 AM	5,4	9,7	59
4/16/2025	9:11 AM	5,2	11,2	68
4/16/2025	9:21 AM	4,8	11,0	76
4/16/2025	9:31 AM	5,5	11,3	75
4/16/2025	9:41 AM	5,1	11,3	72
4/16/2025	9:51 AM	4,7	10,0	79
4/16/2025	10:01 AM	5,4	11,9	84
4/16/2025	10:11 AM	5,8	11,8	91
4/16/2025	10:21 AM	5,6	12,2	93
4/16/2025	10:31 AM	5,3	11,0	83
4/16/2025	10:41 AM	5,0	9,7	70
4/16/2025	10:51 AM	5,3	10,4	66
4/16/2025	11:01 AM	5,5	10,5	60
4/16/2025	11:11 AM	5,2	10,8	61
4/16/2025	11:21 AM	5,3	10,3	67
4/16/2025	11:31 AM	5,1	10,8	76
4/16/2025	11:41 AM	5,3	10,6	73
4/16/2025	11:51 AM	5,2	10,3	75
4/16/2025	12:01 PM	5,1	10,8	71
4/16/2025	12:11 PM	5,3	9,9	64
4/16/2025	12:21 PM	5,6	11,9	65
4/16/2025	12:31 PM	6,1	14,8	65
4/16/2025	12:41 PM	6,3	12,1	62
4/16/2025	12:51 PM	6,3	11,8	60
4/16/2025	1:01 PM	7,1	12,7	57
4/16/2025	1:11 PM	7,4	12,5	51
4/16/2025	1:21 PM	7,2	12,2	55
4/16/2025	1:31 PM	6,9	13,1	56
4/16/2025	1:41 PM	6,7	12,9	62
4/16/2025	1:51 PM	7,0	14,3	55
4/16/2025	2:01 PM	7,6	13,9	51
4/16/2025	2:11 PM	7,3	13,5	56
4/16/2025	2:21 PM	7,5	13,9	55
4/16/2025	2:31 PM	8,2	14,1	50
4/16/2025	2:41 PM	7,5	15,0	53
4/16/2025	2:51 PM	7,2	16,3	55
4/16/2025	3:01 PM	6,7	13,2	57
4/16/2025	3:11 PM	6,2	12,3	62
4/16/2025	3:21 PM	5,8	11,3	64
4/16/2025	3:31 PM	5,6	11,4	66
4/16/2025	3:41 PM	5,2	10,2	69
4/16/2025	3:51 PM	5,8	11,0	61
4/16/2025	4:01 PM	5,8	10,2	60

Date	Time	Wind speed	Wind speed max	Wind direction
4/16/2025	4:11 PM	6,4	12,1	60
4/16/2025	4:21 PM	5,6	11,0	65
4/16/2025	4:31 PM	6,1	10,5	61
4/16/2025	4:41 PM	6,3	10,6	59
4/16/2025	4:51 PM	6,2	12,1	57
4/16/2025	5:01 PM	5,8	9,9	60
4/16/2025	5:11 PM	5,9	11,6	62
4/16/2025	5:21 PM	6,7	12,5	57
4/16/2025	5:31 PM	6,5	11,0	60
4/16/2025	5:41 PM	6,3	11,8	58
4/16/2025	5:51 PM	5,8	11,4	63
4/16/2025	6:01 PM	6,1	11,2	61
4/16/2025	6:11 PM	5,9	11,6	54
4/16/2025	6:21 PM	5,1	9,3	56
4/16/2025	6:31 PM	5,4	9,3	55
4/16/2025	6:41 PM	5,3	9,3	56
4/16/2025	6:51 PM	5,4	8,9	56
4/16/2025	7:01 PM	5,2	9,4	56
4/16/2025	7:11 PM	4,4	8,1	61
4/16/2025	7:21 PM	4,6	9,1	60
4/16/2025	7:31 PM	4,7	7,8	59
4/16/2025	7:41 PM	4,6	9,2	60
4/16/2025	7:51 PM	4,7	7,8	55
4/16/2025	8:01 PM	4,6	7,9	54
4/16/2025	8:11 PM	5,8	10,1	51
4/16/2025	8:21 PM	5,7	10,1	46
4/16/2025	8:31 PM	5,2	9,2	37
4/16/2025	8:41 PM	5,2	8,5	38
4/16/2025	8:51 PM	5,4	9,7	38
4/16/2025	9:01 PM	5,4	9,5	41
4/16/2025	9:11 PM	4,7	8,1	38
4/16/2025	9:21 PM	5,2	9,5	36
4/16/2025	9:31 PM	4,7	8,7	27
4/16/2025	9:41 PM	4,0	6,8	23
4/16/2025	9:51 PM	3,8	7,3	16
4/16/2025	10:01 PM	3,1	6,3	29
4/16/2025	10:11 PM	2,9	5,1	36
4/16/2025	10:21 PM	3,3	6,0	37
4/16/2025	10:31 PM	3,2	6,1	45
4/16/2025	10:41 PM	3,1	5,4	54
4/16/2025	10:51 PM	1,9	4,9	81
4/16/2025	11:01 PM	2,1	4,5	108
4/16/2025	11:11 PM	2,0	4,7	92
4/16/2025	11:21 PM	1,6	3,8	94
4/16/2025	11:31 PM	1,6	2,6	22

Date	Time	Wind speed	Wind speed max	Wind direction
4/16/2025	11:41 PM	0,7	2,0	353
4/16/2025	11:51 PM	0,4	1,4	345
4/17/2025	12:01 AM	0,5	1,4	8
4/17/2025	12:11 AM	0,4	1,1	16
4/17/2025	12:21 AM	0,3	1,2	237
4/17/2025	12:31 AM	0,8	1,3	253
4/17/2025	12:41 AM	0,8	1,3	245
4/17/2025	12:51 AM	0,3	0,9	255
4/17/2025	1:01 AM	0,4	0,9	249
4/17/2025	1:11 AM	0,2	0,7	256
4/17/2025	1:21 AM	0,2	0,7	301
4/17/2025	1:31 AM	0,4	0,7	289
4/17/2025	1:41 AM	0,2	0,8	259
4/17/2025	1:51 AM	0,1	0,8	160
4/17/2025	2:01 AM	0,0	0,5	232
4/17/2025	2:11 AM	0,1	0,6	155
4/17/2025	2:21 AM	0,1	0,7	308
4/17/2025	2:31 AM	0,6	0,7	249
4/17/2025	2:41 AM	0,1	0,5	274
4/17/2025	2:51 AM	0,3	1,0	316
4/17/2025	3:01 AM	0,2	0,8	313
4/17/2025	3:11 AM	0,5	1,2	321
4/17/2025	3:21 AM	0,3	1,2	269
4/17/2025	3:31 AM	0,1	0,8	264
4/17/2025	3:41 AM	0,3	0,6	303
4/17/2025	3:51 AM	0,3	0,7	265
4/17/2025	4:01 AM	0,1	0,9	320
4/17/2025	4:11 AM	0,1	0,9	344
4/17/2025	4:21 AM	0,4	0,9	279
4/17/2025	4:31 AM	0,2	0,7	286
4/17/2025	4:41 AM	0,3	1,3	328
4/17/2025	4:51 AM	0,3	0,8	238
4/17/2025	5:01 AM	0,4	0,9	316
4/17/2025	5:11 AM	1,2	1,8	335
4/17/2025	5:21 AM	0,4	1,1	247
4/17/2025	5:31 AM	0,5	1,3	314
4/17/2025	5:41 AM	1,1	1,6	338
4/17/2025	5:51 AM	0,5	0,7	182
4/17/2025	6:01 AM	0,4	0,9	292
4/17/2025	6:11 AM	0,4	0,9	290
4/17/2025	6:21 AM	0,4	0,9	313
4/17/2025	6:31 AM	0,3	0,9	339
4/17/2025	6:41 AM	0,5	1,4	301
4/17/2025	6:51 AM	0,8	1,6	345
4/17/2025	7:01 AM	0,2	1,3	346

Date	Time	Wind speed	Wind speed max	Wind direction
4/17/2025	7:11 AM	0,3	0,7	291
4/17/2025	7:21 AM	0,6	1,2	317
4/17/2025	7:31 AM	0,7	1,1	32
4/17/2025	7:41 AM	0,6	1,2	97
4/17/2025	7:51 AM	0,6	1,0	166
4/17/2025	8:01 AM	0,9	1,8	117
4/17/2025	8:11 AM	0,7	1,3	92
4/17/2025	8:21 AM	1,4	3,2	221
4/17/2025	8:31 AM	2,2	3,9	218
4/17/2025	8:41 AM	2,2	4,4	224

NA-5 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
4/16/2025	8:45 AM	235.11	9.26	0	1.01	1.79
4/16/2025	9:00 AM	239.57	29.57	0	0.98	2.21
4/16/2025	9:15 AM	237.86	36.14	0	1.61	3.54
4/16/2025	9:30 AM	238.08	35.41	0	1.57	3.23
4/16/2025	9:45 AM	236.35	38.07	0	1.49	2.72
4/16/2025	10:00 AM	247.35	36.19	0	1.62	3.45
4/16/2025	10:15 AM	252.7	33.02	0	1.98	4.21
4/16/2025	10:30 AM	268.63	32.55	0	3.8	7.85
4/16/2025	10:45 AM	278.62	30.66	0	5.16	10.42
4/16/2025	11:00 AM	276.27	32.2	0	4.93	9.91
4/16/2025	11:15 AM	282.37	34.38	0	4.5	8.37
4/16/2025	11:30 AM	274.62	35.39	0	4.17	8.57
4/16/2025	11:45 AM	276.45	37.24	0	3.97	7.7
4/16/2025	12:00 PM	275.78	37.55	0	4.13	8.19
4/16/2025	12:15 PM	272.19	37.72	0	4.23	8.76
4/16/2025	12:30 PM	260.82	37.88	0	3.97	8.34
4/16/2025	12:45 PM	250.53	38.66	0	3.71	7.81
4/16/2025	1:00 PM	241.66	37.82	0	3.93	8.42
4/16/2025	1:15 PM	241.9	40.03	0	4.37	9.54
4/16/2025	1:30 PM	240.24	39.23	0	4.52	10.15
4/16/2025	1:45 PM	236.81	36.71	0	3.94	7.64
4/16/2025	2:00 PM	242.26	37.82	0	4.01	15.31
4/16/2025	2:15 PM	233.6	36.14	0	3.14	7.97
4/16/2025	2:30 PM	222.55	38.62	0	2.68	5.15
4/16/2025	2:45 PM	220.19	37.82	0	2.48	4.62
4/16/2025	3:00 PM	213.99	39	0	2.58	5.34
4/16/2025	3:15 PM	208.19	37.76	0	2.61	5.39
4/16/2025	3:30 PM	191.29	42.25	0	2.18	4.52
4/16/2025	3:45 PM	173.92	38.93	0	2.21	4.21
4/16/2025	4:00 PM	166.82	43.59	0	2.09	3.62
4/16/2025	4:15 PM	164.47	39.16	0	2.44	5.29
4/16/2025	4:30 PM	160.49	34.27	0	2.73	5.8
4/16/2025	4:45 PM	169.39	32.28	0	2.65	5.21
4/16/2025	5:00 PM	169.97	31.08	0	2.43	4.63

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
4/16/2025	5:15 PM	169.33	32.39	0	2.51	6.06
4/16/2025	5:30 PM	162.67	32.45	0	2.02	3.84
4/16/2025	5:45 PM	166.13	34.84	0	1.96	3.87
4/16/2025	6:00 PM	179.38	34.07	0	1.91	3.95
4/16/2025	6:15 PM	188.05	33.06	0	1.66	3.06
4/16/2025	6:30 PM	195.16	31.25	0	1.75	3.5
4/16/2025	6:45 PM	207.65	30.41	0	1.85	3.55
4/16/2025	7:00 PM	216.79	30.87	0	1.86	3.9
4/16/2025	7:15 PM	224.9	30.83	0	1.83	3.55
4/16/2025	7:30 PM	219.3	31.5	0	1.76	3.42
4/16/2025	7:45 PM	215.32	35.03	0	1.37	2.63
4/16/2025	8:00 PM	213.56	35.32	0	1.25	2.37
4/16/2025	8:15 PM	214.05	37.23	0	1.2	2.31
4/16/2025	8:30 PM	214.58	37	0	1.2	2.18
4/16/2025	8:45 PM	213.29	36.92	0	0.94	1.54
4/16/2025	9:00 PM	207.2	37.55	0	0.8	1.42
4/16/2025	9:15 PM	197.38	38.98	0	0.51	0.87
4/16/2025	9:30 PM	192.15	40.84	0	0.49	0.94
4/16/2025	9:45 PM	190	40.3	0	0.51	0.88
4/16/2025	10:00 PM	194.49	36.88	0	0.54	1.01
4/16/2025	10:15 PM	214.02	27.54	0	0.69	1.42
4/16/2025	10:30 PM	229.04	14.73	0	0.59	0.99
4/16/2025	10:45 PM	227.99	4.97	0	0.54	0.92
4/16/2025	11:00 PM	232.33	10.24	0	0.47	0.89
4/16/2025	11:15 PM	236.21	26.32	0	0.4	0.7
4/16/2025	11:30 PM	244.53	26.72	0	0.42	0.69
4/16/2025	11:45 PM	277.11	26.7	0	0.4	0.73
4/17/2025	12:00 AM	294.31	23.28	0	0.39	0.73
4/17/2025	12:15 AM	320.03	23.3	0	0.36	0.51
4/17/2025	12:30 AM	333.36	13.12	0	0.35	0.57
4/17/2025	12:45 AM	341.92	21.68	0	0.38	0.57
4/17/2025	1:00 AM	375.09	25.35	0	0.42	0.74
4/17/2025	1:15 AM	381.01	23.88	0	0.36	0.52
4/17/2025	1:30 AM	393.67	27.24	0	0.39	0.64
4/17/2025	1:45 AM	405.28	23.32	0	0.35	0.56
4/17/2025	2:00 AM	417.47	25	0	0.32	0.44
4/17/2025	2:15 AM	428.08	27.58	0	0.41	0.74
4/17/2025	2:30 AM	434.6	24.39	0	0.38	0.55
4/17/2025	2:45 AM	437.74	26.13	0	0.39	0.67
4/17/2025	3:00 AM	454.47	25.52	0	0.37	0.53
4/17/2025	3:15 AM	457.14	23.61	0	0.33	0.55
4/17/2025	3:30 AM	469.25	21.37	0	0.34	0.5
4/17/2025	3:45 AM	475.38	22.67	0	0.38	0.61
4/17/2025	4:00 AM	491.51	24.05	0	0.37	0.72
4/17/2025	4:15 AM	500.28	28.97	0	0.39	0.72
4/17/2025	4:30 AM	497.72	27.2	0	0.4	0.64
4/17/2025	4:45 AM	485.47	24.03	0	0.4	0.63
4/17/2025	5:00 AM	484.1	23.68	0	0.4	0.7
4/17/2025	5:15 AM	488.05	30.6	0	0.37	0.59

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
4/17/2025	5:30 AM	476.08	24.05	0	0.38	0.6
4/17/2025	5:45 AM	484.13	28.67	0	0.4	0.66
4/17/2025	6:00 AM	495.45	24.28	0	0.52	1.16
4/17/2025	6:15 AM	528.8	26.66	0	0.48	0.78
4/17/2025	6:30 AM	521.73	30.16	0	0.53	1.25
4/17/2025	6:45 AM	453.84	37.46	0	0.33	0.48
4/17/2025	7:00 AM	416.24	39.67	0	0.37	0.6
4/17/2025	7:15 AM	375.89	49.39	0	0.31	0.44
4/17/2025	7:30 AM	336.88	53.08	0	0.28	0.47
4/17/2025	7:45 AM	297.78	49.76	0	0.32	0.5
4/17/2025	8:00 AM	247.61	48.7	0	0.86	4.83
4/17/2025	8:15 AM	241.35	46.55	0	1.03	9.1
4/17/2025	8:30 AM	115.08	49.97	0	0.79	2.69

NA-6 Noise load

Date	Time	LAeq	LAm _{ax}	LAm _{in}	LA10	LA90
4/13/2025	11:38 AM	29.5	46	20.4	31.5	22
4/13/2025	11:48 AM	32.1	52.9	19.8	33.4	22.2
4/13/2025	11:58 AM	28.9	47.1	19.9	32.2	21.3
4/13/2025	12:08 PM	29.6	51.3	19.5	32.7	21
4/13/2025	12:18 PM	25	39.7	19.4	27.3	21.1
4/13/2025	12:28 PM	25.2	53.6	19.6	25	20.7
4/13/2025	12:38 PM	25.3	43.1	20.2	27	21.8
4/13/2025	12:48 PM	26.6	39.7	19.8	29.9	21.4
4/13/2025	12:58 PM	24.7	42.4	19.2	27.8	20.4
4/13/2025	1:08 PM	35.6	46.3	19.4	40.2	21.6
4/13/2025	1:18 PM	39.9	47.7	30.5	42.2	36.2
4/13/2025	1:28 PM	29.5	45.9	19.6	30.1	20.6
4/13/2025	1:38 PM	25.2	43.1	19.5	26.9	20.9
4/13/2025	1:48 PM	27.4	43.2	19.4	31.1	20.7
4/13/2025	1:58 PM	25.9	42	18.8	28.3	20.1
4/13/2025	2:08 PM	30.1	46.4	19.7	33.5	20.9
4/13/2025	2:18 PM	22.8	39.5	19.5	23.6	20.6
4/13/2025	2:28 PM	24	36.9	19.8	26.3	20.9
4/13/2025	2:38 PM	23.3	40.9	19.3	25.2	20.5
4/13/2025	2:48 PM	25	38.8	20.2	26.7	21.8
4/13/2025	2:58 PM	30	57.5	21.4	26.3	22.3
4/13/2025	3:08 PM	25.2	38.7	20.1	27.9	21.6
4/13/2025	3:18 PM	28.9	58.3	20	29.4	21.5
4/13/2025	3:28 PM	29.3	47.2	19.9	31.2	21.5
4/13/2025	3:38 PM	27.3	48	20.5	29.7	22.1
4/13/2025	3:48 PM	29.8	49.1	20.9	32.9	22.4
4/13/2025	3:58 PM	31.6	48.5	20.2	35.5	22.5
4/13/2025	4:08 PM	28.8	47.8	21.1	30.2	23
4/13/2025	4:18 PM	28.1	53.4	20.6	27.8	21.8

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/13/2025	4:28 PM	25.8	43.2	20.9	28	22.3
4/13/2025	4:38 PM	29.4	49.6	20.8	32.2	23.1
4/13/2025	4:48 PM	29.2	53.6	21.2	32.8	22.6
4/13/2025	4:58 PM	27.5	48.1	21	29.8	22.5
4/13/2025	5:08 PM	29.1	53.6	20.2	29.1	21.6
4/13/2025	5:18 PM	27.3	43.7	19.6	29.9	20.9
4/13/2025	5:28 PM	38.6	67	20.3	40.7	21.9
4/13/2025	5:38 PM	26.1	52.4	20.3	26.9	21.5
4/13/2025	5:48 PM	28.2	53.6	20	28.9	21.5
4/13/2025	5:58 PM	42.4	77.9	19.8	37.1	21.8
4/13/2025	6:08 PM	24.6	42.1	19.6	25.7	20.8
4/13/2025	6:18 PM	30.1	49.4	20.3	29.5	21.9
4/13/2025	6:28 PM	27.3	45.2	19.9	29.8	21.5
4/13/2025	6:38 PM	22.8	40.9	19.2	24.2	20.2
4/13/2025	6:48 PM	24	45.3	19.1	23.4	20.2
4/13/2025	6:58 PM	23.8	42.6	19.3	25.1	20.6
4/13/2025	7:08 PM	23.8	44.5	18.9	24.8	20.1
4/13/2025	7:18 PM	24.1	44.5	19.1	24.9	20.3
4/13/2025	7:28 PM	26.4	45.6	18.6	29.7	19.6
4/13/2025	7:38 PM	21.7	33.4	18.8	22.7	20
4/13/2025	7:48 PM	23.2	37.2	18.9	24.8	20.5
4/13/2025	7:58 PM	26.2	37.1	19.4	29.5	21.1
4/13/2025	8:08 PM	30.3	45.5	21.4	33.3	23.9
4/13/2025	8:18 PM	30.9	41	20	34.2	24.4
4/13/2025	8:28 PM	33	45.5	24.2	35.9	28.4
4/13/2025	8:38 PM	37.2	49	30.2	39.9	33.1
4/13/2025	8:48 PM	43.3	65.6	33.6	46.3	36.6
4/13/2025	8:58 PM	45.3	59.3	36.5	48.5	39.4
4/13/2025	9:08 PM	42.9	56.2	36.3	45.6	38.4
4/13/2025	9:18 PM	42.8	56.3	36.1	45.8	37.9
4/13/2025	9:28 PM	38.2	52.5	29	41.9	31.6
4/13/2025	9:38 PM	37.3	50.1	31.3	40.2	33.2
4/13/2025	9:48 PM	37.3	52.2	29.4	39.7	33.2
4/13/2025	9:58 PM	36.2	51.8	26.5	39.4	29.3
4/13/2025	10:08 PM	33.8	42.7	27.4	36.8	30
4/13/2025	10:18 PM	32.2	45.1	24.5	35.3	27.2
4/13/2025	10:28 PM	31	39.9	23.2	34.2	25.8
4/13/2025	10:38 PM	33.5	47.2	28	35.7	30.3
4/13/2025	10:48 PM	35	54.2	27.6	37.1	30.1
4/13/2025	10:58 PM	43.2	77.3	28.1	39.4	29.9
4/13/2025	11:08 PM	34	45.1	27.3	36.1	29.8
4/13/2025	11:18 PM	33	42.6	26.8	35.3	29.1
4/13/2025	11:28 PM	31.8	51.6	25.4	34.7	27.6
4/13/2025	11:38 PM	30.5	39.8	24.6	32.4	28
4/13/2025	11:48 PM	29.2	44	23.6	31	25.8

Date	Time	LAeq	LAmx	LAmín	LA10	LA90
4/13/2025	11:58 PM	53.9	75.6	24.2	51.2	26.4
4/14/2025	12:08 AM	39.4	55.4	33.7	41.3	36.3
4/14/2025	12:18 AM	39.9	50.1	33.6	43	35.6
4/14/2025	12:28 AM	40.4	54.4	32.9	43.1	34.5
4/14/2025	12:38 AM	41.4	56.6	34	43.8	36
4/14/2025	12:48 AM	42.2	58.9	33.2	44.7	36.3
4/14/2025	12:58 AM	40	53.8	35.1	42	36.8
4/14/2025	1:08 AM	41.9	58.2	32.9	44.5	35.6
4/14/2025	1:18 AM	39.5	51.1	32.2	42.5	34.3
4/14/2025	1:28 AM	38.2	49.2	30.7	41	33.1
4/14/2025	1:38 AM	39.5	56.1	29.1	41.9	33.8
4/14/2025	1:48 AM	34.4	45.8	28.7	37.2	30.2
4/14/2025	1:58 AM	32.4	48.9	27.2	34.6	28.4
4/14/2025	2:08 AM	40.9	59.6	30.5	44.7	31.7
4/14/2025	2:18 AM	34.8	49.6	30.7	37.4	31.8
4/14/2025	2:28 AM	33.9	44.7	26.5	36.9	28.8
4/14/2025	2:38 AM	29.7	39.5	25.8	32	27.2
4/14/2025	2:48 AM	30.7	42.6	25.6	33.3	26.7
4/14/2025	2:58 AM	32.4	45	28.3	34.6	29.5
4/14/2025	3:08 AM	36.1	47.2	30.6	38.6	32.8
4/14/2025	3:18 AM	44.8	53.1	37.8	46.9	40
4/14/2025	3:28 AM	44.3	55.1	41.3	46	42.4
4/14/2025	3:38 AM	42	47.1	39	42.7	40.6
4/14/2025	3:48 AM	42.5	49.9	39.7	44	40.8
4/14/2025	3:58 AM	45.8	60.1	40.4	48.8	41.4
4/14/2025	4:08 AM	42.3	53.1	40.3	43.3	41.1
4/14/2025	4:18 AM	40.4	44.1	38.6	41.1	39.5
4/14/2025	4:28 AM	38.7	51.9	35.8	40.8	36.7
4/14/2025	4:38 AM	36.1	39.8	34.4	36.9	35.4
4/14/2025	4:48 AM	36.1	38.8	34.7	36.5	35.6
4/14/2025	4:58 AM	35.8	40.1	32.8	37	34.1
4/14/2025	5:08 AM	33.9	37.6	29.5	35.6	31.4
4/14/2025	5:18 AM	31.5	37.6	27.4	33.2	29.1
4/14/2025	5:28 AM	31.8	41.6	28.2	33.4	29.7
4/14/2025	5:38 AM	38.8	49.6	29.1	43.5	30.5
4/14/2025	5:48 AM	33.5	45	29.3	35.9	30.6
4/14/2025	5:58 AM	33.3	38.8	29.1	34.9	30.4
4/14/2025	6:08 AM	33.5	40.5	31.4	34.2	32.8
4/14/2025	6:18 AM	33.5	48.9	30	35.7	31.1
4/14/2025	6:28 AM	34.4	51.6	29.7	36.7	30.5
4/14/2025	6:38 AM	31.6	46.1	29.1	33.4	29.9
4/14/2025	6:48 AM	34.8	48.2	28.6	38.5	29.8
4/14/2025	6:58 AM	41.2	74.1	28.2	36.7	29
4/14/2025	7:08 AM	32.1	53.2	26.9	35	28.2
4/14/2025	7:18 AM	35.7	53.7	26.4	37.8	28.3

Date	Time	LAeq	LAmx	LAmn	LA10	LA90
4/14/2025	7:28 AM	32.9	47.5	25.7	36.8	27.1
4/14/2025	7:38 AM	36.9	63	25.2	37.4	27.2
4/14/2025	7:48 AM	44.8	72	25.7	45	27.7
4/14/2025	7:58 AM	33	48.4	25.5	35.7	27
4/14/2025	8:08 AM	42.2	65	25.5	37.8	27.3
4/14/2025	8:18 AM	34.1	51.4	23.6	37.2	25.5
4/14/2025	8:28 AM	32.1	53.4	21.7	34.1	24.1
4/14/2025	8:38 AM	34.7	56.4	21	36.2	22.7
4/14/2025	8:48 AM	43.1	61.6	21.9	45.7	24.7
4/14/2025	8:58 AM	37.2	57.5	22	37.7	24.7
4/14/2025	9:08 AM	39.3	59.1	21.5	41.4	24.4
4/14/2025	9:18 AM	32.9	50.9	21.4	36.6	23.4
4/14/2025	9:28 AM	31.5	48.6	21.7	34.6	24.8
4/14/2025	9:38 AM	34.1	49.8	22.8	37.6	25
4/14/2025	9:48 AM	30.1	50.1	22.4	32.2	24
4/14/2025	9:58 AM	29	44.7	22.9	32	24.4
4/14/2025	10:08 AM	28.8	49.2	22.6	31.4	24.6
4/14/2025	10:18 AM	29.7	46.8	22.5	32.2	24.1
4/14/2025	10:28 AM	34	51.2	21.8	36.7	23.6
4/14/2025	10:38 AM	32.3	52	21.2	35.5	23.3
4/14/2025	10:48 AM	31.5	52.3	20.8	33.1	22.7
4/14/2025	10:58 AM	27.2	42.6	21	29.7	23.2
4/14/2025	11:08 AM	30.7	47.1	22.3	34.7	23.9
4/14/2025	11:18 AM	31.2	53.9	22.4	32.5	24.5
4/14/2025	11:28 AM	35.1	56.7	22.9	38.1	25
4/14/2025	11:38 AM	32	51.3	22.9	35.3	24.5

NA-6 Wind conditions

Date	Time	Wind speed	Wind speed max	Wind direction
4/13/2025	11:40 AM	2,4	18,0	2
4/13/2025	11:50 AM	2,2	4,9	275
4/13/2025	12:00 PM	2,8	6,3	95
4/13/2025	12:10 PM	2,4	4,8	88
4/13/2025	12:20 PM	1,9	6,5	109
4/13/2025	12:30 PM	1,9	5,1	233
4/13/2025	12:40 PM	1,7	3,6	226
4/13/2025	12:50 PM	3,6	6,2	253
4/13/2025	1:00 PM	2,1	4,5	313
4/13/2025	1:10 PM	2,1	5,3	95
4/13/2025	1:20 PM	2,1	5,4	199
4/13/2025	1:30 PM	2,6	6,7	115
4/13/2025	1:40 PM	2,3	6,0	89
4/13/2025	1:50 PM	2,4	6,3	50
4/13/2025	2:00 PM	2,1	4,3	24

Date	Time	Wind speed	Wind speed max	Wind direction
4/13/2025	2:10 PM	1,9	5,4	234
4/13/2025	2:20 PM	1,9	3,5	263
4/13/2025	2:30 PM	1,5	2,9	179
4/13/2025	2:40 PM	1,6	4,2	348
4/13/2025	2:50 PM	2,4	4,6	83
4/13/2025	3:00 PM	2,0	4,8	310
4/13/2025	3:10 PM	2,3	4,2	278
4/13/2025	3:20 PM	2,1	5,1	319
4/13/2025	3:30 PM	1,9	5,7	49
4/13/2025	3:40 PM	2,6	5,4	285
4/13/2025	3:50 PM	2,4	5,4	308
4/13/2025	4:00 PM	1,9	4,2	334
4/13/2025	4:10 PM	2,3	4,1	353
4/13/2025	4:20 PM	2,7	4,6	338
4/13/2025	4:30 PM	2,0	5,1	333
4/13/2025	4:40 PM	2,6	4,5	340
4/13/2025	4:50 PM	3,0	4,8	342
4/13/2025	5:00 PM	2,9	4,4	348
4/13/2025	5:10 PM	2,9	5,3	27
4/13/2025	5:20 PM	2,8	4,9	23
4/13/2025	5:30 PM	2,4	4,5	44
4/13/2025	5:40 PM	2,9	4,6	31
4/13/2025	5:50 PM	3,2	5,2	16
4/13/2025	6:00 PM	3,3	5,3	15
4/13/2025	6:10 PM	3,0	4,7	17
4/13/2025	6:20 PM	2,6	4,6	41
4/13/2025	6:30 PM	3,1	5,4	33
4/13/2025	6:40 PM	3,1	6,2	59
4/13/2025	6:50 PM	2,7	4,4	70
4/13/2025	7:00 PM	3,5	4,9	79
4/13/2025	7:10 PM	3,0	5,1	58
4/13/2025	7:20 PM	3,2	4,7	84
4/13/2025	7:30 PM	3,2	4,5	83
4/13/2025	7:40 PM	3,6	4,6	76
4/13/2025	7:50 PM	2,8	4,0	76
4/13/2025	8:00 PM	2,4	3,6	48
4/13/2025	8:10 PM	2,3	3,4	53
4/13/2025	8:20 PM	2,5	3,9	97
4/13/2025	8:30 PM	2,8	5,4	111
4/13/2025	8:40 PM	3,9	8,0	83
4/13/2025	8:50 PM	5,5	10,2	79
4/13/2025	9:00 PM	6,2	12,1	73
4/13/2025	9:10 PM	7,1	11,6	83
4/13/2025	9:20 PM	6,6	10,6	84
4/13/2025	9:30 PM	6,8	11,0	79

Date	Time	Wind speed	Wind speed max	Wind direction
4/13/2025	9:40 PM	3,7	8,3	98
4/13/2025	9:50 PM	4,2	7,6	86
4/13/2025	10:00 PM	4,9	9,1	85
4/13/2025	10:10 PM	3,9	7,8	90
4/13/2025	10:20 PM	3,0	5,7	89
4/13/2025	10:30 PM	2,8	6,3	97
4/13/2025	10:40 PM	2,2	4,9	92
4/13/2025	10:50 PM	3,9	7,2	84
4/13/2025	11:00 PM	4,7	8,1	83
4/13/2025	11:10 PM	3,4	6,2	90
4/13/2025	11:20 PM	4,2	9,1	78
4/13/2025	11:30 PM	4,4	8,4	79
4/13/2025	11:40 PM	4,1	6,9	79
4/13/2025	11:50 PM	3,8	7,0	70
4/14/2025	12:00 AM	3,2	6,8	73
4/14/2025	12:10 AM	3,7	10,1	84
4/14/2025	12:20 AM	4,7	9,0	88
4/14/2025	12:30 AM	4,9	8,2	82
4/14/2025	12:40 AM	5,6	10,8	77
4/14/2025	12:50 AM	6,3	10,8	76
4/14/2025	1:00 AM	5,7	11,5	84
4/14/2025	1:10 AM	4,9	9,3	106
4/14/2025	1:20 AM	5,1	9,3	93
4/14/2025	1:30 AM	4,7	8,6	97
4/14/2025	1:40 AM	5,3	8,3	103
4/14/2025	1:50 AM	4,8	7,9	102
4/14/2025	2:00 AM	4,3	8,1	101
4/14/2025	2:10 AM	3,8	8,0	107
4/14/2025	2:20 AM	4,7	7,7	105
4/14/2025	2:30 AM	4,1	8,5	107
4/14/2025	2:40 AM	4,1	6,2	87
4/14/2025	2:50 AM	4,4	6,8	87
4/14/2025	3:00 AM	4,8	7,6	77
4/14/2025	3:10 AM	4,4	8,0	77
4/14/2025	3:20 AM	3,7	6,2	77
4/14/2025	3:30 AM	3,3	7,8	81
4/14/2025	3:40 AM	2,2	4,8	78
4/14/2025	3:50 AM	2,1	3,3	266
4/14/2025	4:00 AM	2,6	6,0	226
4/14/2025	4:10 AM	2,2	4,3	242
4/14/2025	4:20 AM	1,3	2,9	209
4/14/2025	4:30 AM	1,1	2,0	27
4/14/2025	4:40 AM	1,8	2,8	67
4/14/2025	4:50 AM	2,0	2,8	67
4/14/2025	5:00 AM	2,0	3,1	71

Date	Time	Wind speed	Wind speed max	Wind direction
4/14/2025	5:10 AM	2,4	3,9	54
4/14/2025	5:20 AM	1,6	3,6	119
4/14/2025	5:30 AM	-	-	-
4/14/2025	5:40 AM	2,7	6,2	300
4/14/2025	5:50 AM	3,8	7,9	244
4/14/2025	6:00 AM	2,6	5,2	241
4/14/2025	6:10 AM	2,1	2,8	254
4/14/2025	6:20 AM	1,9	3,1	239
4/14/2025	6:30 AM	1,0	1,9	201
4/14/2025	6:40 AM	0,9	1,4	248
4/14/2025	6:50 AM	1,0	1,8	13
4/14/2025	7:00 AM	1,4	1,9	40
4/14/2025	7:10 AM	1,4	1,8	75
4/14/2025	7:20 AM	1,2	1,7	65
4/14/2025	7:30 AM	1,0	1,6	18
4/14/2025	7:40 AM	1,4	3,1	72
4/14/2025	7:50 AM	2,6	4,7	80
4/14/2025	8:00 AM	2,3	3,6	89
4/14/2025	8:10 AM	1,7	2,8	268
4/14/2025	8:20 AM	0,8	1,2	329
4/14/2025	8:30 AM	2,1	3,5	65
4/14/2025	8:40 AM	2,9	4,1	71
4/14/2025	8:50 AM	2,6	3,8	79
4/14/2025	9:00 AM	3,2	4,9	82
4/14/2025	9:10 AM	3,1	4,9	83
4/14/2025	9:20 AM	2,3	3,5	78
4/14/2025	9:30 AM	2,3	4,4	64
4/14/2025	9:40 AM	1,9	3,6	218
4/14/2025	9:50 AM	1,9	3,1	257
4/14/2025	10:00 AM	1,9	2,9	263
4/14/2025	10:10 AM	2,3	3,5	261
4/14/2025	10:20 AM	2,0	3,0	266
4/14/2025	10:30 AM	1,1	2,0	265
4/14/2025	10:40 AM	0,8	1,4	299
4/14/2025	10:50 AM	1,1	2,8	229
4/14/2025	11:00 AM	1,8	4,7	25
4/14/2025	11:10 AM	1,9	2,9	265
4/14/2025	11:20 AM	2,4	5,4	248
4/14/2025	11:30 AM	3,2	5,4	264
4/14/2025	11:40 AM	3,2	5,1	268

NA-6 Air quality

Date	Time	CO, µg/m³	NO2, µg/m³	SO2, µg/m³	PM2.5, µg/m³	PM10, µg/m³
4/13/2025	11:15 AM	0	29.05	0	0.92	2.75
4/13/2025	11:30 AM	0	31.84	0	0.73	2.55

Date	Time	CO, µg/m ³	NO2, µg/m ³	SO2, µg/m ³	PM2.5, µg/m ³	PM10, µg/m ³
4/13/2025	11:45 AM	0	33.81	0	0.71	3.37
4/13/2025	12:00 PM	0	30.29	0	0.75	2.74
4/13/2025	12:15 PM	0	30.29	0	0.56	1.25
4/13/2025	12:30 PM	0	35.91	0	0.63	2.08
4/13/2025	12:45 PM	0	33.06	0	0.7	2.37
4/13/2025	1:00 PM	0	33.94	0	0.72	2.35
4/13/2025	1:15 PM	0	37.26	0	0.75	2.42
4/13/2025	1:30 PM	0	35.32	0	0.75	2.4
4/13/2025	1:45 PM	0	33.67	0	0.74	2.57
4/13/2025	2:00 PM	0	48.28	0	0.81	2.19
4/13/2025	2:15 PM	0	46.87	0	1.01	3.43
4/13/2025	2:30 PM	0	45.5	0	0.84	3.28
4/13/2025	2:45 PM	0	47.85	0	0.92	3.23
4/13/2025	3:00 PM	0	43.97	0	0.89	3.12
4/13/2025	3:15 PM	0	46.45	0	0.85	4.02
4/13/2025	3:30 PM	0	51.02	0	0.85	3.1
4/13/2025	3:45 PM	0	42.44	0	0.89	2.67
4/13/2025	4:00 PM	0	43.72	0	0.91	4.06
4/13/2025	4:15 PM	0	43.07	0	0.83	3.03
4/13/2025	4:30 PM	16.86	45.74	0	0.75	2.27
4/13/2025	4:45 PM	35.18	39.65	0	0.74	3.94
4/13/2025	5:00 PM	32.84	41.62	0	0.74	3.33
4/13/2025	5:15 PM	84.26	42.96	0	0.7	3.08
4/13/2025	5:30 PM	28.29	38.26	0	0.72	3.34
4/13/2025	5:45 PM	39.74	44.29	0	0.86	4.79
4/13/2025	6:00 PM	61.67	40.47	0	0.75	3.02
4/13/2025	6:15 PM	69.6	41.05	0	0.83	3.2
4/13/2025	6:30 PM	71.55	36.1	0	0.74	4.04
4/13/2025	6:45 PM	76.62	35.97	0	0.77	4.51
4/13/2025	7:00 PM	79.07	37.03	0	0.58	3
4/13/2025	7:15 PM	74.92	34.07	0	0.43	1.77
4/13/2025	7:30 PM	98.03	34.61	0	0.27	0.47
4/13/2025	7:45 PM	100.92	41.16	0	0.5	2.14
4/13/2025	8:00 PM	105.84	47.29	0	0.95	3.55
4/13/2025	8:15 PM	98.54	46.36	0	1.25	3.74
4/13/2025	8:30 PM	99.84	44.45	0	1.41	3.66
4/13/2025	8:45 PM	99.92	40.32	0	0.87	2.26
4/13/2025	9:00 PM	103.19	45.55	0	0.7	1.73
4/13/2025	9:15 PM	108.56	44.9	0	0.67	1.73
4/13/2025	9:30 PM	101.24	41.2	0	0.52	0.89
4/13/2025	9:45 PM	101.63	40.42	0	0.43	1.14
4/13/2025	10:00 PM	102.98	42.84	0	0.76	2.06
4/13/2025	10:15 PM	97.65	46.07	0	0.75	2.35
4/13/2025	10:30 PM	93.37	44.79	0	0.82	2.71
4/13/2025	10:45 PM	93.09	42.63	0	0.74	1.79
4/13/2025	11:00 PM	93.37	40.51	0	0.62	1.42
4/13/2025	11:15 PM	107.15	53.98	0	0.93	2.4
4/13/2025	11:30 PM	106.04	52.6	0	1.27	2.9
4/13/2025	11:45 PM	137.76	54.45	0	1.53	4.38

Date	Time	CO, µg/m ³	NO ₂ , µg/m ³	SO ₂ , µg/m ³	PM _{2.5} , µg/m ³	PM ₁₀ , µg/m ³
4/14/2025	12:00 AM	156.96	53.71	0	1.88	4.48
4/14/2025	12:15 AM	169.58	53.4	0	1.42	3.12
4/14/2025	12:30 AM	182.86	52.98	0	1.53	3.9
4/14/2025	12:45 AM	203.85	54.78	0	1.77	4.21
4/14/2025	1:00 AM	198.36	52.62	0	1.61	3.19
4/14/2025	1:15 AM	198.01	57.09	0	1.6	3.1
4/14/2025	1:30 AM	204.7	54.99	0	2.38	4.99
4/14/2025	1:45 AM	220.59	53	0	2.88	6.57
4/14/2025	2:00 AM	228.59	53.75	0	3.91	7.8
4/14/2025	2:15 AM	216.46	58.73	0	2.5	5.12
4/14/2025	2:30 AM	195.12	54.24	0	1.75	3.54
4/14/2025	2:45 AM	181.78	48.99	0	0.78	1.53
4/14/2025	3:00 AM	224.64	50.18	0	0.56	0.87
4/14/2025	3:15 AM	255.89	44.35	0	0.74	1.28
4/14/2025	3:30 AM	290.73	35.93	0	0.62	0.92
4/14/2025	3:45 AM	228.45	42.71	0	0.61	0.92
4/14/2025	4:00 AM	229.94	45.8	0	0.71	1.25
4/14/2025	4:15 AM	229.71	45.48	0	0.65	1.03
4/14/2025	4:30 AM	228.48	32.09	0	0.58	1.01
4/14/2025	4:45 AM	234.89	41.52	0	0.89	2.24
4/14/2025	5:00 AM	233.77	40.53	0	1.41	3.43
4/14/2025	5:15 AM	222.66	39.25	0	0.91	1.53
4/14/2025	5:30 AM	207.05	35.51	0	0.67	1.18
4/14/2025	5:45 AM	204.75	28.54	0	0.6	0.98
4/14/2025	6:00 AM	211.33	32.68	0	0.6	1.13
4/14/2025	6:15 AM	205.24	34.15	0	0.66	1.38
4/14/2025	6:30 AM	202.83	26.72	0	0.62	1.09
4/14/2025	6:45 AM	202.88	33.96	0	0.53	0.81
4/14/2025	7:00 AM	202.75	36.96	0	0.62	1.22
4/14/2025	7:15 AM	280.31	34.46	0	0.59	0.98
4/14/2025	7:30 AM	196.55	34.65	0	0.51	0.81
4/14/2025	7:45 AM	180.26	42.1	0	0.68	1.26
4/14/2025	8:00 AM	175.75	39.33	0	0.71	1.42
4/14/2025	8:15 AM	166.69	37.8	0	0.72	1.52
4/14/2025	8:30 AM	158.84	37.78	0	0.61	0.99
4/14/2025	8:45 AM	157.13	34.82	0	0.52	0.86
4/14/2025	9:00 AM	153.4	32.24	0	0.48	0.78
4/14/2025	9:15 AM	162.56	32.45	0	0.68	1.24
4/14/2025	9:30 AM	169.66	27.79	0	0.72	1.27
4/14/2025	9:45 AM	179.9	17.9	0	0.64	1.1
4/14/2025	10:00 AM	178.3	29.26	0	0.57	0.94
4/14/2025	10:15 AM	161.09	30.35	0	0.56	0.98
4/14/2025	10:30 AM	139.44	36.27	0	0.59	0.98
4/14/2025	10:45 AM	130.84	39.77	0	0.68	1.15
4/14/2025	11:00 AM	152.24	41.54	0	0.46	0.72

Technical appendix 4:

Soil and water assessment report



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Soil and Water assessment report

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Table of Contents

1	Introduction	4
2	Soil and Water sampling.....	5
3	Results of visual investigation and laboratory analysis	11
3.1	Soil analyses results	11
3.2	Water analyses results	14
4	National standards and Maximum Permissible Concentrations (MPC) for soil and water.....	8
	Annex 1. Picture of the soil and water sampling and quartering	16
	Annex 2. Original protocol of the result.....	21

Table of Figures

Figure 1: Location of sample collection.....	6
Figure 2: Soil sampling at S-1.....	16
Figure 3: Soil profile at S-2.....	16
Figure 4: Composite sample and background at S-2.....	16
Figure 5: Soil profile and composite sample at S-3.....	17
Figure 6: S-3 sample background.....	17
Figure 7: Soil profile at S-4.....	17
Figure 8: S-4 sample background.....	17
Figure 9: Sampling process at S-5 (under fresh snow that fell a few hours before sampling).....	18
Figure 10: Soil profile at S-6 (under fresh snow that fell a few hours before sampling)	18
Figure 11: S-7 sampling location and background	19
Figure 12: S-8 sampling location and background	19
Figure 13: S-9 sampling location and background	19
Figure 14: S-9 soil sample	19
Figure 15: Water sample (SW-1).....	20
Figure 16: Water sampling (SW-3)	20

Table of Tables

Table 1: Coordinates of sampling locations.....	7
Table 2: Parameters provided for analysis in the laboratory	7
Table 4: MPCs of Chemical Substances in Soil	8
Table 5: TPCs of Chemical Substances in Soil	9
Table 6: Dutch Standards for Soil Contamination (2013)	10
Table 7: MPCs of Chemical Substances in water.....	11
Table 8: Results of soil analysis (red cells indicate exceedances)	13
Table 9: Results of water analysis	14

1 Introduction

The project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. The OHTL route starts from Kemin SS and goes southeast (south from Boon Gorge) through the Kyrgyz Range along existing OHTLs. In the Issyk-Kul region, the OHTL passes along the EM-11 highway to the location of the planned Balykchy SS.

In the eastern part of the project area, the climate is influenced by the terrain and Lake Issyk-Kul. Since mountain ranges are located north of the lake, the main air exchange with northern air masses occurs through the Boom Gorge, resulting in strong winds. Precipitation is highly dependent on Issyk-Kul and wind dynamics, leading to most precipitation falling east of the lake, while the project area east of the Boom Gorge is characterized by a semi-desert zone¹. Within the Kyrgyz Range, the OHTL passes through steep slopes and small mountain meadows. This area has been modified by several existing OHTLs but relatively insignificantly. Where all route options converge, Near the Kemin SS, the terrain transitions into a flat landscape, with fields and intermountain plains used for agriculture.

The Chu River, which runs near the proposed routes, is one of the largest Rivers in the region, forming a major drainage basin. The primary source of the river's water, as with many other rivers in the region, is glaciers. The mountain slopes on both sides of the Chu River contain multiple small Riverbeds, most of which remain dry for most of the year. The main perennial right tributaries include the Chon-Kemin River and the smaller tributary (mountain stream) Kiyamat-Kur-Kul(also known as Sharygai). The left tributary is the small mountain River Komorchek.

In the semi-desert zone of the project, the soils are classified as Brown Desert-Steppe Soils (USSR classification²³) or Xerosols (WRB⁴). These soils are characterized by a weakly developed soil profile, low fertility, and sparse vegetation cover. Mountain meadows and the western part of the project area are classified as Mountain Chestnut Soils (USSR classification) or Chestnut (WRB). These soils have higher fertility, and vegetation development depends on the topographic position and the degree of soil profile development. In river valleys, the soils are composed of material deposited by river flow and belong to the intrazonal type of alluvial soils (according to the USSR classification) or to Fluvisols (WRB).

The main sources of soil contamination may include livestock grazing, littering, and pollutant deposition from precipitation.

Water quality in the area may deteriorate due to household pollution, livestock farming, and discharges from wastewater treatment facilities located upstream relative to the project area, as well as from contaminants carried by inflowing tributaries.

1 Geography of the Kyrgyz Republic, Part 1. Physical Geography of the Kyrgyz Republic: Study Guide / Edited by Yu.V. Shinko. - Bishkek, KRSU Publishing House, 2021. - 242 pages

2 Due to the large body of data accumulated under the Soviet classification, this chapter discusses the USSR Soil Classification System² alongside the international World Reference Base for Soil Resources (WRB) classification

3 Mamytov A.M. Soils of the Kyrgyz SSR. 1974.

4 World Reference Base for Soil Resources.IUSS Working Group WRB. 2022.

2 Soil and Water sampling

Samples were taken at 9 locations where the intended sampling of soil and water was determined (*Figure 1*).

Soil samples were taken from 20 cm in accordance with the established State standard 17.4.4.02-2017 "*Nature protection. Soils. Methods for sampling and preparation of soil for chemical, bacteriological, helminthological analysis*". For sample collection, five points were determined using the envelope method. Whenever possible, a distance of approximately 100 meters was maintained between the outermost points to ensure representative sampling. At each point, a pit was dug to collect 500 grams of soil, after which all collected soil was thoroughly mixed. Using the quartering method, a portion of the sample was returned to the pits. As a result, the composite sample weighed approximately 800 to 1000 grams.

Water sampling was carried out in accordance with the established State standard 31861-2012 "Water. General requirements for sampling". The water sample points are strategically located to capture surface water from the nearest source to the project and within the project activity area. A one-liter water sample was collected and stored in polymer bottles for subsequent analysis in the laboratory. One sample of ground water was taken from existing borehole.

The coordinates of sampling are provided in Table 1.

Figure 1: Location of sample collection

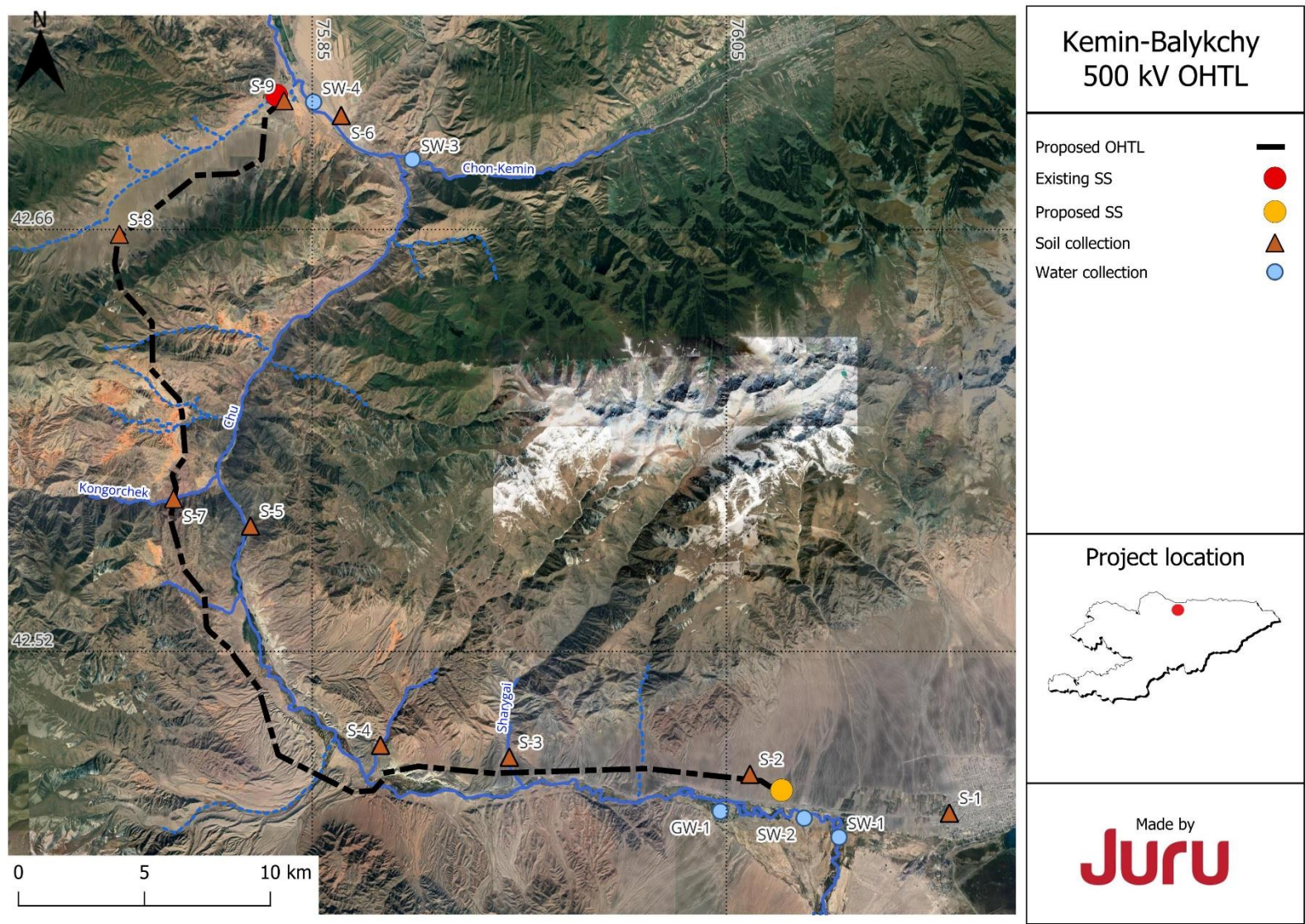


Table 1: Coordinates of sampling locations

Name of sample	Coordinates	
	Northing	Easting
S-1	42.45746	76.15770
S-2	42.47128	76.06139
S-3	42.47737	75.94523
S-4	42.48161	75.88302
S-5	42.55967	75.82026
S-6	42.70553	75.86404
S-7	42.56928	75.78310
S-8	42.66333	75.75694
S-9	42.71076	75.83645
SW-1	42.44886	76.10441
SW-2	42.45563	76.08755
SW-3	42.68992	75.89839
SW-4	42.71031	75.85072
GW-1	42.45807	76.04708

Table 2: Parameters provided for analysis in the laboratory

Nature component	Parameters	Laboratory
Soil	pH	STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC (Kyrgyz Republic, Kara-Balta city)
	Gross content (Zn, Cr, Cd, Cu, Mn, Hg, Ni, Fe, Pb, Na, K)	
	NO ³⁻	
Water	pH	
	Gross content (As, Zn, Al, Cd, Cu, Ni, Pb)	
	Cr ⁶⁺	

3 National standards and Maximum Permissible Concentrations (MPC) for soil and water

In Kyrgyzstan, at the national level, two types of indicators are used for soil: Maximum Permissible Concentrations (MPC) (Table 3) and Tentative Permissible Concentrations (TPC) (Table 4). MPC values are applied based on specific land use types.

- The indicator may be translocation-based, meaning it is determined using a method that estimates the potential uptake of the substance by agricultural crops.
- It may also be defined for water migration, which applies to substances that actively migrate through the landscape and accumulate in water bodies, most commonly fertilizers and pesticides.
- The general sanitary indicator refers to the concentration of a substance in soils of residential areas.

For natural soils without a specific land use type, TPC is applied. Substances under this regulation are measured in their total content form.

Table 3: MPCs of Chemical Substances in Soil⁵

Substance name	Substance form	MPC value, mg/kg of soil considering background (Clarke)	Limiting factor
Arsenic (As)	Mobile	2,0	Translocation
Nitrates (NO ³⁻)	Gross content	130,0	Water migration
Mercury (Hg)	Mobile	2,1	Translocation
Lead (Pb)	Gross content	32,0	General sanitary
Copper (Cu) ¹	Mobile	3,0	General sanitary
Nickel (Ni)	Mobile	4,0	General sanitary
Lead (Pb)	Mobile	6,0	General sanitary
Zinc (Zn)	Mobile	23,0	Translocation
Chromium (Cr)	Mobile	6,0	General sanitary

⁵ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Appendix 21).

Table 4: TPCs of Chemical Substances in Soil⁶

Substance name	Group of soils	TPC value, mg/kg of soil considering background (Clarke)
Cadmium (Cd)	Sandy and sandy loam soils	0,5
	Acidic (loamy and clayey) soils, pH KCl < 5.5	1,0
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	2,0
Copper (Cu)	Sandy and sandy loam soils	33
	Acidic (loamy and clayey) soils, pH KCl < 5.5	66
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	132
Arsenic (As)	Sandy and sandy loam soils	2
	Acidic (loamy and clayey) soils, pH KCl < 5.5	5
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	10
Nickel (Ni)	Sandy and sandy loam soils	20
	Acidic (loamy and clayey) soils, pH KCl < 5.5	40
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	80
Lead (Pb)	Sandy and sandy loam soils	32
	Acidic (loamy and clayey) soils, pH KCl < 5.5	65
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	130
Zinc (Zn)	Sandy and sandy loam soils	55

⁶ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil" according to Appendix 21).

Substance name	Group of soils	TPC value, mg/kg of soil considering background (Clarke)
	Acidic (loamy and clayey) soils, pH KCl < 5.5	110
	Near-neutral and neutral (loamy and clayey) soils, pH KCl > 5.5	220

The Table 5 presenting the Dutch Standards values for soil.

Table 5: Dutch Standards for Soil Contamination (2013)⁷

Parameters	Soil (mg/kg dry matter)	
	Target value*	Intervention value
Arsenic	29	76
Barium	160	-
Cadmium	0.8	13
Chromium	100	-
Chromium III	-	180
Chromium IV	-	78
Cobalt	-	190
Copper	36	190
Lead	85	530
Mercury	0.3	36 (inorganic) 4 (organic)
Molybdenum	3	190
Nickel	35	100
Zinc	140	720

Note: The soil values are calculated for a 'Standard Soil' with 10% organic matter and 25% clay. A case of environmental contamination is defined as 'serious' if >25 m³ soil or >100 m³ groundwater is contaminated above the intervention value. Where contaminants are found to exceed 'intervention' levels, this is considered to be a case of soil contamination, which is dangerous to the health of humans and the natural environment. Such a level of contamination should prompt a need for remediation, appropriate treatment and disposal.

⁷ Source: Soil Remediation Circular 2013, (*Target values for soil refer to 2000 version as they are not present in the 2013)

National water quality standards are presented in Table 6. These parameters represent the Maximum Permissible Concentrations (MPC) for water used for domestic, drinking, and recreational purposes.

The limiting factor depends on the chemical properties of a substance and is determined by the characteristic on which its negative impact manifests at the lowest concentration compared to other effects.

- Organoleptic refers to negative qualities of a substance that are perceptible by human senses, such as odor or turbidity, etc.
- Sanitary-toxicological indicates harm to health due to toxicity.
- General sanitary includes a combination of different impacts.

Substances are also assigned a hazard class, where:

- Class 1 – Extremely hazardous
- Class 2 – Highly hazardous
- Class 3 – Hazardous
- Class 4 – Moderately hazardous

Table 6: MPCs of Chemical Substances in water⁸

Substance name	MPC, mg/l	Limiting factor	Hazard class
Aluminum (Al)	0,2	Organoleptic – Turbidity	3
Cadmium (Cd)	0,001	Sanitary-toxicological	2
Copper (Cu)	1,0	Sanitary-toxicological	3
Arsenic (As)	0,01	Sanitary-toxicological	1
Nickel (Ni)	0,02	Sanitary-toxicological	2
Lead (Pb)	0,01	Sanitary-toxicological	2
Chromium VI (Cr VI)	0,05	Sanitary-toxicological	3
Zinc (Zn)	1	General sanitary	3

4 Results of visual investigation and laboratory analysis

4.1 Soil analyses results

Soil samples can be divided into several groups. Points S-1 to S-4 belong to Brown Desert-Steppe Soils/Xerosols, Point S-5 to Mountain Chestnut/Chestnut but has been significantly altered by constant

⁸ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum permissible concentrations of chemical substances in water bodies for domestic and drinking water use" according to Appendix 16).

deposits from the mountains and anthropogenic activity. S-6, S-8 and S-9 belongs to Mountain Chestnut/Chestnut, of which only S-6 was significantly transformed by agricultural activities. S-7 belongs to Alluvial soils/ Fluvisols

Points S-1 to S-4 had a weakly developed and weakly differentiated profile with high rockiness. According to literature data, this type of soil in Kyrgyzstan is represented by loams. The upper horizons have almost no distinct colour differences from the underlying layers, indicating a low organic matter content.

Laboratory analyses of samples S-1 to S-4 revealed an alkaline reaction, which is typical for this soil type. The heavy metal content varies within acceptable concentrations according to both national standards (reference values for loamy soils with $\text{pH} \geq 6$ are used) and European regional indicators. For metals such as Chromium (Cr) and Manganese (Mn), national regulations consider only the mobile form, which is used to assess metal transfer into plants in agriculture, whereas for processes like dust dispersion, the total element content is more relevant. The total content of these metals is relatively low, especially given their low mobility under alkaline conditions.

The Sodium (Na) concentration in sample S-2 is high, indicating significant salinization of the surrounding area. At the same time, all samples show relatively high potassium (K) reserves due to its low utilization, given the sparse vegetation cover. Nitrate concentrations are relatively high for non-agricultural soils, which may indicate contamination due to grazing activities.

Point S-5 is located in an area of periodic rockfalls, and the surrounding territories were significantly littered with construction debris. The soil profile is about 25 cm deep, after which high rockiness is observed. Exceedances of national or European standards are noted for zinc (Zn), copper (Cu), nickel (Ni), and lead (Pb). The Cadmium (Cd) concentration is also above background levels but only slightly. Compared to other samples, this point has the highest iron (Fe) content, most likely due to contamination.

Point S-6 is located near agricultural fields and, judging by its profile, was also involved in agriculture. The upper horizon has a significantly darker colour than in other samples. Heavy metal concentrations are below the strictest regulatory limits, there are no signs of salinization, and no nitrate contamination is present.

Point S-7 is located in a gorge on the bank of the small mountain river Konorchek. The soils along the banks are composed of sandy river deposits. Although the heavy metal content corresponds to average values found in other samples, stricter national standards apply to sandy soils - exceedances are observed for Zn, Cu, and Ni. According to Dutch standards, exceedance is only recorded for the strictest standard for Ni. Nitrate concentration is low. No pollution sources were identified in the sampling area or expected upstream, so these concentrations can be considered natural, due to the composition of local parent rocks.

Samples S-8 and S-9 are located in a mountain valley, with a shallow soil profile (about 30-40 cm) and high stoniness. Vegetation is sparse, with signs of grazing. The concentrations of heavy metals and Na correspond to those found in the other samples. Nitrate concentration is low Exceedance is observed only according to the strict international standard for Ni.

The soil analysis results are presented in Table 7.

Table 7: Results of soil analysis (red cells indicate exceedances)

Name of parameters	Locations									TPC/MPC ⁹ in mg/kg	Dutch intervention Value / Target Value ¹⁰	
	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9			
pH	8	8	8	8	8	8	8	8	9	-	-	-
Zinc (Zn), mg/kg	134	64	105	71	200	60	77 ¹¹	73	77	55.0 ¹¹ / 220.0 ¹² (gross content)	7200	140
Chromium (Cr), mg/kg	38	24	35	39	84	36	54	48	54	6.0 (mobile)	180	-
Cadmium (Cd), mg/kg	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	0.5 ¹¹ / 2.0 ¹² (gross content)	13	0.8
Copper (Cu), mg/kg	32	23	39	23	139	27	40 ¹¹	30	40	33.0 ¹¹ / 132.0 ¹² (gross content)	190	36
Manganese (Mn), mg/kg	557	592	683	484	1128	583	696	660	696	60.0 ¹¹ / 700.0 ¹² (mobile)	-	-
Mercury (Hg), mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.1 (gross content)	36	0.3
Nickel (Ni), mg/kg	23	23	23	18	62	32	49 ¹¹	39	49	20.0 ¹¹ / 80.0 ¹² (gross content)	100	35
Iron (Fe), mg/kg	29507	24626	29125	28195	41858	27553	36988	33642	36988	-	-	-
Lead (Pb), mg/kg	39	23	68	36	206	23	20	21	20	32.0 ¹¹ – 130.0 ¹² (gross content)	530	85

⁹ Maximum Permissible Concentration – MPC. The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards “Maximum Permissible Concentrations and Tentatively Permissible Quantities of Chemical Substances in Soil” according to Appendix 21) - **The studied soils are not of a specific land use type; therefore, TPC was used as a reference when available, and MPC was applied in the absence of an alternative.**

¹⁰ Dutch Standards for Soil and groundwater Contamination (2013).

¹¹ Sandy or sandy loam soil

¹² Loamy and clayey soils

Name of parameters	Locations									TPC/MP C ⁹ in mg/kg	Dutch intervention Value / Target Value ¹⁰	
	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9			
Sodium (Na), mg/kg	449	1274	195	497	315	118	285	368	285	-	-	-
Potassium (K), mg/kg	2987	3330	2786	2978	2963	3523	4280	4658	4280	-	-	-
Nitrate (NO³⁻)	30	22	89	47	3.7	3.8	2.6	2.1	1.8	130	-	-

4.2 Water analysis results

Water sampling was conducted in the upper reaches of the Chu River, upstream and downstream of the wastewater treatment facilities, with samples SW-1 and SW-2 taken accordingly. Samples SW-3 and SW-4 were collected near the endpoint of the OHTL, from a major right tributary of the Chon-Kemin River and after its confluence, respectively. A groundwater sample was taken from the settlement of Kok-Moynok-1 from a drinking water well. All samples have an alkaline reaction, with a pH ranging from 8.0 to 8.4, which is normal for the southern region of Kyrgyzstan.

This alkalinity is at the upper limit of what is considered safe for drinking water consumption. The concentration of heavy metals in all samples is very low, at the detection limit of the method. The only exception is arsenic in surface water samples downstream; however, its concentration remains safe and is several times below national standards.

The water analysis results are presented in Table 8.

Table 8: Results of water analysis

Name of parameters	Locations					The lower limit of detection	MPC ¹³ mg/l ¹⁴ (Domestic and drinking water use)
	SW-1	SW-2	SW-3	SW-4	GW-1		
pH	8.1	8.2	8.4	8.3	8.0	1-14	-
Aluminum (Al), ppm	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.2
Cadmium (Cd), ppm	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0003	0.001
Chromium (Cr VI), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.05
Copper (Cu), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	1.0

¹³ The Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201 (Hygienic standards "Maximum permissible concentrations of chemical substances in water bodies for domestic and drinking water use" according to Appendix 16).

¹⁴ 1 mg/l ≈ 1 ppm

Name of parameters	Locations					The lower limit of detection	MPC ¹³ mg/l ¹⁴ (Domestic and drinking water use)
	SW-1	SW-2	SW-3	SW-4	GW-1		
Lead (Pb), ppm	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.01
Nickel (Ni), ppm	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.02
Zinc (Zn), ppm	<0.004	<0.004	<0.004	<0.004	<0.004	0.004	1.0
Arsenic (As), ppm	<0.001	<0.001	0.002	0.002	<0.001	0.001	0.01

Annex 1. Picture of the soil and water sampling and quartering

Figure 2: Soil sampling at S-1



Figure 3: Soil profile at S-2



Figure 4: Composite sample and background at S-2



Figure 5: Soil profile and composite sample at S-3



Figure 6: S-3 sample background



Figure 7: Soil profile at S-4



Figure 8: S-4 sample background



Figure 9: Sampling process at S-5 (under fresh snow that fell a few hours before sampling)



Figure 10: Soil profile at S-6 (under fresh snow that fell a few hours before sampling)



Figure 11: S-7 sampling location and background



Figure 12: S-8 sampling location and background



Figure 13: S-9 sampling location and background



Figure 14: S-9 soil sample



Figure 15: Water sample (SW-1)



Figure 16: Water sampling (SW-3)



Annex 2. Original protocol of the result
Soil analysis protocol

Cover sheet Page 1 of 1

STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC
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Client Name/ Имя клиента:	JURU LIMITED	Number of Samples/ Количество проб:	6
Client Reference/ Ссылка клиента:	№ JEC-OUT-24-20 от 14.11.2024	Lab Job No./ № лаб. Заказа:	27448
Receiving Date/ Дата получения:	15.11.2024	Finalized Date/ Дата завершения:	27.11.2024
Sample Type/ Тип пробы:	Soil/ Почва	Date of report/ Дата отчёта:	28.11.2024
Sample Conditions/ Состояние пробы:	Satisfactory/ Удовлетворительное	Report Reference/ Ссылка отчёта:	2881
Place of analysis/ Место анализа:	SAEL Lab / Лаборатория СЭИЛ	Report Status/ Статус отчёта:	Final /Финальный
		Total No. of pages/ Общее кол-во стр.:	2

Methods used / Используемый метод	Description / Описание
Code / Код	None / Нет
<u>Sampling / Отбор проб</u>	
<u>Preparation / Подготовка</u>	None / Нет
<u>Analysis / Анализ</u>	
Code: S3*, S6*, S8*	Soil analysis

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За ОсОО "Стюарт Эссей энд Инваронментал Лэборэторис"

Vladimir Schudro / Владимир Щудро
Managing Director / Управляющий директор

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Results apply to samples as submitted. All pages of this report have been checked and approved for release. / Результаты относятся к представленным пробам.
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Soil analysis protocol

SampleID	S1	S2	S3	S4	S5	S6
Ag, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Al, mg/kg	15377	13577	15199	10438	23677	16472
As, mg/kg	12	8	14	10	11	13
Ba, mg/kg	110	100	90	113	80	160
Be, mg/kg	1	1	1	1	1	1
Bi, mg/kg	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Ca, mg/kg	23849	38356	24776	27870	>50000	28000
Cd, mg/kg	<0.5	<0.5	<0.5	<0.5	1	<0.5
Co, mg/kg	11	10	14	10	25	11
Cr, mg/kg	38	24	35	39	84	36
Cu, mg/kg	32	23	39	23	139	27
Fe, mg/kg	29507	24626	29125	28195	41858	27553
Hg, mg/kg	<1	<1	<1	<1	<1	<1
K, mg/kg	2987	3330	2786	2978	2963	3523
La, mg/kg	21	25	24	26	15	23
Mg, mg/kg	12856	12588	12175	8670	22746	10222
Mn, mg/kg	557	592	683	484	1128	583
Mo, mg/kg	1	<1	2	1	<1	<1
Na, mg/kg	449	1274	195	497	315	118
Ni, mg/kg	23	23	23	18	62	32
P, mg/kg	1153	851	880	1040	570	531
Pb, mg/kg	39	23	68	36	206	23
S, mg/kg	1170	811	737	427	272	223
Sb, mg/kg	3	<2.5	<2.5	<2.5	<2.5	<2.5
Sc, mg/kg	5	4	4	3	11	5
Se, mg/kg	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Sn, mg/kg	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Sr, mg/kg	114	131	52	57	114	50
Te, mg/kg	<5	<5	<5	<5	<5	<5
Ti, mg/kg	803	823	733	681	>1000	500
U, mg/kg	<50	<50	<50	<50	<50	<50
V, mg/kg	49	38	52	62	101	47
W, mg/kg	<10	<10	<10	<10	<10	<10
Y, mg/kg	10	13	11	12	12	12
Zn, mg/kg	134	64	105	71	200	60
Zr, mg/kg	5	5	4	4	6	3
pH	8	8	8	8	8	8
NO3, mg/kg	30	22	89	47	3.7	3.8



Soil analysis protocol

SAEL

Page 1 of 1
Форма/Form 2.1
Издание/Issue 2
Дата/Date 01.07.2023
Процедура QP-8

STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC

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tel.: +996 3133 31925; fax: +996 3133 34252; e-mail: Sael.KaraBalta@saelglobal.com

ANALYSIS REPORT / ОТЧЁТ ОБ АНАЛИЗАХ

Имя клиента: / Client Name:	JURU LIMITED	Количество проб: / Number of Samples:	3
Ссылка клиента: / Client Reference:	№ JE-OUT-25-3 от 03.04.2025 г.	Лаб. № заказа: / Lab Job No.:	25D023
Участок: / Selection site		Дата завершения: Finalized Date:	10.04.2025
Дата получения: / Receiving Date:	04.04.2025	Дата отчёта: / Date of report:	11.04.2025
Тип пробы: / Sample Type:	Pulp / Пульпа	Ссылка отчёта: / Report Reference:	878
Состояние пробы: / Sample Conditions:	Satisfactory/ Удовлетворительное	Статус отчёта: / Report Status:	Финальный / Final
Место анализа: / Place of analysis:	SAEL Lab / Лаборатория СЭИЛ	Общее кол-во стр.: / Total number of pages:	4

Использованный метод /

Methods used

Код / Code

Description / Описание

Отбор пробы / Sampling

None / Нет

Подготовка / Preparation

None / Нет

Анализ / Analysis

AR/ES/G**

0.2 g Aqua Regia digestion with following ICP-OES reading /

0.2 г Царсководочное разложение с ICP-OES окончанием

SAEL-WA-47-2020*

Determination of nitrate by IC / Определение нитратов методом ИХ

SAEL-WA-21-2020*

Determination of pH by potentiometric method / Определение pH
потенциометрическим методом

Client Address: / Адрес клиента:

За ОсОО "Стюарт Эссей энд Инваронментал Лэборэторис" /
For Stewart Assay and Environmental Laboratories LLC

Саламат Иманакунов/Salamat Imanakunov
Лабораторный управляющий/laboratory manager

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Soil analysis protocol

Stewart Assay and Environmental Laboratories LLC						Results Sheet						Page 1 of 1 Форма/Form 2.1 Издание/Issue 2 Дата/Date 01.07.2023 Процедура QP-8			
Лаб. № заказа / Lab Job Number:		25D023		Ссылка отчёта / Report Reference:		878		Статус отчёта / Report Status:		Финальный / Final		Дата отчёта: / Date of Report:		11.04.25	
##	Sample ID / Шифр пробы Method Code / Код метода	Cd AR/ES/G	Cr AR/ES/G	Cu AR/ES/G	Fe AR/ES/G	Hg AR/ES/G	K AR/ES/G	Mn AR/ES/G	Na AR/ES/G	Ni AR/ES/G	Pb AR/ES/G	Zn AR/ES/G	pH	NO3 SAEL-soil	NO3 SAEL-soil
	Unit / Ед. измерения LDL / НПО	ppm 0.5	ppm 0.5	ppm 1	ppm 100	ppm 1	ppm 100	ppm 5	ppm 100	ppm 1	ppm 3.5	ppm 2	pH	mg/kg	mg/kg
	UL / ВП	500	5000	10000	50000	1000	50000	10000	50000	10000	10000	10000	14	1000	1000
1	S-7	<0.5	54	40	36968	<1	4280	696	285	49	20	77	8.428	2.592	
2	S-8	<0.5	48	30	33642	<1	4658	660	368	39	21	73	8.433	2.130	
3	S-9	<0.5	54	40	36968	<1	4280	696	285	49	20	77	8.663	1.779	

Water analysis protocol

Cover sheet

Page 1 of 1

STEWART ASSAY AND ENVIRONMENTAL LABORATORIES LLC
ОсОО СТУАРТ ЭССЕЙ ЭНД ИНВАЙРОНМЕНТАЛ ЛЭБОРЭТОРИС
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Client Name/ Имя клиента:	JURU LIMITED	Number of Samples/ Количество проб:	5
Client Reference/ Ссылка клиента:	№JEC-OUT-24-20 от 14.11.2024	Lab Job No./ № лаб. Заказа:	27447
Receiving Date/ Дата получения:	15.11.2024	Finalized Date/ Дата завершения:	27.11.2024
Sample Type/ Тип пробы:	Water / Вода	Date of report/ Дата отчёта:	28.11.2024
Sample Conditions/ Состояние пробы:	Satisfactory/ Удовлетворительное	Report Reference/ Ссылка отчёта:	2880
Place of analysis/ Место анализа:	SAEL Lab / Лаборатория СЭИЛ	Report Status/ Статус отчёта:	Final /Финальный
		Total No. of pages/ Общее кол-во стр.:	2

Methods used / Используемый метод

Code / Код	Description / Описание
<u>Sampling / Отбор проб</u>	None / Нет
<u>Preparation / Подготовка</u>	None / Нет
<u>Analysis / Анализ</u>	

Code: W6**, SAEL-WA-21, SAEL-WA-Cr Water analysis / Анализ воды

Client Address / Адрес клиента:

71-75 Shelton Street, Covent Garden, London, UK. WC2H 9JQ /
71-75 Shelton Street, Covent Garden, Лондон, Великобритания. WC2H 9JQ

For Stewart Assay and Environmental Laboratories LLC /
За ОсОО "Стюарт Эссей энд Инваронментал Лэборэторис"

Vladimir Schudro / Владимир Щудро
Managing Director / Управляющий директор

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Water analysis protocol

SampleID	SW1	GW1	SW2	SW3	SW4
Ag, ppm	<0.003	<0.003	<0.003	<0.003	<0.003
Al, ppm	<0.03	<0.03	<0.03	<0.03	<0.03
As, ppm	<0.001	<0.001	0.001	0.002	0.002
Ca, ppm	60.70	50.25	61.25	35.31	38.16
Cd, ppm	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Co, ppm	<0.004	<0.004	<0.004	<0.004	<0.004
Cr, ppm	<0.008	<0.008	<0.008	<0.008	<0.008
Cu, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Fe, ppm	<0.004	0.074	0.015	0.007	0.016
Hg, ppm	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
K, ppm	2.13	1.98	2.80	1.28	1.47
Mg, ppm	16.84	13.44	15.94	7.00	8.51
Mn, ppm	<0.003	<0.003	<0.003	<0.003	<0.003
Mo, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Na, ppm	21.12	17.63	22.27	6.36	9.74
Ni, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
Pb, ppm	<0.002	<0.002	<0.002	<0.002	<0.002
Sb, ppm	<0.001	<0.001	<0.001	<0.001	<0.001
Se, ppm	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, ppm	<0.004	<0.004	<0.004	<0.004	<0.004
Cr VI, ppm	<0.005	<0.005	<0.005	<0.005	<0.005
pH	8.062	8.017	8.214	8.354	8.262



Technical appendix 5: Traffic count report



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Traffic count

Consulting Firm:

Juru

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United Kingdom, EC3V 9DF

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Prepared for:



**Joint-Stock «National Electric Grid of
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Document Information

Project Name	Environmental & Social Impact Assessment (ESIA) for Kemin-Balykchy OHTL
Document Title	Traffic count report
Juru's Project Reference	KGZ-EBRD-Kemin-Balykchy OHTL ESIA
Client	NEGK
Juru's Project Manager	Nicola Davies
Juru's Project Director	Jushkinbek Ismailov

Document Control

Version	Date	Description	Author	Reviewer	Approver
1.0	25 May 2025	Traffic count report	Danila Avdulov	Nicola Davies	Nicola Davies

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Table of contents

1. Introduction.....	4
1.1. Overview.....	4
1.2. Sampling overview.....	4
2. Measurement methodology.....	6
3. Summary.....	25

Table of Figures

Table 1: Traffic count at T-1 (EM-11, both ways)	7
Table 2: Traffic count at T-2 (EM-11, both ways)	11
Table 3: Traffic count at T-3 (M-036, both ways)	14
Table 4: Traffic count at T-4 (EM-11, both ways, weekend day)	17
Table 5: Traffic count at T-4 (EM-11, both ways, weekday)	18
Table 6: Traffic count at T-5 (gravel road near NABU, both ways)	24

Table of Tables

Figure 1: Traffic count monitoring locations	5
Figure 2: Examples of cars at T-1.....	8
Figure 3: Example of VAN (pic. 1) and HGVs at T-1	9
Figure 4: Other examples of traffic at T-1	10
Figure 5: Examples of HGVs at T-2	12
Figure 6: Examples of cars at T-2.....	13
Figure 7: Examples of cars at T-3.....	15
Figure 8: Examples of VANs at T-3	16
Figure 9: Examples of cars at T-3.....	19
Figure 10: Examples of VANs and HGVs at T-3.....	21

1. Introduction

1.1. Overview

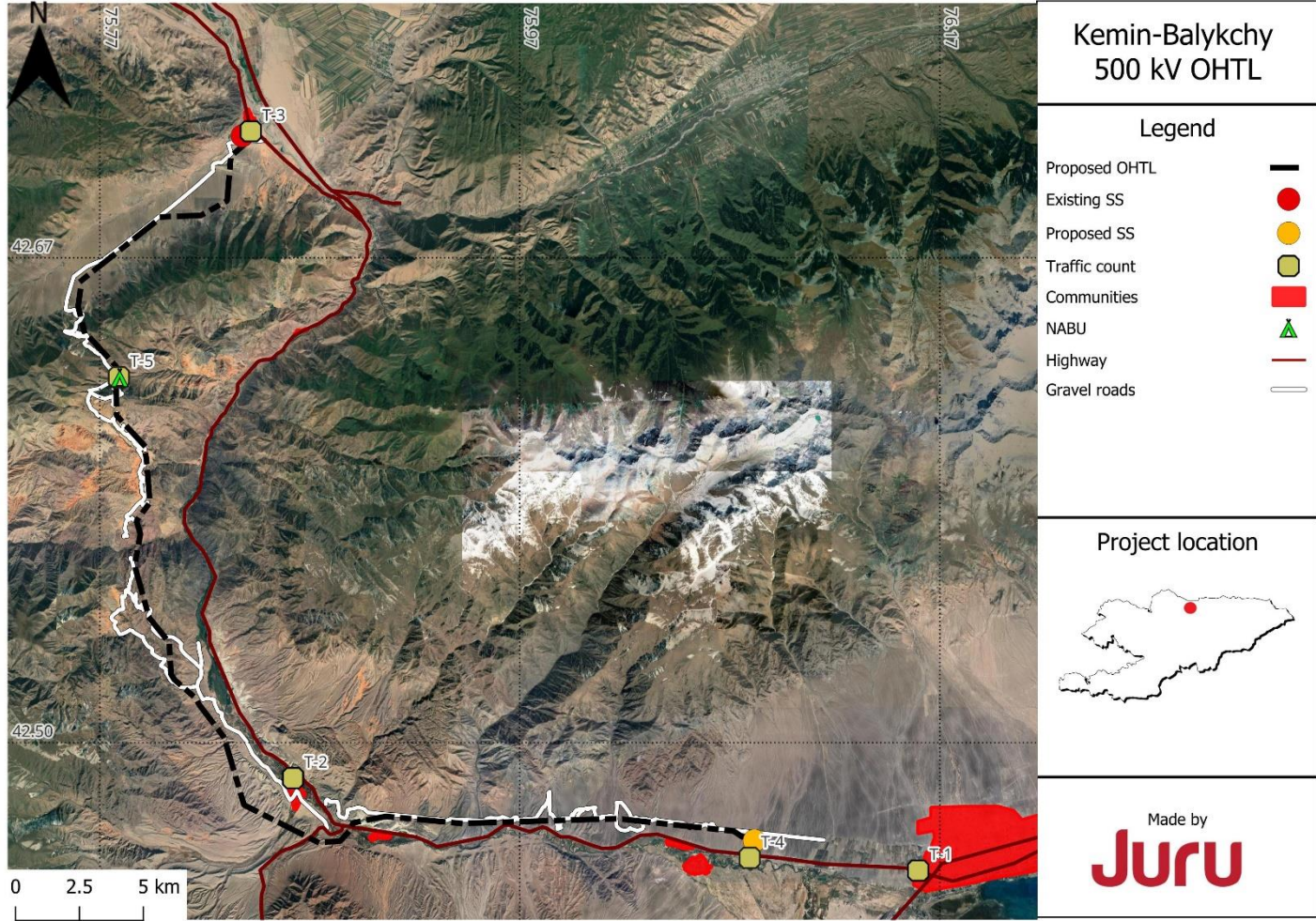
The Project area is located in the northern part of Kyrgyzstan, northwest of Lake Issyk-Kul. The project route runs between the existing Kemin substation (near the village of Cholok) and ends at the planned Balykchy substation near the village of Kok-Moynok-1, 6 km from the town of Balykchy. The route passes through mountainous areas south of the Boom Gorge, where it runs 120 m from the NABU rehabilitation center. The line then descends onto the plains near the village of Kok-Moynok-2, passing along its southern boundary, crosses the Chu River, and continues parallel to the EM-11 road to the north.

.

1.2. Sampling overview

Traffic monitoring was conducted at five points near the nearest communities and receptors (T-1 at Balykchy city; T-2 at Kok-Moynok-2; T-3 at Cholok, T-4 at Kok-Moynok-1; T-4 near NABU center). Vehicles were categorized into HGVs, cars, and vans. Figure 1 shows the map of the monitoring points.

Figure 1: Traffic count monitoring locations



2. Measurement methodology

For traffic counts observers were located a specific time interval (as shown in Table 1) for a total of six hours per day over three different time periods, (morning, noon and evening) representing the busiest times of the day. The observers manually counted the volume of cars, HGV's, vans and motorcycles. Observations were performed over one day and are considered representative of typical traffic in this area.

All vehicles were travelling north / south along EM11/ M-036/ gravel roads. The locations were determined to reflect either the areas where there may be the highest concentration of project vehicles (near substation locations) or at points where traffic flow is considered typical of the average flow on the road. Observers choose a location at these points where they had good vision of traffic approaching.

The dates chosen reflect normal weekdays (e.g., avoiding holidays or other peak traffic periods). Weekend day count may also be conducted if significant deviation is expected. Information was recorded on a tally sheet.

Table 1: Traffic count at T-1 (EM-11, both ways)

Location	Date	Duration	HGV ¹	Cars ²	VAN ³	Motorcycle ⁴	Total
T-1	November 17, 2024	9:00-9:30	4	129	19	0	152
		9:30-10:00	6	107	29	0	142
		10:00-10:30	9	157	23	0	189
		10:30-11:00	2	194	28	0	224
		subtotal					707
		13:00-13:30	25	196	41	0	262
		13:30-14:00	17	231	36	0	284
		14:00-14:30	24	211	28	0	263
		14:30-15:00	9	213	41	0	263
		subtotal					1072
		17:00-17:30	17	221	43	0	281
		17:30-18:00	21	239	58	0	318
		18:00-18:30	28	247	67	0	342

¹ HGV include a heavy (3 or more axles) or medium truck (2 axle trucks) including Agricultural tractors and trailers, large buses.

² Cars – includes All types of car used either for personal or taxi services, jeeps and three-wheeled light vehicles with a cargo body.

³ Van includes - utility vehicles, minibuses, light trucks (up to #3 tonnes).

⁴ Motorcycle - All two wheeled motorised vehicles.

		18:30-19:00	18	168	47	0	233
		subtotal					1174

Total: 2953

Figure 2: Examples of cars at T-1



Figure 3: Example of VAN (pic. 1) and HGVs at T-1



Figure 4: Other examples of traffic at T-1



Table 2: Traffic count at T-2 (EM-11, both ways)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total	
T-2	November 18, 2024	9:00-9:30	15	101	25	0	141	
		9:30-10:00	15	110	25	0	150	
		10:00-10:30	25	85	29	0	139	
		10:30-11:00	14	123	29	1	166	
		subtotal						596
		13:00-13:30	30	162	34	0	226	
		13:30-14:00	45	244	58	0	347	
		14:00-14:30	48	229	53	0	330	
		14:30-15:00	36	201	36	0	273	
		subtotal						1176
		17:00-17:30	42	387	40	0	469	
		17:30-18:00	35	346	38	0	419	
		18:00-18:30	32	402	51	0	485	
		18:30-19:00	36	269	57	0	362	
		subtotal						1735

Total: 3507

Figure 5: Examples of HGVs at T-2



Figure 6: Examples of cars at T-2



Table 3: Traffic count at T-3 (M-036, both ways)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total	
T-3	November 19, 2024	9:00-9:30	0	45	6	0	51	
		9:30-10:00	0	26	1	0	27	
		10:00-10:30	0	41	7	0	48	
		10:30-11:00	0	59	13	0	72	
		subtotal						198
		13:00-13:30	0	51	7	0	58	
		13:30-14:00	0	37	2	0	39	
		14:00-14:30	0	36	7	0	43	
		14:30-15:00	0	39	11	0	50	
		subtotal						190
		17:00-17:30	0	37	3	0	40	
		17:30-18:00	0	52	5	0	57	
		18:00-18:30	0	44	3	0	47	
		18:30-19:00	0	43	0	0	43	
		subtotal						187

Total: 575

Figure 7: Examples of cars at T-3



Figure 8: Examples of VANs at T-3



Table 4: Traffic count at T-4 (EM-11, both ways, weekend day)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
T-4	April 12, 2025	9:00-9:30	15	201	18		234
		9:30-10:00	19	213	21		253
		10:00-10:30	17	197	24		238
		10:30-11:00	12	200	29		241
		subtotal					966
		13:00-13:30	12	213	27	4	256
		13:30-14:00	19	209	33		261
		14:00-14:30	17	203	24		244
		14:30-15:00	14	217	39		270
		subtotal					1031
		17:00-17:30	14	218	37	2	271
		17:30-18:00	16	215	35		266
		18:00-18:30	15	194	36		245
		18:30-19:00	12	199	34		245
		subtotal					1027

Total: 3024

Table 5: Traffic count at T-4 (EM-11, both ways, weekday)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
T-4	April 14, 2025	9:00-9:30	9	184	37		230
		9:30-10:00	10	198	34		242
		10:00-10:30	17	182	31		230
		10:30-11:00	13	200	27		240
		subtotal					942
		13:00-13:30	8	215	17		240
		13:30-14:00	12	217	19		248
		14:00-14:30	11	199	21		231
		14:30-15:00	17	203	18		238
		subtotal					957
		17:00-17:30	21	189	22		232
		17:30-18:00	18	203	29		250
		18:00-18:30	14	185	31		230
		18:30-19:00	17	197	18		232
		subtotal					944

Total: 2843

Figure 9: Examples of cars at T-3

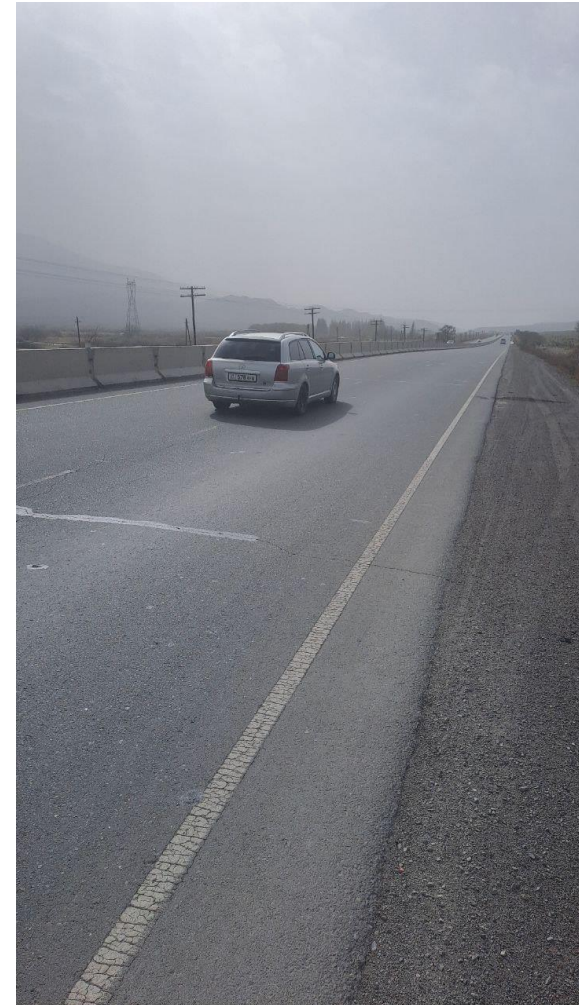
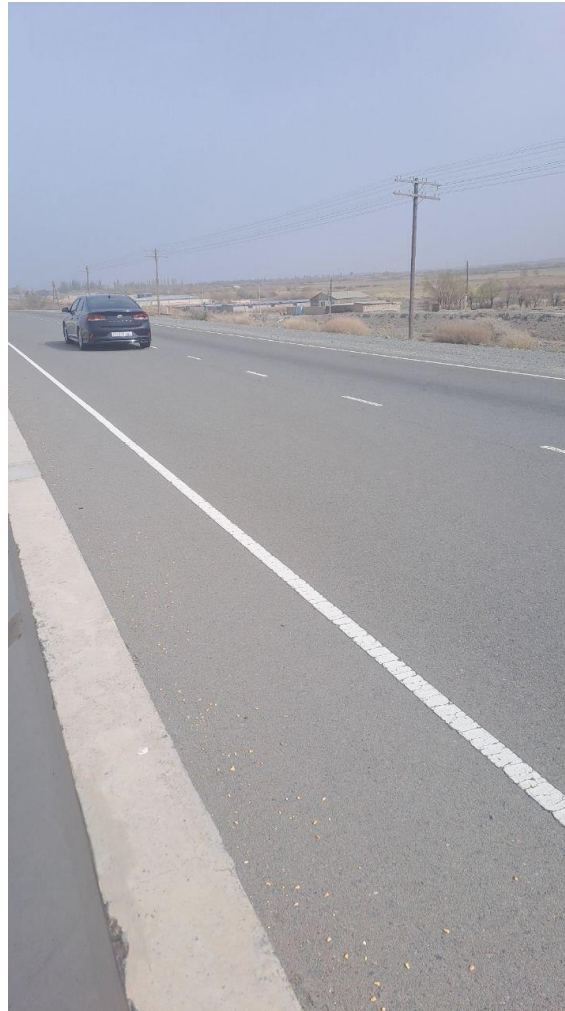




Figure 10: Examples of VANS and HGVs at T-3

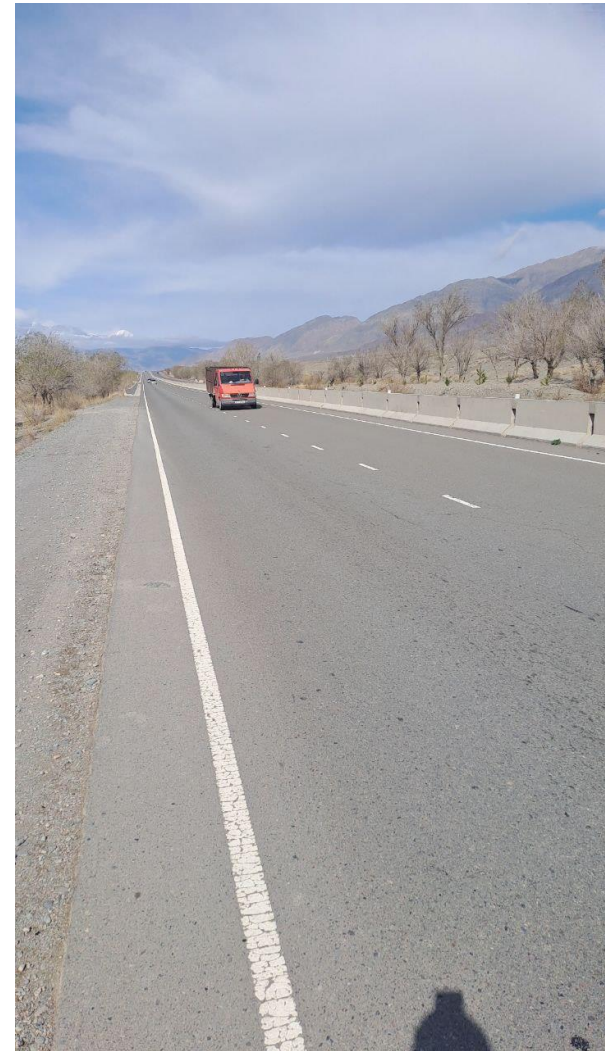






Table 6: Traffic count at T-5 (gravel road near NABU, both ways)

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
T-5	April 12, 2025	9:00-9:30					
		9:30-10:00		1			1
		10:00-10:30					
		10:30-11:00		1			1
		subtotal					2
		13:00-13:30					
		13:30-14:00					
		14:00-14:30		2			2
		14:30-15:00					
		subtotal					2
		17:00-17:30		2			2
		17:30-18:00					
		18:00-18:30		1			1
		18:30-19:00					
		subtotal					3

Total: 7

3. Summary

At Point T-1, the highest volume of car-type traffic was observed, with approximately the same number of vehicles during the day and in the evening. The morning traffic peak was not very pronounced and fell between 10:30 and 11:00 AM, while the evening peak was between 6:00 and 6:30 PM. During the daytime, the number of HGVs was 2–3 times lower than in other periods. The number of vans increases in the evening.

Point T-2 has the highest volume of HGV traffic, between 30 and 40 vehicles, with a clear drop in the morning hours to 10–20 vehicles. The morning peak is the same as at T-1, between 10:30 and 11:00 AM, and the evening peak is between 6:00 and 6:30 PM.

At T-3, there were no HGVs because the location is on the M-036 bypass. There may be a ban on this type of traffic. A significant portion of the traffic stopped near roadside cafes in the village of Cholok. The morning peak coincided with the other points, and the evening peak was slightly later - from 6:20 to 7:00 PM. The highest number of vehicles was observed at midday, between 1:00 and 1:30 PM.

The study at point T-4 was conducted during the spring season, which may be associated with the start of nature tourism in the region. Nevertheless, no significant deviations from the autumn season were observed. Morning peaks were hardly noticeable and could be represented as a slight increase above the average values by several vehicles between 9:30 and 10:00 AM. The evening peak, also not strongly pronounced, could be observed between 5:30 and 6:00 PM. On the day off, a slight increase in cars was noted in the evening - by 5 to 15 vehicles within 30 minutes.

Point T-5, located near the NABU wildlife rehabilitation center, is situated on a mountain road and has low traffic - 7 vehicles per day, evenly distributed across the observed time intervals.

Technical appendix 6: VP Bird Monitoring report (Spring 2025)



VP Bird Monitoring Report

Spring 2025

Kemin-Balykchy 500 kV OHTL Project

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1	03 June 2025	VP Bird Monitoring Report Spring 2025	Jeremie Berlioux, Maxim Koshkin	Caleb Gordon	Anna Ten

Disclaimer

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Table of Contents

1. Introduction4

2. Materials and methods6

3. Findings and Results.....7

 3.1. VP results.....7

 3.2. Key species.....9

4. Conclusions..... 10

Annexes 11

 Annex 1. Species observation table..... 11

 Annex 2. Species photos 16

Table of Figures

Figure 1: Kemin-Balykchi OHTL route and substation5

Figure 2: Elevation profile of proposed OHTL route5

Figure 3: Locations of vantage points surveyed in spring 2025 along the northwestern section of the OHTL route6

Table of Tables

Table 1: Schedule of the survey and effort level (hours)7

Table 2: Vantage points coordinates.....7

Table 3: Bird species observed during VP surveys, their conservation status and distribution by points.....8

1. Introduction

Overhead transmission lines (OHTL) can cause fatal collisions for birds, especially for bustards, cranes, and large-bodied waterbirds. These structures are also associated with bird electrocutions, primarily affecting raptors, vultures, and other large birds that tend to perch and/or nest on towers. The risk of electrocution is particularly high when pylons are constructed with hazardous designs and situated in high-risk areas. For high voltage OHTL, risks of bird collisions are considered to be high, but bird electrocution risk is generally considered to be low, as industry-standard designs generally have wide spacing of electrified parts, and conductors suspended below, rather than above support structures.,

The proposed (500kV) Kemin-Balykchy Interconnection (or the “Project”) is a 52.9 km stretch of OHTL that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a substation to be built west of Balykchy (Figure 1).

This report presents the results of ornithological monitoring conducted for the primary purpose of characterising the species composition of bird species that are potentially susceptible to OHTL collision and/or electrocution impacts within the project's area of influence. These surveys assessed the abundance and spatial distribution of bird species, the nature of the stay, daily activity of birds during spring migration and the beginning of nesting, in addition to identifying bird species of conservation concern, as listed in the IUCN Red List and the Kyrgyzstan Red Book.

This report presents the primary findings from bird Vantage Point (VP) surveys conducted in the area during March and April 2025.

The proposed OHTL passes through the Boom Gorge and crosses the Chu River and one of its tributaries. The OHTL route runs at elevations between 1284 m and 2411 m asl, spanning an elevation difference of 1127 metres (Figure 2).

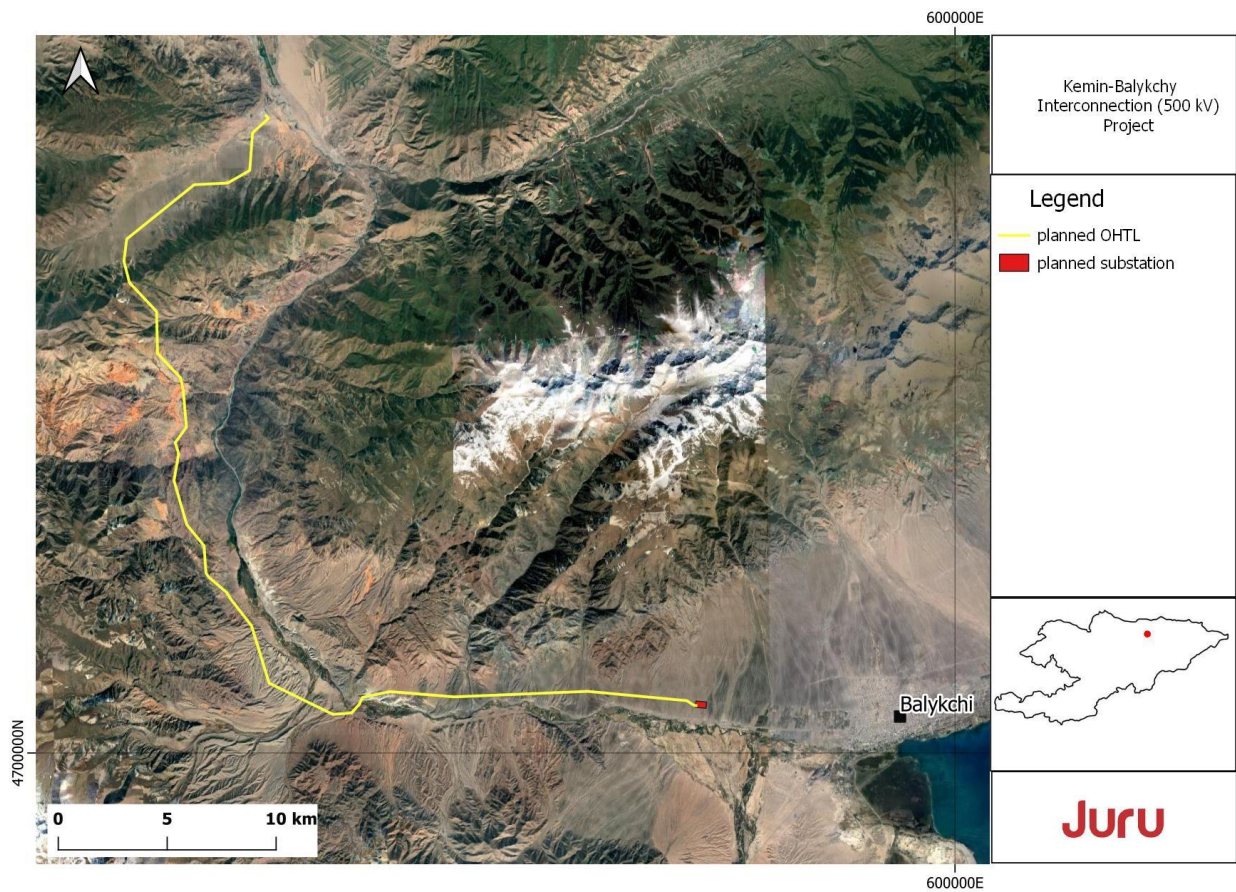


Figure 1: Kemin-Balykchi OHTL route and substation

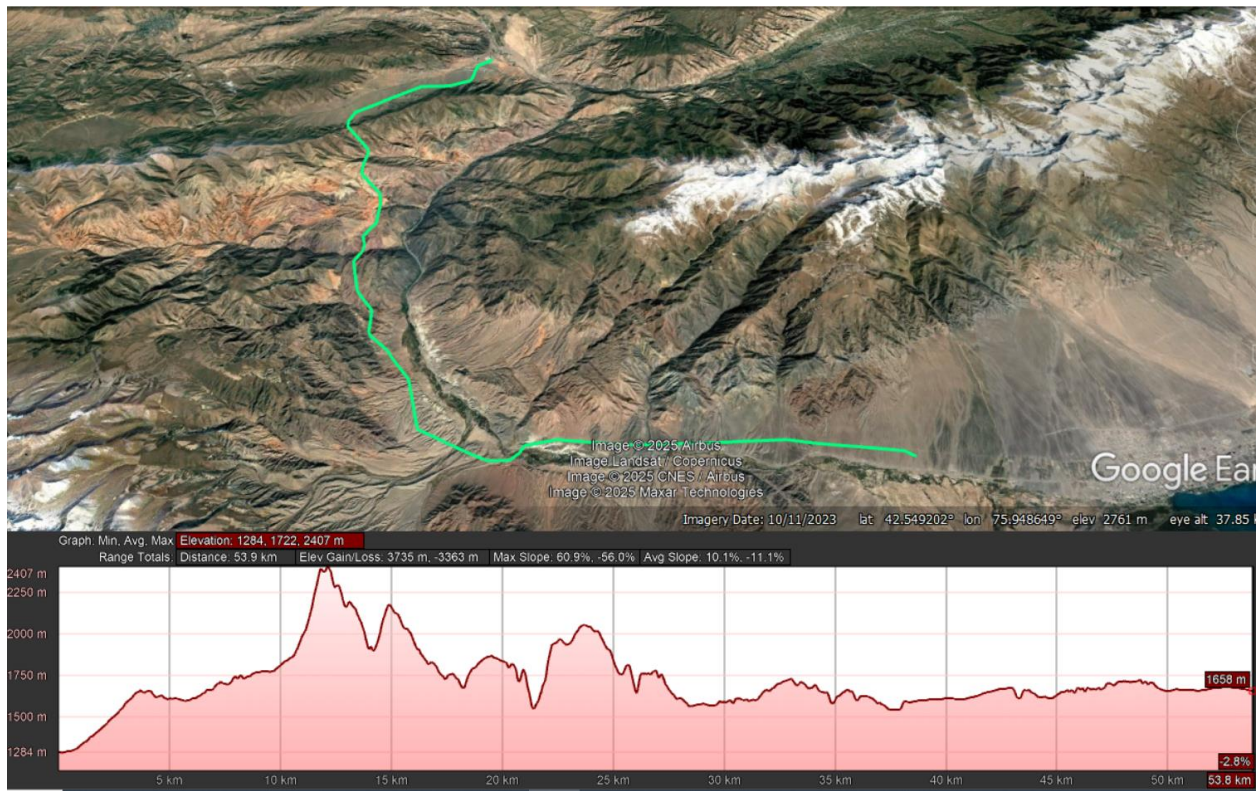


Figure 2: Elevation profile of proposed OHTL route

2. Materials and methods

Geographically, surveys focused on the north-western section of the OHTL route Option 2 (approx. 25 km long), as the south-eastern part of the route has been covered by spring and autumn VP surveys in 2024¹. Throughout the spring survey period from March 20 to April 14, 2025, approximately 20 hours of VP surveys were conducted at each of the four VP evenly distributed along the northwestern section of the OHTL, using locations with maximum visibility and no coverage overlap (Figure 3, Table 1).

Surveys were conducted by 2 observers, alternating on different rounds, including two experts in local avifauna (Andrei Averin and Jeremie Berlioux) and an assistant, Azamat Khasenov. For the surveys, 10 binoculars and 30 telescopes were used. During surveys, some of the birds were photographed to confirm the correct identification of species.

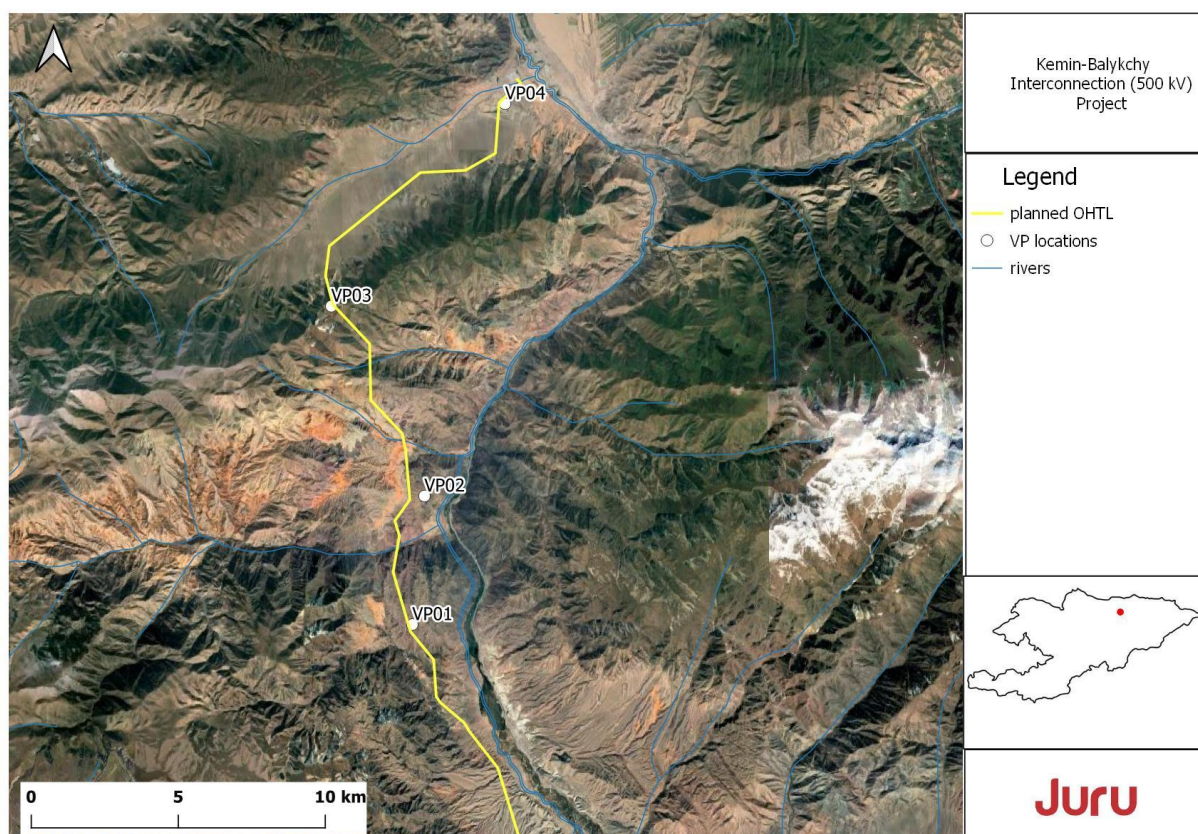


Figure 3: Locations of vantage points surveyed in spring 2025 along the northwestern section of the OHTL route

Between 4 and 12 hours of surveys were completed each day, resulting in a total of 20 survey hours per VP location, or 82 total hours of VP surveys over the course of 9 days (Table 1). Surveys were conducted during three rounds, and the team tried to survey each VP location on different days to

¹ Vantage point survey report, spring 2024. KGZ-EBRD-Bird surveys Kemin&Tamga. Juru/EBRD

maximise temporal coverage to account for potential effects of weather and migration timing/patterns.

The VP survey methods followed the guidelines outlined by Scottish Natural Heritage (SNH) in 2017², for bird assessment. While industry-standard collision risk modelling methods using VP survey data as inputs have only been developed for modelling collisions of birds with wind turbines, VP surveys are, nonetheless, the standard, and most suitable survey methodology for characterising the use of airspace by key bird groups that can be impacted by powerlines, including raptors, vultures, migrating waterbirds, and others. These surveys aimed to monitor sensitive bird species within the survey area, gathering valuable data on their presence, behaviour, and abundance.

Table 1: Schedule of the survey and effort level (hours)

VP ID	March		April							
	20	21	02	03	10	11	12	13	14	Total
VP01	2	2	3			4	4		6	21
VP02		3	3			4	4		6	20
VP03	4			3	4	4		6		21
VP04	6			3		4	4	3		20
TOTAL:										82

Table 2: Vantage points coordinates

Survey Points	Coordinates (dd)		Biotope
	N	E	
VP01	42.546186 °	75.789638 °	Ridgeline, semi-desert habitat
VP02	42.584935 °	75.794443 °	Ridgeline, overlooking Konorchok canyon to the west and Boom gorge to the east
VP03	42.643866 °	75.757027 °	Ridgeline, overlooking a wide valley to the west and rugged terrain to the east
VP04	42.705487 °	75.829838 °	Wide semi-desert valley, south of the Kemin sub-station

3. Findings and Results

3.1. VP results

21 bird species were observed across all VPs (Table 3), with a total of 129 observations recorded. Of these only two, Eastern Imperial Eagle (*Aquila heliaca*) and Steppe Eagle (*Aquila nipalensis*), are listed

² Scottish Natural Heritage (SNH) 2017, Recommended bird survey methods to inform impact assessment of onshore wind farms. March 2017 version 2, Scotland, UK.

in the IUCN Red List as Vulnerable (VU) and Endangered, respectively, while the latter is also listed in the Red Data Book of the Kyrgyz Republic (RDB) as VU. Both species were observed on VP #1.

There was one observation of a Black Stork (*Ciconia nigra*) en-route to the VP01 location, which likely indicates that the species still breeds somewhere in the general area. It was previously observed also during spring VP counts in 2024, following the last confirmed successful breeding (fledglings observed) of the species in the area in 2021.

Table 3: Bird species observed during VP surveys, their conservation status and distribution by points

№	Latin name	Common name	VPs	IUCN status	Kyrgyz RDB Status	Total # of obs.
1	<i>Aegypius monachus</i>	Cinereous Vulture	1, 2, 3, 4	NT	NT	15
2	<i>Alectoris chukar</i>	Chukar	1, 2	LC		4
3	<i>Aquila chrysaetos</i>	Golden Eagle	1, 2, 3	LC	NT	23
4	<i>Aquila heliaca</i>	Eastern Imperial Eagle	1	VU	VU	1
5	<i>Aquila nipalensis</i>	Steppe Eagle	1	EN	NT	1
6	<i>Buteo rufinus</i>	Long-legged Buzzard	1	LC		2
7	<i>Columba livia</i>	Rock Dove	4	LC		1
8	<i>Columba palumbus</i>	Common Woodpigeon	4	LC		1
9	<i>Corvus corax</i>	Common Raven	1, 2, 3	LC		10
10	<i>Corvus corone</i>	Carrion Crow	1, 2, 4	LC		10
11	Eagle/Vulture		2	-		1
12	<i>Falco naumanni</i>	Lesser Kestrel	3	LC		1
13	<i>Falco tinnunculus</i>	Common Kestrel	2, 3	LC		3
14	<i>Gypaetus barbatus</i>	Bearded Vulture	1, 2, 3	NT	NT	17
15	<i>Gyps fulvus</i>	Griffon Vulture	1, 2, 3	LC		10
16	<i>Gyps sp.</i>		1, 2	-		3
17	<i>Gyps himalayensis</i>	Himalayan Griffon	1, 2, 3	NT	LC	15
18	<i>Milvus migrans</i>	Black Kite	2, 4	LC		2
19	<i>Phasianus colchicus</i>	Common Pheasant	2	LC		1
20	<i>Pica pica</i>	Eurasian Magpie	2, 3, 4	LC		5
21	<i>Pyrrhocorax pyrrhocorax</i>	Red-billed Chough	1, 3	LC		3

3.2. Key species

Key species noted on the IUCN red list or the Kyrgyz RDB are discussed in more detail below.

Eastern Imperial Eagle (*Aquila heliaca*) – IUCN: VU; RDB: VU

Status: Migratory and wintering species, very rare

This species breeds in forest-steppes and forests from Europe to Mongolia and migrates south to its key wintering grounds in the Middle East and South Asia. In Kyrgyzstan observations are rare and in the last decades it has been mainly observed in the north of the country. Most recent observations are mainly from the parts of the Chui Province, adjacent to the Kazakh border during migration, in March-April and September-November, with a couple of observations of wintering birds in December.

Only one individual was observed during the surveys conducted during the peak of spring migration of the species in Kyrgyzstan, indicating that the area along the OHTL is unlikely used as a major migratory route for the species.

Steppe Eagle (*Aquila nipalensis*) – IUCN: EN; RDB: NT

Status: Migratory and wintering species, rare

This species primarily breeds in steppes of Kazakhstan, Russia and Mongolia and migrates south to its key wintering grounds in the Middle East, Africa and South Asia. In Kyrgyzstan observations are rare and although it has been mainly observed in the lowland valleys in the north of the country, there are recent records from the Issyk Kul and Naryn Provinces, indicating that the species is crossing the mountains.

Only one individual was observed during the surveys conducted during the peak of spring migration of the species in Kyrgyzstan, indicating that the area along the OHTL is unlikely used as a major migratory route for the species.

Bearded vulture (*Gypaetus barbatus*) – IUCN: NT; RDB: NT

Status: Sedentary local breeding bird, relatively common

In Kyrgyzstan, this species can be found on all major ridges of the Western, Northern, Central, and Inner Tien Shan, as well as the Pamir-Alai. The species primarily inhabits the middle and upper mountain belt at altitudes of 1,000-4,300 meters above sea level, nesting on rocky cliffs. Periodically, during the non-breeding season, certain individuals may migrate to lowlands regions.

During the surveys, a total of 17 observations of the species were recorded at 3 VP locations, indicating that the species is likely breeding in the surrounding mountains, likely at higher elevations.

Himalayan Griffon (*Gyps himalayensis*) – IUCN: NT; RDB: LC

Status: Sedentary local breeding bird, common

In Kyrgyzstan, this species is widely distributed, with breeding colonies found across most mountain ridges of the country, where it usually breeds at elevations above 2,500 meters asl.

An active nest of *Gyps himalayensis* was discovered in the Boom Gorge during Raptor nest search in 2024, while an active roosting site was found close to the planned OHTL during Raptor nest search in April 2025.

During the surveys, a total of 15 observations of the species was recorded at 3 VP locations, indicating that the species is likely breeding in the surrounding mountains, likely at higher elevations.

Cinereous vulture (*Aegypius monachus*) - IUCN: NT; RDB: NT

Status: Migratory local breeding bird, relatively common

This relatively common breeding species in Kyrgyzstan is confined to the lower and middle elevation zones of the mountains and foothills.

During the surveys, this species was observed at all four VP locations, with a total of 15 observations recorded. This indicated the species is likely breeding in the surrounding mountains and/or foothills.

Golden eagle (*Aquila chrysaetos*) - IUCN: LC; RDB: NT

Status: Sedentary local breeding bird, common

A widely distributed breeding birds in Kyrgyzstan, found breeding at medium to high elevations of the mountains and sometimes foothills, using rock and clay cliffs for breeding.

The most frequently observed birds during VP surveys, with a total of 23 observations recorded at 3 VP locations. Potentially active nests and territorial birds were also recorded during raptor nest search surveys in April 2025.

4. Conclusions

The bird VP surveys conducted in Spring 2025 recorded a diversity of bird species, typical for medium and high-altitude habitats of the Kyrgyz mountains.

Most of the recorded observations (75%) are of raptors and vultures, of which 91% are large-bodied vultures and eagles. Only 2 species (Steppe Eagle and Eastern Imperial Eagle) of the total of 21 species observed are IUCN red-listed, but more likely migrate through the area, depending on weather and timing of migration.

The likely presence of at least one breeding pair of Black Stork must also be considered.

Annexes

Annex 1. Species observation table

Survey ID	VP ID	Date	Time start	Time end	Survey duration	Species (Latin name)	Number of individuals	Observation time	Distance (meters)	Flight height	Behaviour
1	4	20.03.2025	10:20	16:20	06:00	<i>Milvus migrans</i>	1	11:58	1750	100	in flight
2	3	20.03.2025	12:00	16:00	04:00	<i>Aegypius monachus</i>	1	12:57	1500	50	in flight
2	3	20.03.2025	12:00	16:00	04:00	<i>Aquila chrysaetos</i>	1	13:10	700	1300	in flight
2	3	20.03.2025	12:00	16:00	04:00	<i>Gypaetus barbatus</i>	1	12:00	120	60	in flight
2	3	20.03.2025	12:00	16:00	04:00	<i>Gypaetus barbatus</i>	1	14:00	900	1400	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aegypius monachus</i>	1	10:26	1600	200	in flight
3	1	20.03.2025	17:30	19:30	02:00	<i>Aquila chrysaetos</i>	1	17:30	800	500	in flight
3	1	20.03.2025	17:30	19:30	02:00	<i>Aquila chrysaetos</i>	1	18:40	100	200	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	1	09:08	950	300	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	1	09:20	1500	450	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	1	10:20	20	0	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	1	10:24	200	-5	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	3	10:31	1200	1200	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Aquila chrysaetos</i>	1	10:46	300	-20	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Buteo rufinus</i>	1	09:47	300	0	in flight
3	1	20.03.2025	17:30	19:30	02:00	<i>Gypaetus barbatus</i>	1	18:15	400	50	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Gypaetus barbatus</i>	1	09:13	1500	-200	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Gyps fulvus</i>	1	10:18	961	250	in flight
3	1	21.03.2025	09:00	11:00	02:00	<i>Gyps himalayensis</i>	1	10:24	1000	10	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Aquila chrysaetos</i>	1	13:56	2000	300	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Aquila chrysaetos</i>	1	14:16	3100	500	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Aquila chrysaetos</i>	1	14:47	1500	500	in flight

Survey ID	VP ID	Date	Time start	Time end	Survey duration	Species (Latin name)	Number of individuals	Observation time	Distance (meters)	Flight height	Behaviour
4	2	21.03.2025	13:50	16:00	02:50	<i>Aquila chrysaetos</i>	1	14:52	1600	300	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Gypaetus barbatus</i>	1	13:53	1500	250	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Gypaetus barbatus</i>	1	14:17	500	100	in flight
4	2	21.03.2025	13:50	16:00	02:50	<i>Milvus migrans</i>	2	14:08	900	-50	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aegypius monachus</i>	1	11:00	500	0	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aegypius monachus</i>	1	12:34	1000	700	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aquila chrysaetos</i>	2	12:30	1600	1200	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aquila chrysaetos</i>	1	13:06	1500	200	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aquila heliaca</i>	1	13:11	800	700	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Aquila nipalensis</i>	1	11:00	500	100	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Gypaetus barbatus</i>	1	12:37	500	900	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Gypaetus barbatus</i>	1	12:42	1000	100	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Gyps himalayensis</i>	2	12:46	3000	1200	in flight
5	1	02.04.2025	11:00	14:00	03:00	<i>Gyps himalayensis</i>	2	12:49	1000	700	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	6	15:40	2000	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	2	16:16	1500	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	2	16:50	800	300	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	1	17:04	500	700	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	1	17:35	2000	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aegypius monachus</i>	1	18:00	2500	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Aquila chrysaetos</i>	1	17:12	2500	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Eagle/Vulture</i>	2	18:05	3000	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Falco tinnunculus</i>	1	16:43	0	100	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Gypaetus barbatus</i>	1	17:07	2000	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Gypaetus barbatus</i>	1	17:10	2500	700	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Gyps fulvus</i>	1	18:12	2500	1200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Gyps sp.</i>	2	17:15	1500	200	in flight
6	2	02.04.2025	15:30	18:30	03:00	<i>Gyps himalayensis</i>	1	16:15	1500	200	in flight

Survey ID	VP ID	Date	Time start	Time end	Survey duration	Species (Latin name)	Number of individuals	Observation time	Distance (meters)	Flight height	Behaviour
7	3	03.04.2025	09:15	12:15	03:00	<i>Aegypius monachus</i>	2	10:53	5000	350	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Aquila chrysaetos</i>	2	10:43	2500	750	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Falco naumanni</i>	1	10:59	50	50	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Gypaetus barbatus</i>	1	10:31	200	-50	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Gypaetus barbatus</i>	1	10:39	100	100	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Gypaetus barbatus</i>	1	11:29	1000	150	in flight
7	3	03.04.2025	09:15	12:15	03:00	<i>Gyps himalayensis</i>	1	10:47	1000	350	in flight
8	4	03.04.2025	13:50	16:50	03:00	No birds observed	-	-	-	-	-
9	3	10.04.2025	14:00	18:00	04:00	<i>Aegypius monachus</i>	2	14:41	1500	-400	in flight
9	3	10.04.2025	14:00	18:00	04:00	<i>Aegypius monachus</i>	1	15:38	1500	100	in flight
9	3	10.04.2025	14:00	18:00	04:00	<i>Gypaetus barbatus</i>	1	16:23	260	-15	in flight
9	3	10.04.2025	14:00	18:00	04:00	<i>Gyps fulvus</i>	2	14:41	1500	-400	in flight
9	3	10.04.2025	14:00	18:00	04:00	<i>Gyps himalayensis</i>	1	14:41	1500	-400	in flight
11	3	11.04.2025	08:00	12:00	04:00	No birds observed	1	11:45	800	0	in flight
12	1	11.04.2025	14:30	18:30	04:00	<i>Gyps fulvus</i>	1	15:40	2000	700	in flight
12	1	11.04.2025	14:30	18:30	04:00	<i>Gyps himalayensis</i>	2	16:46	1500	500	in flight
13	2	11.04.2025	14:10	18:10	04:00	<i>Gypaetus barbatus</i>	1	15:36	1000	100	in flight
13	2	11.04.2025	14:10	18:10	04:00	<i>vulture sp.</i>	2	15:42	2300	800	in flight
17	1	12.04.2025	14:30	18:30	04:00	<i>Aquila chrysaetos</i>	1	15:40	800	500	in flight
17	1	12.04.2025	14:30	18:30	04:00	<i>Aquila chrysaetos</i>	1	15:41	500	500	in flight
17	1	12.04.2025	14:30	18:30	04:00	<i>Buteo rufinus</i>	1	15:43	600	500	in flight
18	4	13.04.2025	06:30	09:30	03:00	<i>Aegypius monachus</i>	1	07:45	60	20	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	11:15	1500	500	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	12:30	1500	800	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	13:25	1200	600	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Aquila chrysaetos</i>	1	12:54	900	300	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Aquila chrysaetos</i>	1	13:34	200	600	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Falco tinnunculus</i>	1	12:48	20	-5	in flight

Survey ID	VP ID	Date	Time start	Time end	Survey duration	Species (Latin name)	Number of individuals	Observation time	Distance (meters)	Flight height	Behaviour
19	3	13.04.2025	10:00	16:00	06:00	<i>Gypaetus barbatus</i>	1	11:55	60	5	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps fulvus</i>	2	14:12	200	150	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	1	11:00	150	10	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	1	13:00	800	200	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	1	13:42	500	0	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	1	13:48	300	0	in flight
19	3	13.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	2	13:56	0	200	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Aegypius monachus</i>	3	12:05	2000	800	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Aegypius monachus</i>	1	12:26	1400	100	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Aquila chrysaetos</i>	1	12:09	1200	400	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Gyps fulvus</i>	1	12:13	900	200	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Gyps fulvus</i>	1	12:36	2100	100	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Gyps fulvus</i>	1	13:33	1800	-20	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>Gyps himalayensis</i>	1	12:20	800	150	in flight
20	1	14.04.2025	08:00	14:00	06:00	<i>vulture sp.</i>	2	12:22	3500	800	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	2	10:54	100	40	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	2	10:56	100	40	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	11:56	300	200	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	12:17	600	300	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	13:20	1000	500	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	14:57	1500	300	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aegypius monachus</i>	1	15:48	1000	600	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Aquila chrysaetos</i>	1	14:58	1500	200	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Falco tinnunculus</i>	1	15:30	120	60	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Gypaetus barbatus</i>	1	14:57	1500	300	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Gyps fulvus</i>	1	11:14	60	40	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Gyps Fulvus</i>	1	15:30	600	400	in flight
21	2	14.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	2	15:20	1000	500	in flight

Survey ID	VP ID	Date	Time start	Time end	Survey duration	Species (Latin name)	Number of individuals	Observation time	Distance (meters)	Flight height	Behaviour
21	2	14.04.2025	10:00	16:00	06:00	<i>Gyps himalayensis</i>	1	15:52	700	700	in flight

Annex 2. Species photos

1. *Aegypius monachus*



Cinereous Vulture, Aegypius monachus, 2 April 2025, Jeremie Berlioux

2. *Aquila nipalensis*



Steppe Eagle, Aquila nipalensis, 11.09.2024, Bishkek, Jeremie Berlioux

3. *Gypaetus barbatus*



Bearded Vulture, Gypaetus barbatus, immature bird, 3 April 2025, Andrey Averin

4. *Gyps himalayensis*



Himalayan vulture, Gyps himalayensis, 10 April 2025, Andrey Averin

5. *Gyps fulvus*



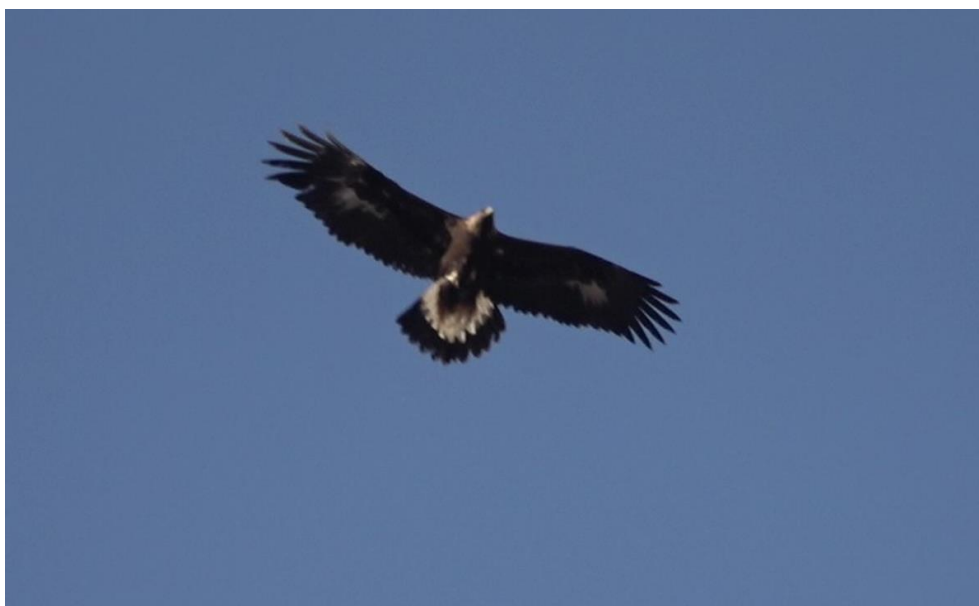
Eurasian griffon vulture, Gyps fulvus, 14 April 2025, Andrey Averin

6. *Buteo rufinus*



Long-legged Buzzard, Buteo rufinus, 21 March 2025, Andrey Averin

7. *Aquila chrysaetos*



Golden Eagle, Aquila chrysaetos, 2 April 2025, Andrey Averin

8. *Aquila heliaca*



Eastern Imperial Eagle, Aquila heliaca, 2 April 2025, Andrey Averin

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Technical appendix 7: Raptor nesting survey report (Spring 2025)



Raptor Nesting Survey Report

Spring 2025

Kemin-Balykchy 500 kV OHTL Project

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1	03 June 2025	Raptor Nesting Survey Report	Maxim Koshkin	Caleb Gordon	Anna Ten

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Table of Contents

1. Introduction	4
2. Materials and methods	5
3. Findings and Results.....	7
3.1 Literature review	7
3.2 Field work.....	7
Himalayan Vulture (<i>Gyps himalayensis</i>) roosting site.....	9
Long-legged buzzard (<i>Buteo rufinus</i>).....	10
4. Limitations	11
5. Conclusions.....	11

Table of Figures

Figure 1: 53.9 km Kemin-Balykchy Interconnection (500kV)	5
Figure 2: Survey routes used during nesting raptors surveys along the northwestern section of the Kemin-Balykchy OHTL ROW, April 2025.	6
Figure 3: Locations of raptor nests and roosts identified during surveys along the north-western section of Kemin-Balykchi OHTL between 3-6 April 2025. Nest numbers correspond to the numbers in Table 1	8
Figure 4: The location of a <i>Gyps himalayensis</i> roost site and “unknown” nest N05 in relation to the existing and planned OHTLs.	10
Figure 5 The nest of the <i>Buteo rufinus</i>	11
Figure 6: Suitability of the habitat within a 1 km buffer along the OHTL ROW for raptor nesting.....	12

Table of Tables

Table 1: Raptor species that could potentially be nesting along the planned Kemin-Balykchy OHTL. ..	7
Table 2: Results of nesting raptors survey along the north-eastern section of the proposed Kemin-Balykchy OHTL route option 2.....	8

1. Introduction

The European Bank for Reconstruction and Development (“EBRD”) is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic (“JSC NEGK”) to finance the construction of a 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the Kemin substation in Chui region and the new Balykchy substation in Issyk-Kul region (see Figure 1). EBRD has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project, including baseline biodiversity studies.

The proposed (500kV) Kemin-Balykchi Interconnection (the “Project”) is a 52.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built west of Balykchy (Figure 1).

The raptor/vulture nest search was conducted in April 2025 along the north-western section of the proposed OHTL route (approx. 25 km) to complement raptor vulture nest surveys performed in Spring/Summer 2024 on an alternative route¹, which covered the remaining section of the preferred route.

The purpose of this survey was to find and locate active raptor nests within 1 km buffer around the OHTL, estimate their proximity to the OHTL, identify birds of conservation interest listed in the IUCN Red List and the Kyrgyzstan Red Book (KgRDB), and draw conclusions about the impact of OHTL on raptors nesting within a 1 km range.

¹ Raptor nesting survey report, spring 2024. KGZ-EBRD-Bird surveys Kemin&Tamga. Juru/EBRD

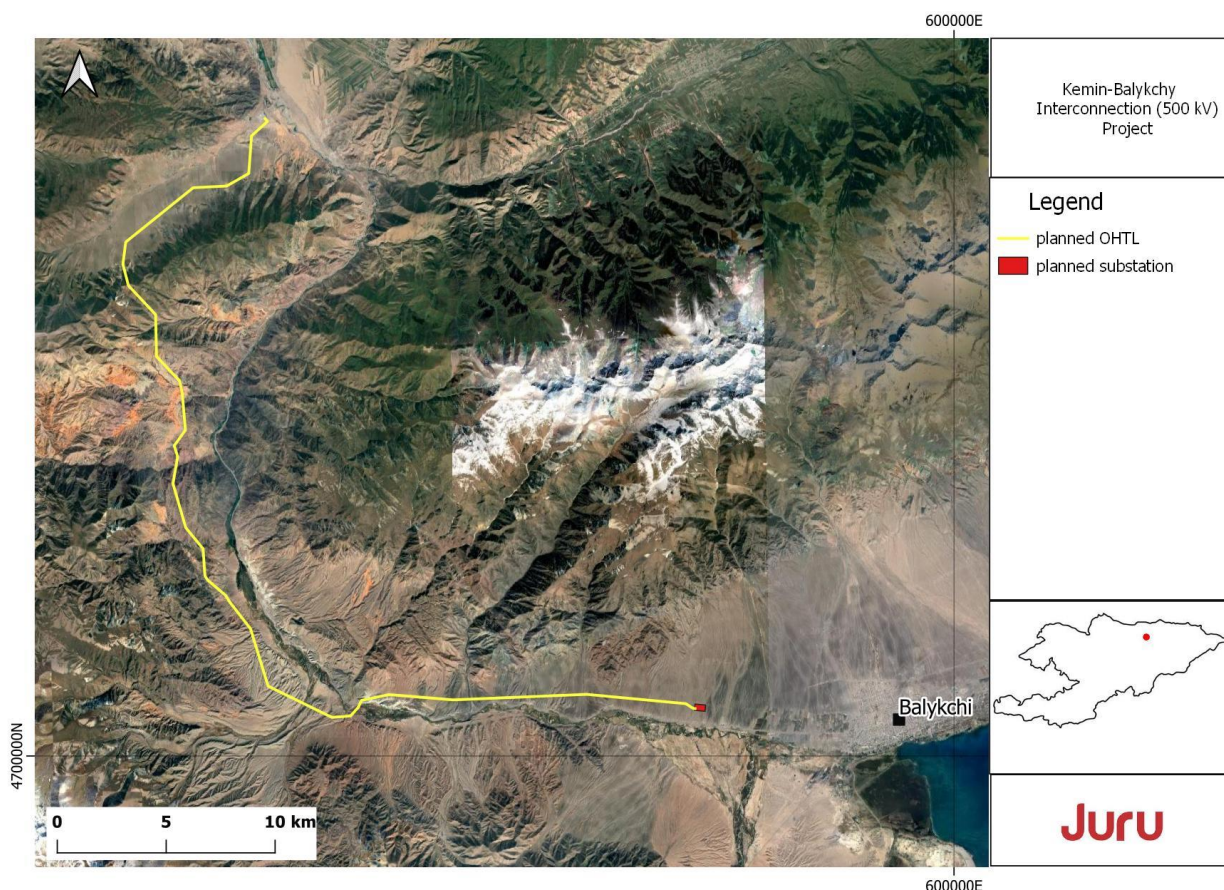


Figure 1: 52.9 km Kemin-Balykchy Interconnection (500kV)

2. Materials and methods

Rapid raptor nesting surveys for the Kemin-Balykchy OHTL were conducted between 3 and 6 April 2025 within a 1 km buffer along the proposed OHTL route, constrained by accessibility.

As the easternmost portion of the OHTL was surveyed for raptor nests in spring 2024, surveys in 2025 focused on the northwestern section of the OHTL as shown in Figure 2. A review of literature, open-source data, and maps was conducted to plan the field surveys.

Most of the surveyed area consists of the foothills of the Kungey Alatau range, characterised by grazed mountain semi-desert, clay, and stony canyons. Along the Chu River and its tributaries, which the proposed OHTL follows, forests and typical floodplain communities are prevalent.

Surveys were conducted by two observers, both qualified to identify raptors and vultures of the region, during four full days, generally following the survey routes shown in Figure 2, mostly using existing dirt tracks to move along the OHTL and making regular stops. Surveys were conducted on foot where driving was not possible. Nest searches were conducted during the day, by scanning all nesting substrates and habitats suitable for raptors and vultures, such as cliffs, rocky slopes, caves, trees, OHTL poles, abandoned buildings, and other human-made structures, as well as by observing birds and their behaviour. The observers did not approach any nests to avoid disturbance. The survey

effort was limited to accessible areas. During the observations, surveyors used binoculars (Nikon 8x42), a spotting scope (Swarovski x 30), and a digital camera (Panasonic Lumix FZ1000, 25-400mm).

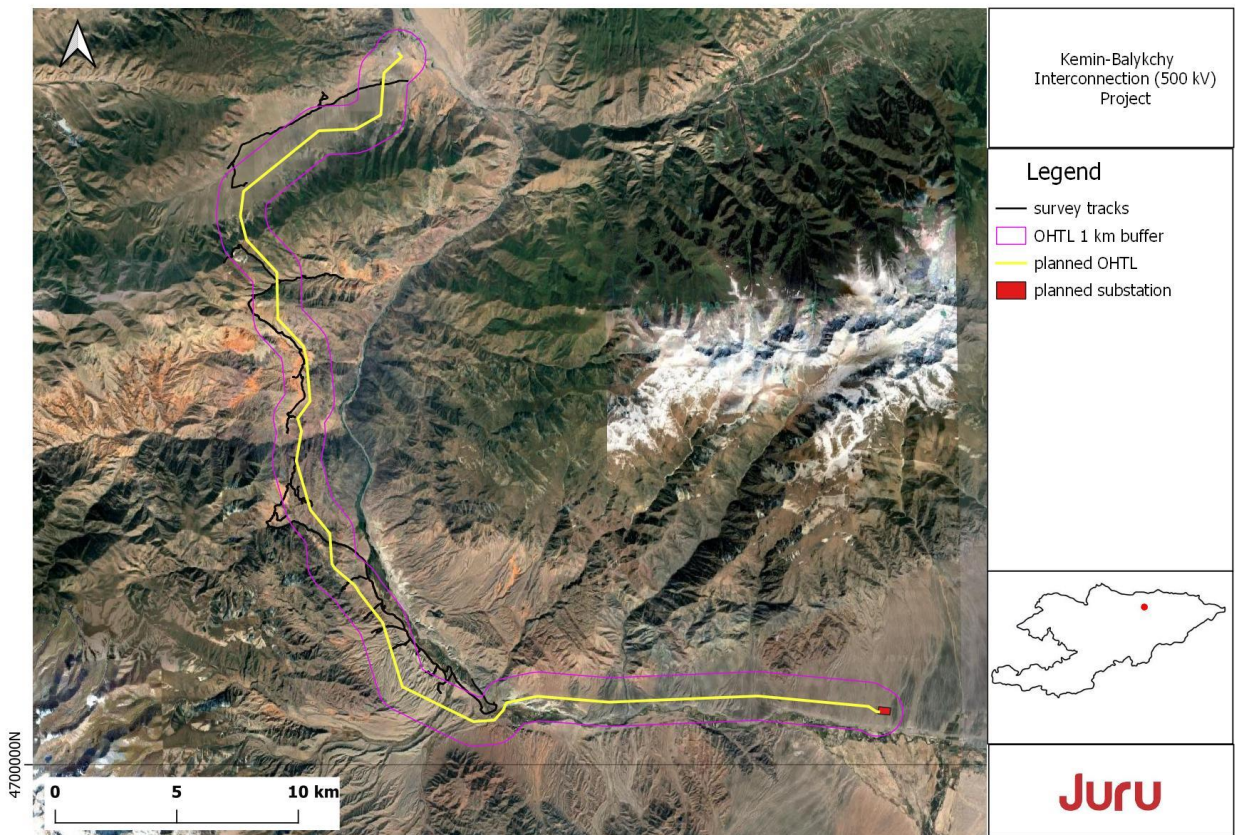


Figure 2: Survey routes used during nesting raptors surveys along the northwestern section of the Kemin-Balykchy OHTL ROW, April 2025.

3. Findings and Results

3.1 Literature review

According to the review of the available literature, open-source data, and based on previous nesting raptor surveys and vantage point surveys in the area, the following 10 species of raptors were identified as potentially breeding in the area (Table 1).

	Common name	Latin name	IUCN status	Kyrgyz RDB Status
1	Bearded vulture	<i>Gypaetus barbatus</i>	NT	NT
2	Cinereous vulture	<i>Aegypius monachus</i>	NT	NT
3	Himalayan vulture	<i>Gyps himalayensis</i>	NT	LC
4	Golden eagle	<i>Aquila chrysaetos</i>	LC	NT
5	Saker Falcon	<i>Falco cherrug</i>	EN	EN
6	Eurasian sparrowhawk	<i>Accipiter nisus</i>	LC	-
7	Black kite	<i>Milvus migrans</i>	LC	-
8	Common buzzard	<i>Buteo buteo</i>	LC	-
9	Long-legged buzzard	<i>Buteo rufinus</i>	LC	-
10	Eurasian Kestrel	<i>Falco tinnunculus</i>	LC	-
11	Eurasian hobby	<i>Falco subbuteo</i>	LC	-

Table 1: Raptor species that could potentially be nesting along the planned Kemin-Balykchy OHTL.

3.2 Field work

A total of six nests of three species of raptors were found, including 3 Golden Eagle *Aquila chrysaetos* nests, 2 Long-legged Buzzard *Buteo rufinus* nests, and 1 Common Kestrel *Falco tinnunculus* nest (Figure 3, Table 1). The occupancy status of the active Long-legged Buzzard nest was directly confirmed by observations of adults on the nest. For four over nests, occupancy/status was indirectly confirmed based on observations of adult birds in proximity to the nests, fresh scat/streaking observed near the nests, and/or nest size, structure, and substrate. Additionally, one inactive raptor nest, one nest of an unidentified raptor species and a roost site² of Himalayan Vulture *Gyps himalayensis* were found during surveys.

Locations of all nests and of the roost are shown in Figure 3, and additional details on these observations are provided in Table 2.

Five of the seven nests were located within a 1 km buffer zone around the planned OHTL and two at a distance over 2.5 km. The closest nest is located 205 m from the OHTL, while the roost of *Gyps himalayensis* was as close as 170 m.

² A vulture roost site is a communal location where vultures gather to rest, sleep, and exchange information, often serving as a gathering point for foraging groups.

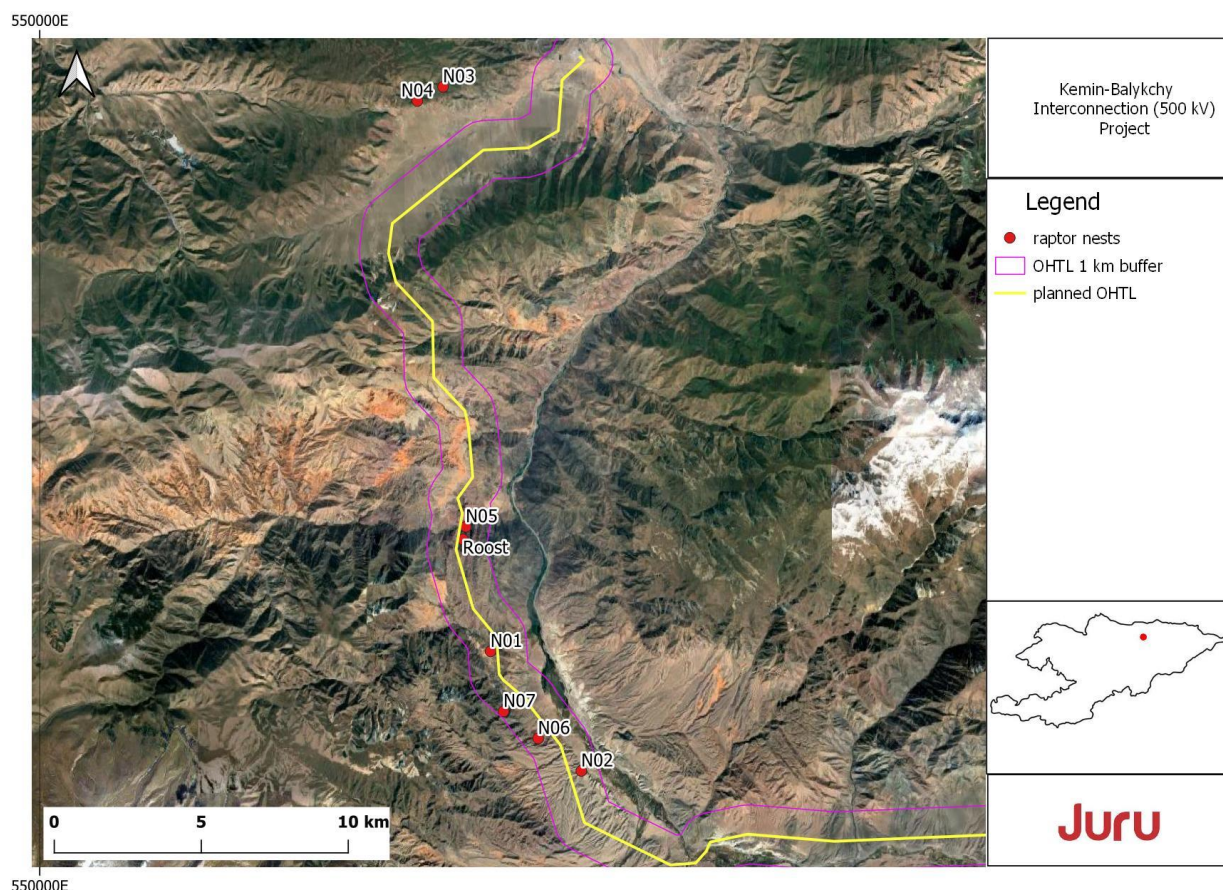


Figure 3: Locations of raptor nests and roosts identified during surveys along the north-western section of Kemin-Balykchi OHTL between 3-6 April 2025. Nest numbers correspond to the numbers in Table 1

Table 2: Results of nesting raptors survey along the north-eastern section of the proposed Kemin-Balykchy OHTL route option 2.

N	Date	Species (scientific)	Species (EN)	Location	IUCN	Kyrgyz RDB	Distance to OHTL, m	Confirmation of nest identity and status
N01	03 April 2025	Golden Eagle	<i>Aquila chrysaetos</i>	42.530853 75.795511	LC	NT (VI)	234	Active, indirect
N02	05 April 2025	Common Kestrel	<i>Falco tinnunculus</i>	42.493993 75.832585	LC	-	323	Active, indirect
N03	06 April 2025	Long-Legged Buzzard	<i>Buteo rufinus?</i>	42.703765 75.777978	LC	-	2520	Active, indirect
N04	06 April 2025	Golden Eagle	<i>Aquila chrysaetos?</i>	42.699513 75.767271	LC	NT (VI)	2740	Inactive nest
N05	03 April 2025		unknown	42.569074 75.785744	-	-	205	Active, indirect

N	Date	Species (scientific)	Species (EN)	Location	IUCN	Kyrgyz RDB	Distance to OHTL, m	Confirmation of nest identity and status
N06	05 April 2025	Long-legged Buzzard	<i>Buteo rufinus</i>	42.504063 75.814853	LC	-	483	Active, direct
N07	05 April 2025	Golden Eagle	<i>Aquila chrysaetos</i>	42.512448 75.800658	LC	NT (VI)	800	Indirect
Roost	03 April 2025	Himalayan Vulture	<i>Gyps himalayensis</i>	42.565213 75.784466	NT	NT (VI)	170	Active, direct

The following sections provide more detail on the active nest and the roost site.

Himalayan Vulture (*Gyps himalayensis*) roosting site

A roosting site of the IUCN Near-threatened *Gyps himalayensis* is located 170 m east of the planned OHTL line. Two birds were observed leaving the area in the morning of the 03 April 2025, however presence of several areas with a substantial amount of 'whitewash' suggests that the roost is likely used by more individuals. No suitable niches or rock shelves were located, which would indicate this could be a breeding colony.

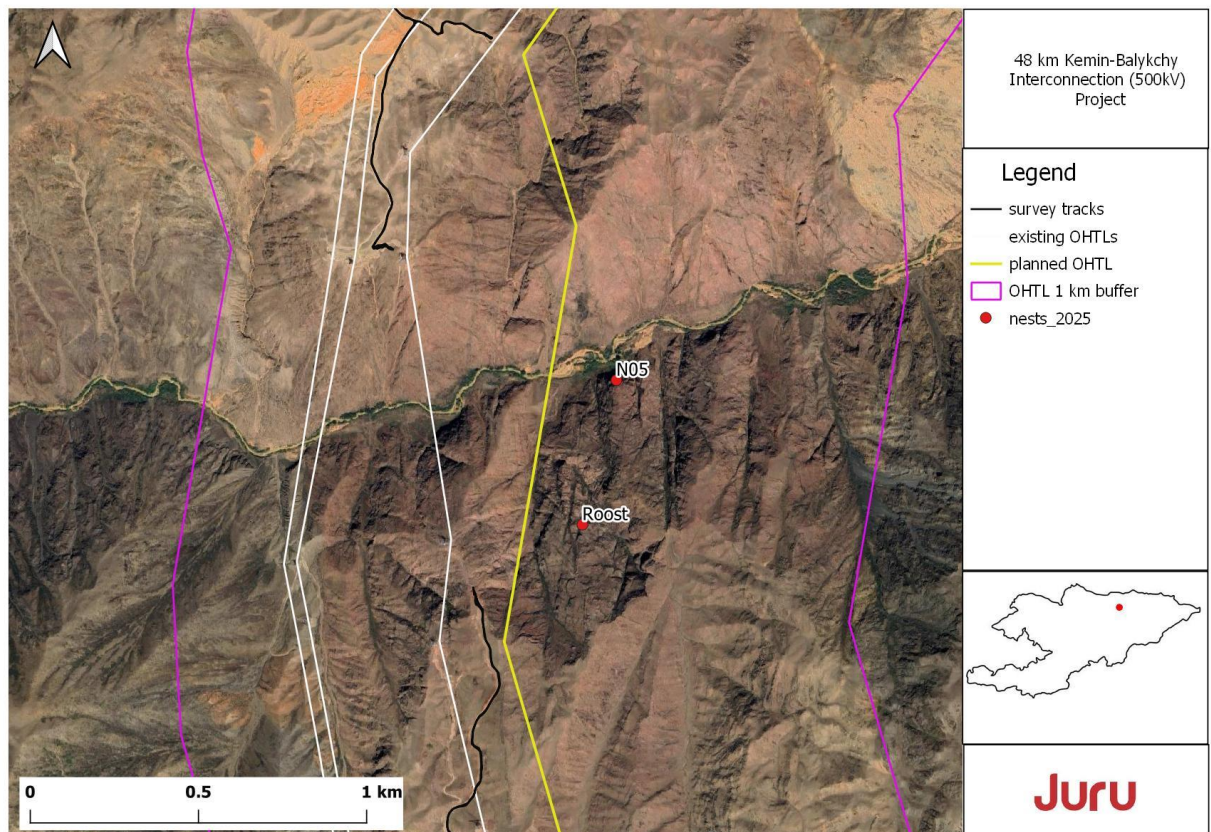


Figure 4: The location of a *Gyps himalayensis* roost site and “unknown” nest N05 in relation to the existing and planned OHTLs.

Long-legged buzzard (*Buteo rufinus*)

The only active nest along the surveyed section of the OHTL with confirmed nest occupancy was a *Buteo rufinus* nest located on 05 April 2025. The female was observed incubating on the nest, and the male was observed bringing her food. This nest is located on a clay wall of the Kok-Moinok canyon frequented by tourists, where, for its nest, the breeding pair chose part of the canyon furthestmost from the tourist path. The nest is located 483 m west of the planned OHTL route, with 2 existing powerlines located between the nest and the planned OHTL.



Figure 5 The nest of the *Buteo rufinus*

4. Limitations

A small proportion of suitable nesting habitat within a 1 km buffer around the OHTL route was not fully surveyed due to the inaccessibility of some sites along two steep river gorges. Therefore, the actual number of nesting birds may be slightly higher, assuming a couple of nests have been missed.

Another limitation is related to the seasonality of the surveys, as the behaviour of raptors varies throughout different stages of nesting, which affects their visibility.

5. Conclusions

During the surveys, 6 nests of 3 raptor species and an active roost of Himalayan Vulture were identified. All the species are listed by the IUCN and the Kyrgyz Red Book as LC or NT. The identified nests are all outside the OHTL ROW (30m on either side of the overhead conductor, with the nearest nest 205 metres from the OHTL).

Most of the area surveyed within a 1 km buffer around the OHTL and often beyond does not have suitable breeding sites for raptors or vultures, as either too flat or without steep slopes and cliffs to provide structure for nests. There are hardly any trees in the area large enough to support nesting sites and no raptor nests were found on existing OHTL towers. All found nests are built on rocks and cliffs, in niches or on shelves.

Less than 40% of the habitat within 1 km buffer around the OHTL route may be considered as suitable for raptor nesting (Figure 6). The remaining part of the project area does not have suitable habitat for nesting raptors, such as cliffs, steep slopes, rocks or large trees.

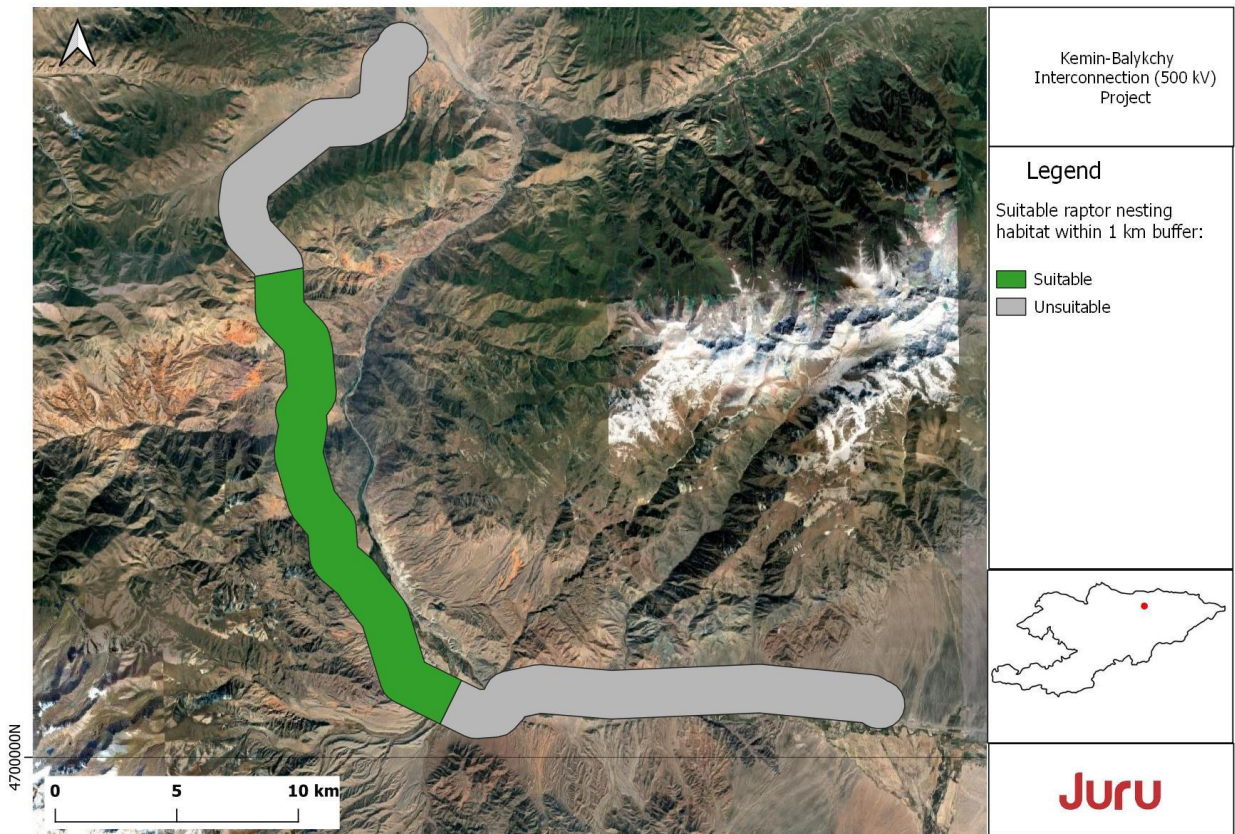


Figure 6: Suitability of the habitat within a 1 km buffer along the OHTL ROW for raptor nesting.



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Technical appendix 8: Mammal survey report (Spring 2025)



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Mammal Survey Report

Spring 2025

Kemin-Balykchy 500 kV OHTL Project

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Juru's Project Manager	Anna Ten
Juru's Project Director	Jushkinbek Ismailov

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Table of Content

1. Introduction.....	4
2. Materials and methods.....	5
3. Results.....	7
3.1 Literature Review	7
3.2 Walked transects	8
3.3 Camera trapping	11
3.4 Limitations and uncertainties	14
4 Conclusions	14

Table of Figures

Figure 1: The route of the proposed Kemin-Balykchi OHTL.....	5
Figure 2: Locations of walked transects used to survey mammals along the proposed OHTL	6
Figure 3: Locations of camera traps set up for mammal surveys	7
Figure 4: Examples of camera trap setups	7
Figure 5: Examples of activity signs recorded during walked mammal transects along the proposed OHTL ROW (from top left clockwise: Red Fox foot print; Red Fox faeces; Altai Marmot by its burrow; Tolai Hare faeces).....	9

Table of Tables

Table 1: Details of mammal transects surveyed in April 2025 along the proposed Kemin-Balykchy OHTL route..	6
Table 2: Species of mammals potentially occurring within the Project area.	8
Table 3: Results of mammal transect surveys along the Kemin-Balykchi OHTL conducted between 3 and 6 April 2025.....	10
Table 4: Coordinates and other details of camera traps set up along the planned OHTL ROW.	11
Table 5: Observations of mammal species recorded by camera traps set up along the proposed OHTL route. Only observations from camera traps set up along the OHTL route option 2 are listed.	13

1. Introduction

The European Bank for Reconstruction and Development (“EBRD”) is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic (“JSC NEGK”) to finance the construction of a 500 kV overhead transmission line (OHTL) and supporting new substation in Kyrgyz Republic between the Kemin substation in Chui region and a new substation in the Issyk-Kul region (see Figure 1). EBRD on behalf of NEGK has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project, including baseline biodiversity studies.

The proposed (500kV) Kemin-Balykchi Interconnection (the “Project”) is a 52.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a substation to be built approximately 10 km west of Balykchy (Figure 1).

Construction of a new OHTL can have different potential impacts on mammals inhabiting the territory of the Project site. Some species can be affected through disturbance (e.g., noise from construction activities, presence of humans and heavy machinery), temporary or permanent displacement (e.g. disturbance or destruction of burrows, shelters etc.), and mortality.

The report presents results of a literature review to compile a list of potential species inhabiting the project OHTL ROW and the results of camera trapping survey conducted between October 2024 and April 2025 and mammal transect surveys conducted in April 2025 along the proposed OHTL right of way (ROW). The purpose of these surveys was to identify any terrestrial mammal species that might be sensitive or at risk due to construction.

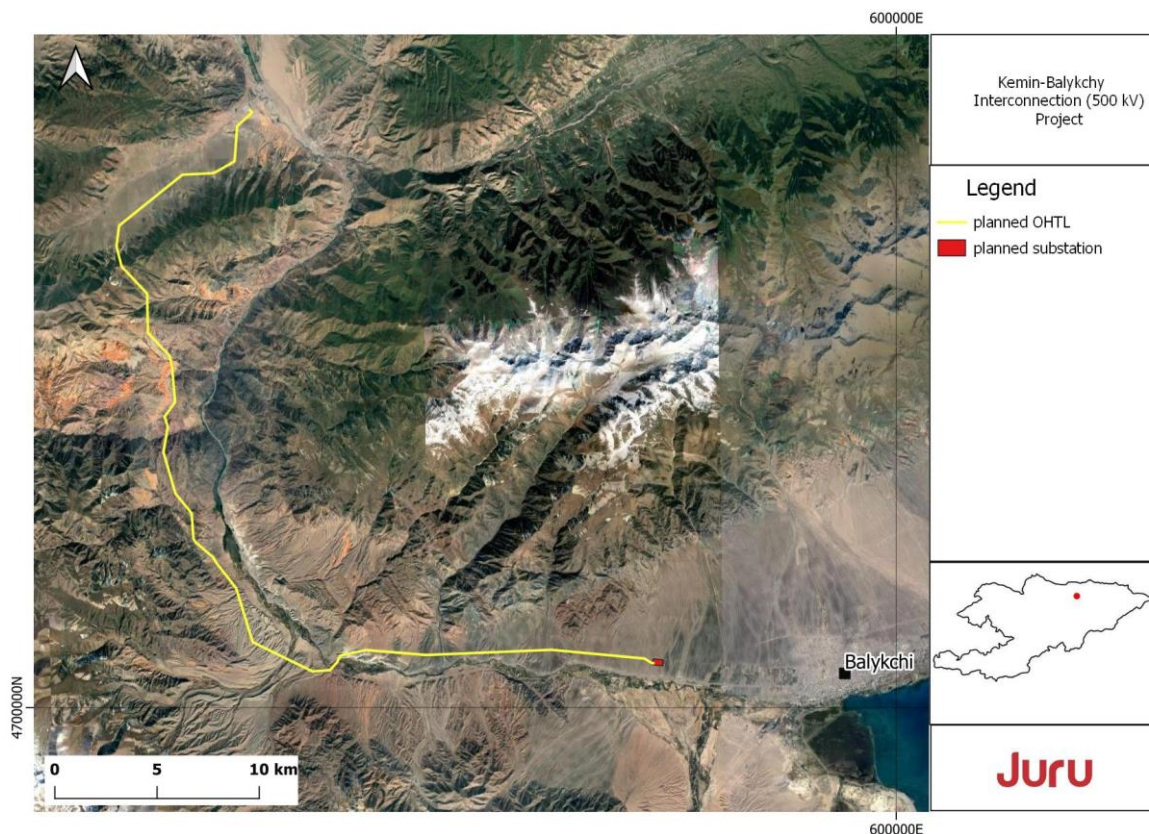


Figure 1: The route of the proposed Kemin-Balykchi OHTL

2. Materials and methods

To assess the impact of linear objects on mammals, surveys were carried out along walked transects. The length of these transects along the route of a linear object should be at least 10% and cover all habitats.

The transects were planned to be evenly distributed along the OHTL route and to cover all key types of habitats present in the area. Surveys were conducted by a single observer who is experienced in the identification of terrestrial mammals of the region from tracks, scat, fur, and visually. While an effort was made to follow the proposed OHTL route, sometimes transects deviated from the route where following a straight line was not possible due to rugged terrain. For each survey, observations of mammals, their burrows, tracks, faeces, and other signs of mammals' activity were recorded. The survey strip was set at 50 m on each side of the transects (for visual observations and burrows); however, searching for tracks and other signs of activity was limited to 2-3 m on both sides of the transects, due to predominantly stony substrate.

Mammal surveys were conducted along 9 walked transects with a total length of 13.3 km, which represents 24.6 % of the OHTL length (53.9 km) (Table 1). The transects were evenly distributed along the OHTL and covered key habitat types along the route and were representative of the substation site, including flat stony semi-desert along the eastern section, clay foothills, higher altitude areas in the central part, and alpine grassland along the northwestern section of the route (Figure 2).

Table 1: Details of mammal transects surveyed in April 2025 along the proposed Kemin-Balykchy OHTL route

Transect ID	Habitat Type	Date	Lat Start	Long Start	Lat End	Long End	Length (km)
1		03.04.2025	42.545245	75.788641	42.534972	75.796983	1.5
2		04.04.2025	42.580263	75.779082	42.588545	75.785033	1.4
3		04.04.2025	42.622758	75.761151	42.618213	75.771716	1.1
4		04.04.2025	42.636371	75.746627	42.631369	75.769644	3.1
5		05.04.2025	42.470372	76.061283	42.470372	76.061283	1.3
6		05.04.2025	42.473226	76.010572	42.473226	76.010572	1.6
7		05.04.2025	42.476305	75.878587	42.472275	75.879837	0.7
8		05.04.2025	42.498340	75.818796	42.500372	75.823823	0.5
9		06.04.2026	42.665190	75.758115	42.677221	75.765723	2.1

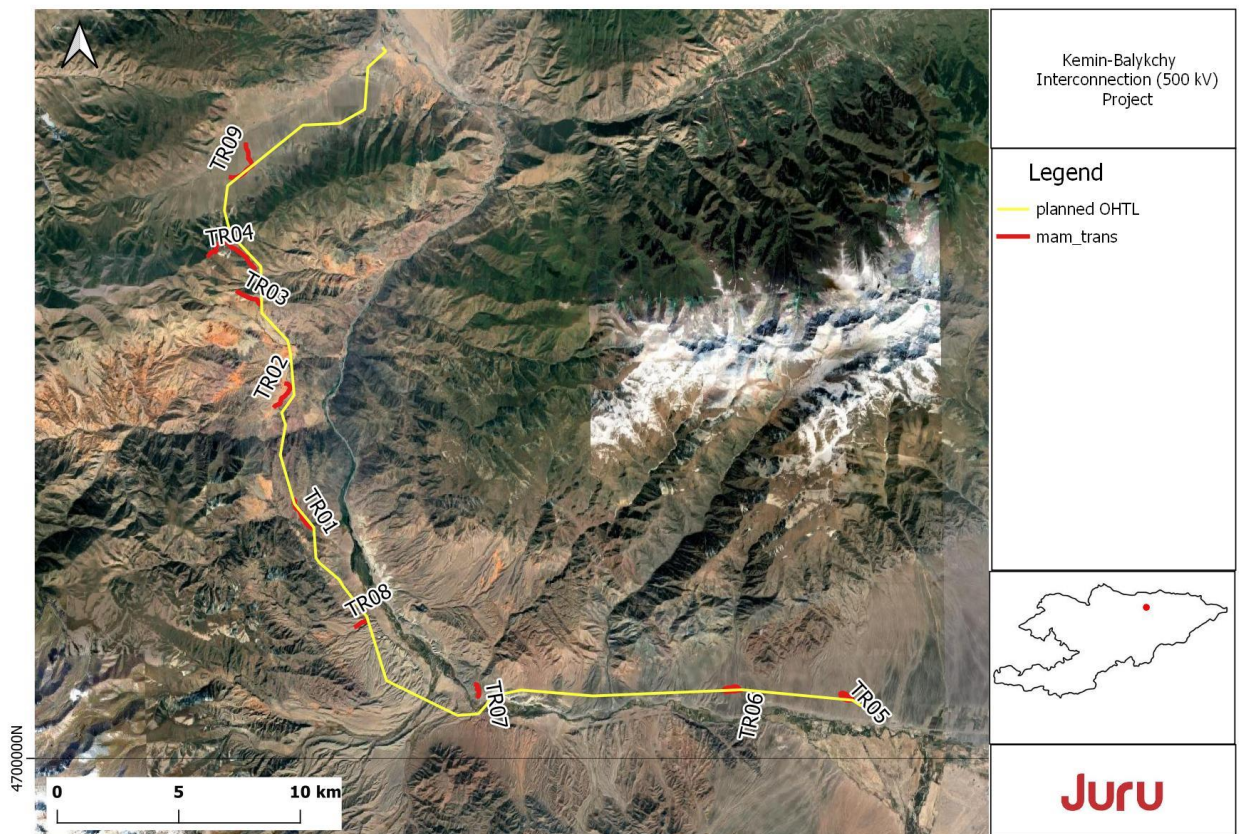


Figure 2: Locations of walked transects used to survey mammals along the proposed OHTL.

Additionally, 10 camera traps (Spypoint Force-48 and Bushnell Core 24 MP) were installed on November 13 and 14, 2024, and on January 15, 2025¹ (refer to Figure 3² and Figure 4). Since the Project site is easily accessible and used by people for grazing, fishing, hunting, and tourism, camera trap locations were chosen to balance optimal wildlife detection and concealment from humans. The traps

¹ During the route options appraisal, the preferred route was significantly changed along the northwestern section of the OHTL, requiring three of the camera traps installed in November 2024 to be moved to the northwestern section of the final route in January 2025.

² Figure 3 shows the final locations of camera traps

were set up to cover major habitat types (high mountains, stony desert, riverine forest and clay foothills) to try to find evidence of the site

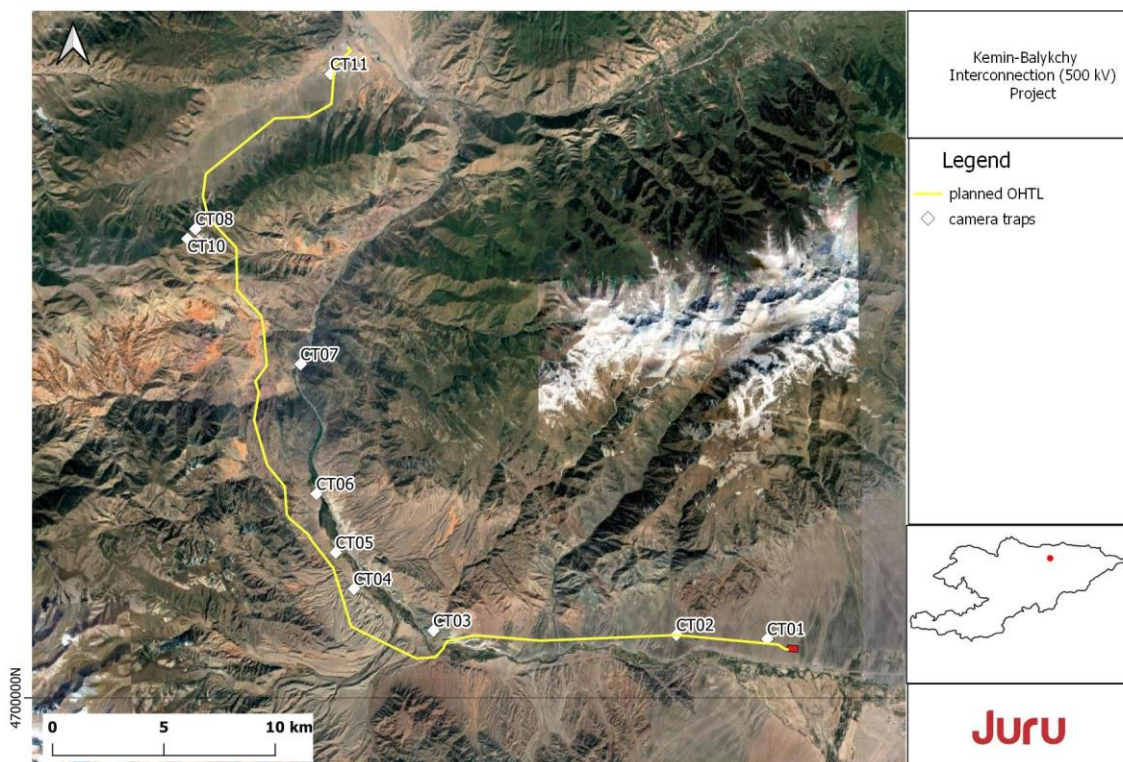


Figure 3: Locations of camera traps set up for mammal surveys



Figure 4: Examples of camera trap setups

3. Results

3.1 Literature Review

After conducting extensive literature research, analysis of open-source databases and consultations with local experts, the potential presence of around 70 mammal species was expected within the areas around the proposed OHTL route. These include the Snow Leopard and Marbled Polecat, listed by IUCN as Vulnerable and 8 species listed in the Red Data Book of the Kyrgyz Republic (Table 2).

According to the IBAT³ report for the area, the potential presence of three globally threatened mammals is expected within 50 km buffer around the suggested OHTL route, namely Snow Leopard (IUCN VU, KG RDB CR), Marbled Polecat (IUCN VU, KG RDB CR) and Goitered Gazelle (IUCN VU, KG RDB CR). Of these, Goitered Gazelle can be excluded, as this species has been extinct in the Kyrgyz Republic since the 1970s, and only recently, a species re-introduction initiative has started, with the first few individuals currently kept in enclosures at a site along the southern shore of the Lake Issyk-Kul (Ilbirs Foundation, unpublished data).

Although there is potentially suitable habitat for the Marbled Polecat around Project ROW, the latest observations (last decades) of the species in the country are anecdotally limited to the western part of the Chu Valley and foothills of the Chatkal Mountain Range in the west of the country (Red Data Book of Kyrgyz Republic 2006).

The Snow Leopard is likely to be found at higher elevations within the mountain ranges to the east and west of the project area. Although the chances of the species crossing the proposed routes are small, there is anecdotal evidence that a snow leopard was seen crossing the EM11 road at night (Snow Leopard Foundation, unpublished data). Snow Leopards have also been recorded on camera traps on both sides of the Boom Gorge, with the nearest confirmed record 25 km to the west of the OHTL route (Snow Leopard Foundation, unpublished data). Therefore, it is likely that some individuals cross the gorge, especially at night in winter, when road traffic is weak and the water level in the Chu River is low.

Camera traps were placed along the planned OHTL route to try to confirm desktop review and unpublished data sets for the snow leopard and other mammal species.

Table 2: Species of mammals potentially occurring within the Project area.

Latin name	Common name	IUCN status	Kyrgyz Republic RDB Status
<i>Panthera uncia</i>	Snow Leopard	VU	CR
<i>Vormela peregusna</i>	Marbled Polecat	VU	CR
<i>Neomys fodiens</i>	Eurasian Water Shrew	LC	NT
<i>Tadarida teniotis</i>	European Free-tailed bat	LC	LC
<i>Martes foina</i>	Beech Marten	LC	LC
<i>Lynx lynx</i>	Eurasian Lynx	LC	NT
<i>Hystrix indica</i>	Indian Crested Porcupine	LC	LC
<i>Allactaga elater</i>	Small Five-toed Jerboa	LC	LC
<i>Allactaga sibirica</i>	Siberian Jerboa	LC	LC
<i>Allactaga severtzovi</i>	Severtzov's Jerboa	LC	LC

3.2 Walked transects

Walked transect surveys resulted in only two visual observations of mammals, Altai Marmot *Marmota baibacina* (TR04) and Tolai Hare *Lepus tolai* (TR06) (**Error! Reference source not found.**). A total of 10 Altai Marmots were observed within a loose colony stretched for several hundred meters along

³ IBAT PS6 & ESS6 Report. Generated under licence 43172-72638 from the Integrated Biodiversity Assessment Tool on 09 October 2024 (GMT). www.ibat-alliance.org

the existing OHTL service road, which is adjacent (300 m) from the proposed OHTL ROW, totalling approximately 80 burrows (both active and inactive). A Tolai Hare was observed leaving its shelter and running away.

In addition, various signs of activity of six mammal species were recorded, including faeces, tracks, and burrows (**Error! Reference source not found.**). None of the species that were identified are listed in the IUCN Red List or the Kyrgyz Red Data Book.

A colony of a Gerbil species recorded in stony semi-desert (TR06) likely belongs to Tamarisk Gerbil *Meriones tamariscinus* (IUCN LC), as according to IUCN, this is the only species found in the semi-deserts surrounding Issyk-Kul Lake. However, as this species normally inhabits wetter, more vegetated habitats, this identification is not confirmed and may require further surveys. Examples of observations recorded during transects are presented in the images below (Figure 5).



Figure 5: Examples of activity signs recorded during walked mammal transects along the proposed OHTL ROW (from top left clockwise: Red Fox footprint; Red Fox faeces; Altai Marmot by its burrow; Tolai Hare faeces)

Table 3: Results of mammal transect surveys along the Kemin-Balykchi OHTL conducted between 3 and 6 April 2025

Species		IUCN status	KG RDB status	Transect ID								
English name	Scientific name			1	2	3	4	5	6	7	8	9
Tolai Hare	<i>Lepus tolai</i>	LC	unlisted	faeces, tracks (x4)	-	faeces (x5)	-	-	visual (x1), shelter (x1), faeces (x8)	-	-	-
Red fox	<i>Vulpes vulpes</i>	LC	unlisted	-	tracks (x3), faeces (x1)	faeces (x1)	tracks (x1)	-	-	-	-	-
Altai Marmot	<i>Marmota baibacina</i>	LC	unlisted	-	-	burrows (x15)	visual (x10), burrows (x80)	-	-	-	-	-
Long-eared Hedgehog	<i>Hemiechinus auritus</i>	LC	unlisted	-	-	-	-	-	faeces	-	-	-
Gerbil sp.	<i>Meriones tamariscinus</i> - Not confirmed	LC	unlisted	-	-	-	-	-	burrows (x10)	-	-	-
Beech Marten	<i>Martes foina</i>	LC	LC	-	-	-	-	-	faeces	-	-	-

3.3 Camera trapping

Out of 10 camera traps initially set up in November 2024, two (CT06 and CT09) were stolen before the memory card replacement visit in January 2025, while one more (CT05) was stolen after that, which meant that some images from the latter were obtained. Camera traps CT08, 09, 10 were set up in January 2025 after being moved from their initial locations along a previous route variation along the north-western section. As a result, a total of seven camera traps were retrieved between 03 and 06 April 2025, resulting in data from nine camera traps. The activity duration of retrieved camera traps varied from 2 to 6 months, depending on when they were set up and whether some stopped working for technical reasons. The details for each camera trap are presented in Table 4, only presenting data from camera traps set up along the final route option.

Table 4: Coordinates and other details of camera traps set up along the planned OHTL ROW.

Camera ID	N	E	Set date	Active (months)	Habitat
CT01	42.471283	76.060850	13.11.2024	6	Dry river bed (wadi) in a flat area of stony semi-desert
CT02	42.473389	76.011214	13.11.2024	2	Dry river bed (wadi) on slightly elevated alluvial plain, stony semi-desert
CT03	42.476196	75.878546	13.11.2024	4	Slope of a hill, potential animal path, stony semi-desert
CT04	42.493439	75.835279	13.11.2024	6	Clay hills, along an animal path
CT05	42.508209	75.825568	13.11.2024	2	Riverine forest, on a tree, along an animal path, by a river
CT06	42.532043	75.815298	13.11.2024	0	Dry river bed, riverine forest (<i>Stolen before memory card replacement</i>)
CT07	42.532043	75.815298	14.11.2024	2	Dry river bed, along animal path
CT08	42.639374	75.750305	07.01.2025	4	On a slope of a grassy field, along animal path
CT09	42.660561	75.886137	14.11.2024	0	Riverine forest (<i>Stolen before memory card replacement</i>)
CT10	42.635864	75.746308	07.01.2025	4	On a slope of a rocky and grassy field, along animal path running along the ridge
CT11	42.702167	75.825941	07.01.2025	4	At the edge of a reed bed of a small wetland located in a grazed

Across all camera traps only three species of wild mammals were captured, including Golden Jackal *Canis aureus*, Red Fox *Vulpes vulpes* and Tolai Hare *Lepus tolai*, all listed by the IUCN as Least Concern and none listed in the Red Data Book of Kyrgyzstan (see Table 5, and **Error! Reference source not found.**). All the species have been recorded on multiple occasions, indicating that they are relatively common, at least for specific locations. Both Tolai Hare and Red Fox were recorded repeatedly at 3 and 6 separate locations respectively, indicating they are likely the most numerous mammal species within the surveyed area which could be captured with camera traps.

Livestock was captured on 6 out of 9 camera traps for which data is available, including numerous registrations of flocks of sheep, cattle and horses.

People were captured on 4 of the camera traps, with 5 incidents of people passing in front of the camera on CT05, mostly represented by shepherds, however fishermen and hunters/poachers were also recorded.



a) Tolai Hare *Lepus tolai*



b) Chukar



c) Hunter specialist



d) Golden Jackal *Canis aureus*

Figure: Examples of images captured by camera traps deployed to survey mammals along the proposed OHTL route option 2

Table 5: Observations of mammal species recorded by camera traps set up along the proposed OHTL route. Only observations from camera traps set up along the OHTL route option 2 are listed.

Camera ID	Species		IUCN status	Kyrgyz RDB status	Number of observations	Observation dates
	English name	Scientific name				
CT01	Tolai Hare	<i>Lepus tolai</i>	LC	Not assessed	3	01.10.2025, 03.02.2025, 06.02.2025
	Red Fox	<i>Vulpes vulpes</i>	LC	Not assessed	2	28.02.2025, 19.03.2025
CT02	Tolai Hare	<i>Lepus tolai</i>	LC	Not assessed	7	22.11.2024, 12.12.2024, 14.12.2024, 16.12.2024, 17.12.2024, 19.12.2024, 25.12.2024
CT03	Tolai Hare	<i>Lepus tolai</i>	LC	Not assessed	5	09.01.2025, 16.12.2024, 24.01.2025, 04.03.2025, 04.04.2025
	Red Fox	<i>Vulpes vulpes</i>	LC	Not assessed	2	15.11.2024, 19.03.2025
CT04	Red Fox	<i>Vulpes vulpes</i>	LC	Not assessed	2	29.01.2025, 04.04.2025
CT05	Golden Jackal	<i>Canis aureus</i>	LC	Not assessed	1	02.01.2025
	Red fox	<i>Vulpes vulpes</i>	LC	Not assessed	1	03.01.2025
CT07	Tolai Hare	<i>Lepus tolai</i>	LC	Not assessed	15	14.11.2024, 15.11.2024, 16.11.2024, 17.11.2024, 19.11.2024, 21.11.2024, 25.12.2024, 04.01.2025
	Golden Jackal	<i>Canis aureus</i>	LC	Not assessed	4	16.11.2024, 20.12.2024, 21.12.2024, 05.01.2025
CT08	-	-			-	No mammals recorded
CT10	Red Fox	<i>Vulpes vulpes</i>	LC	Not assessed	1	11.02.2025
CT11	Red Fox	<i>Vulpes vulpes</i>	LC	Not assessed	1	25.01.2025

3.4 Limitations and uncertainties

Attempts to conceal camera traps to prevent their theft can be considered the main limitation of the camera trapping survey, as this often meant that the best locations for camera trap set up could not be used.

Many of the transects were walked on stony substrate, which made it difficult to find mammal tracks.

4. Conclusions

None of the species identified during the walked transects and through camera trapping are included in the CR, EN, or VU categories of the IUCN Red List or the Kyrgyz Red Data Book. The Beech Marten (faeces recorded on transect 6), listed as LC in the latter, is the only recorded species listed in the Red Data Book of Kyrgyzstan.

Based on the results, species diversity in the area surveyed is expected to be small. This is due to two main reasons. Firstly, mammal species diversity and abundance are naturally low in the habitats present, which mostly include sparsely vegetated stony and clay semi-desert habitats at medium altitudes and with low annual precipitation. Secondly, most of the area along the proposed OHTL ROW is frequently used by people. The flat areas are easily accessible, and people use the existing adjacent OHTL service roads to access higher altitude sections with rugged terrain. People and signs of their presence were encountered almost everywhere, both during transect and camera trap surveys. This indicates a high level of disturbance from people using the area for livestock grazing, hunting, fishing and tourism. Additionally, some hunters/poachers were recorded on one of the camera traps, suggesting that some mammals might be hunted.

Technical appendix 9: Reptile survey report (Spring 2025)



Reptile Survey Report

Spring 2025

Kemin-Balykchy 500 kV OHTL Project

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Table of Contents

1. Introduction	4
2. Materials and methods	5
3. Findings and Results	7
3.1 Literature review	7
3.2 Field Results	9
Site 1. Biotope on the northern slope of the Kyrgyz Range	9
Site 2. Biotope on the southern slope of the Kungey Ala-Too Range (foothill plain)	12
Site 3. Mid-mountain arid zone (foothill plain)	14
3.3 Limitations	15
4. Conclusion	15
References	16

Table of Figures

Figure 1: The proposed OHTL and new substation location	5
Figure 2: Reptile survey tracks	6
Figure 4: Steppe-runner lizard (<i>Eremias arguta</i>), Zhel Aryk Gorge	10
Figure 5: Eastern steppe viper (<i>Vipera renardi</i>), Zhel Aryk Gorge	11
Figure 6: Foothills of Kungey Ala-Too	12
Figure 7: <i>Eremias stummeri</i> in the Kutmaldy area	13
Figure 8: <i>Eremias velox</i> – in the Kutmaldy area	13
Figure 9: <i>Gloydius halys</i> in the Shirgiy area	14

Table of Tables

Table 1. Main locations of reptile tracks	6
Table 2. A list of reptile species that may potentially inhabit the project site	8
Table 3: Distribution of reptiles encountered during the spring 2025 surveys in Site 1	10
Table 4: Distribution of reptiles encountered during the spring 2025 surveys in Site 2	12
Table 5. Distribution of reptiles encountered during the spring 2025 surveys in Site3	14
Table 6. Distribution of reptiles in the project area	17

1. Introduction

The European Bank for Reconstruction and Development (“EBRD”) is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic (“JSC NEGK”) to finance the construction of a 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the Kemin substation in Chui region and the Balykchy substation (or an alternative new substation) in Issyk-Kul region (see Figure 1). EBRD has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project, including baseline biodiversity studies.

The proposed (500kV) Kemin-Balykchi Interconnection (the “Project”) is a 52.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a new substation to be built in Balykchy (Figure 1).

This report aims to characterize herpetofauna diversity within the OHTL right of way (ROW) in order to evaluate the potential of the Project to impact reptiles and amphibians. Potential adverse effects of the Project on herpetofauna include habitat loss from the Project’s infrastructure footprint, and displacement/disturbance impacts and/or direct mortality impacts during project construction. The planned OHTL route predominantly parallels two existing power lines, traversing mountainous terrain and river valleys.

The planned power transmission line will be located both in human-modified areas and in natural habitats inhabited by various wildlife species.

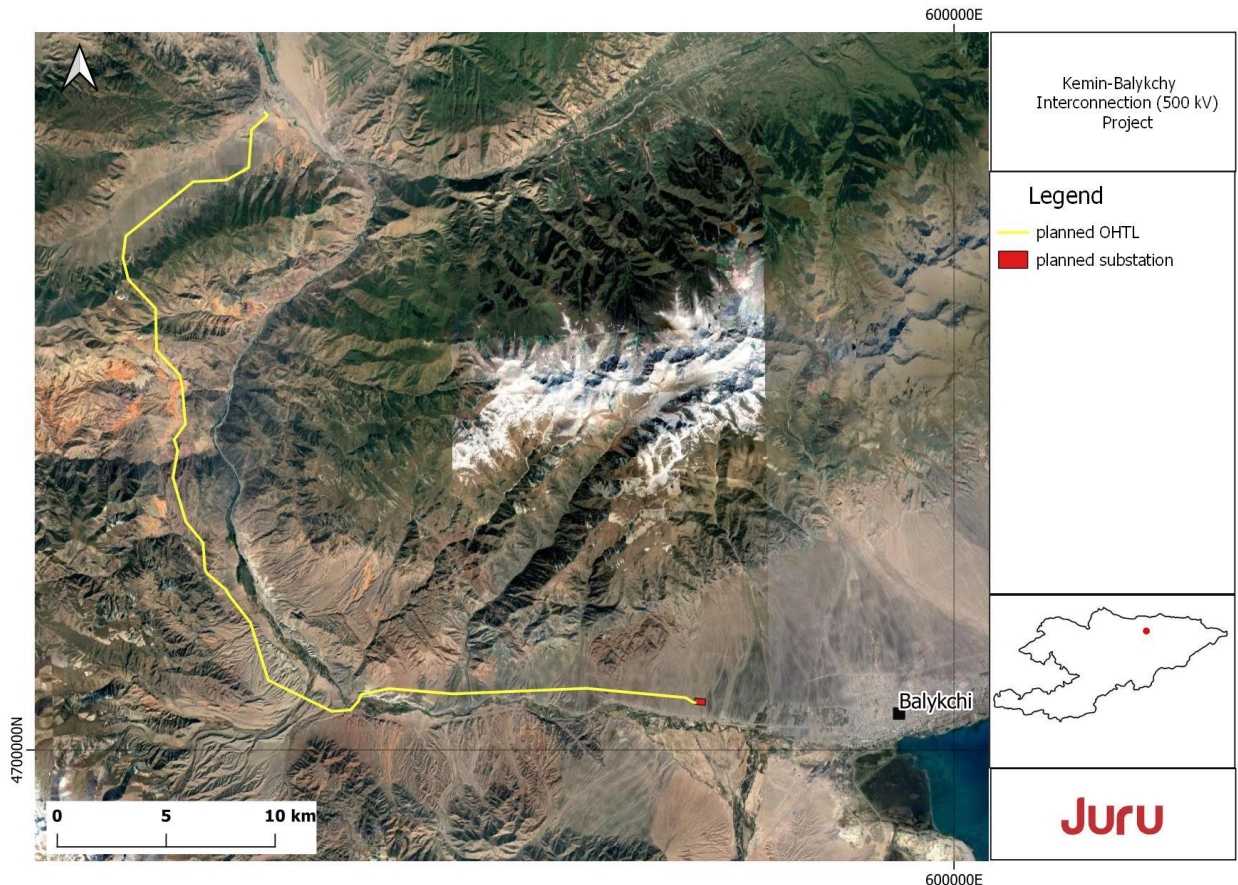


Figure 1: The proposed OHTL and new substation location

2. Materials and methods

The survey aimed to document the species composition and density, territorial distribution, including areas of concentration, and the overall state of the reptile habitats within the study area. It should be noted that the findings were derived from a combination of field surveys and desktop analysis.

Considering that low temperatures can limit reptile detection, observations were carried out no earlier than 10:00 a.m. (given that the area is located in mountainous terrain above 1,200 m a.s.l.), when the air temperature rose above +16°C.

The survey method involved an observer who is qualified to identify reptiles and amphibians of the region walking along designated transects at a suitable observation pace (2–3 km/h), recording all reptiles and amphibians encountered within the survey strip and turning over stones where animals were likely to be found (Figure 2). Reptiles and amphibians were identified to the species level, and all data were recorded in a field notebook.

Thus, the transect surveys followed these main principles:

1. Surveys were conducted along transects with a width of 10 m. The minimum route length for the reptile survey was 5 km.
2. The survey strip was located within a single biotope.

- 3. The surveys accounted for the period of maximum daily activity of reptiles.
- 4. Surveys were conducted under the most favourable weather conditions for reptiles.

The reptile survey route is shown in Figure 2.

The status of reptiles in the study area was assessed.

The field research methodology focused on:

- Species composition within the study area
- Habitat distribution patterns

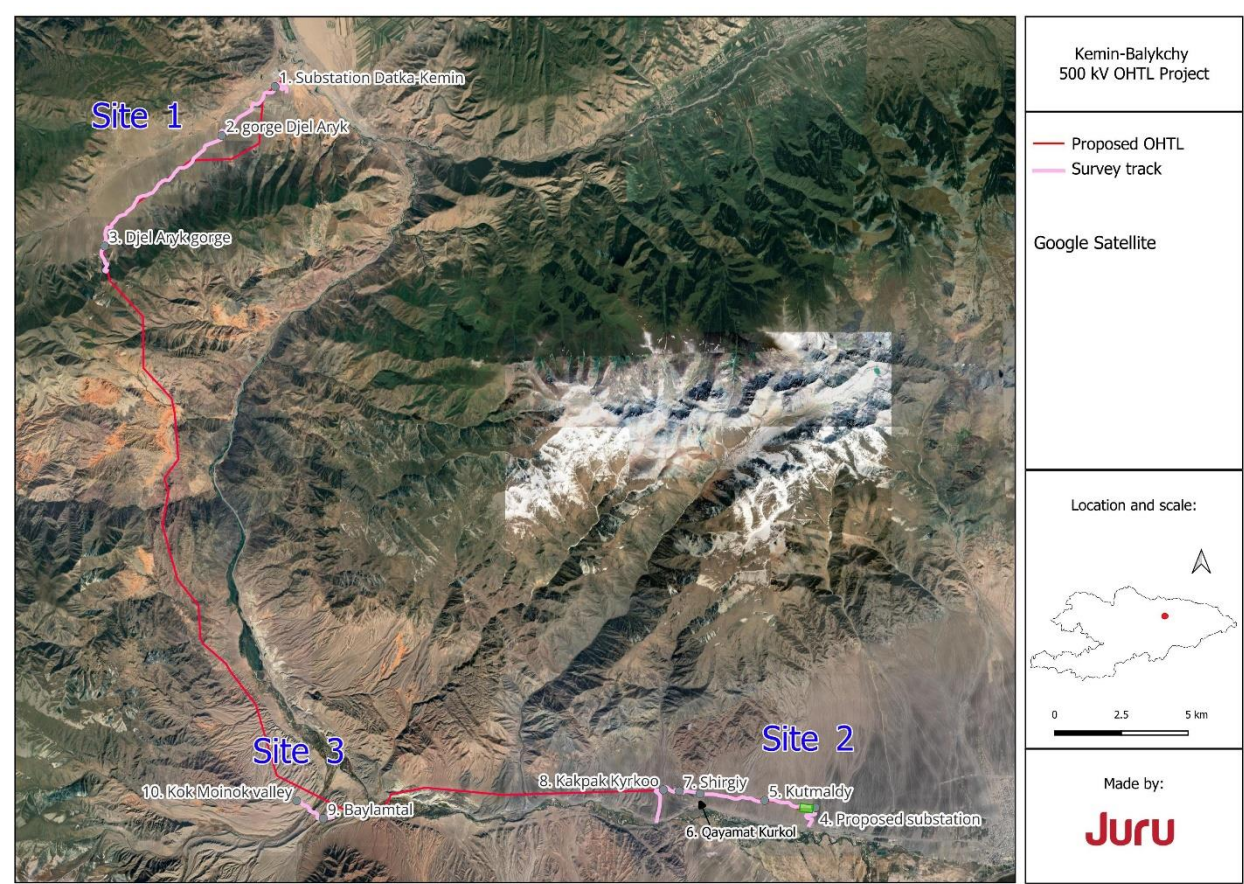


Figure 2: Reptile survey tracks

Table 1. Main locations of reptile tracks

№	Area	Site #	Coordinates		Length (km)
			N	E	
1	Datka-Kemin Substation	1	42.70902	75.83288	2,67
2	Zhel Aryk Gorge	1	42.69267	75.80862	6,20
3	Zhel Aryk Gorge	1	42.65568	75.75532	2,16
4	Solar Substation	2	42.46737	76.07878	2,1
5	Kutmaldy Area	2	42.4698	76.05565	2,44
6	Kayamat Kurkol Area	2	42.47205	76.02628	2,46
7	Shirgiy Area	2	42.47293	76.01685	1,0
8	Kakpak Kyrkoo Area	2	42.47337	76.00955	1,0
9	Baylamtal Area	3	42.46377	75.8548	1,43

№	Area	Site #	Coordinates		Length (km)
			N	E	
10	Kokmoinok Valley	3	42.4697	75.8427	0,98
		In total:			22,5

Field studies were carried out along the OHTL using standard zoological methods for species identification. The research followed methodological guidelines established by L. G. Dinesman and M. L. Kaletskaya (1952), V. M. Makeev and A. T. Bozhansky (1988), and D.A. Bondarenko and N.G. Chelintsev (1996).

The density estimation of species population in the community was assessed using the line transect method in representative biotopes. For diurnal species, surveys used variable-width transects, recording perpendicular distances from the transect line to each observed reptile. These measurements were used to calculate the mean detection distance (\bar{y}) effective census band width (**B**)

Calculation of the population density (**D**) per hectare (ind/ha) was carried out according to the following formula:

$$D = \frac{N}{2BL}; \quad B = \frac{\pi}{2} \bar{y}; \quad \bar{y} = \frac{1}{n} \sum_{i=1}^n y_i,$$

where **N** is the total number of individual reptiles, **n** is the number of individuals with measured detection distances, **L** is the route length. Comparative analysis of the results obtained by various route accounting methods proved its high accuracy (Bondarenko, Chelintsev, 1996). This method has been successfully employed multiple times to survey desert reptile species (Bondarenko, 1994; Bondarenko et al., 2008; Bondarenko, Peregontsev, 2018). Mean values of the population density along with estimation of standard error ($M \pm SE$) were calculated according to the results of accounting at several approximately equal route sections.

Diurnal surveys were conducted during sunny weather with low wind and no precipitation. Surveys began during peak lizard activity and concluded when the animals retreated due to heat. Nocturnal species density was assessed using headlamps within fixed width transects. The quantitative assessment method was tailored to the species ecology, landscape and geographical conditions, season, and type of research.

3. Findings and Results

3.1 Literature review

Kyrgyzstan has limited herpetofauna diversity due to its physical and climatic conditions. The region is dominated by high mountains with harsh climate conditions, which is unfavorable for thermophilic amphibians and reptiles.

The Reptile Database¹ documents 12,263 reptile species globally, with over 250 species found in Central Asia and only 37 occurring in Kyrgyzstan. While approximately 8,500 amphibian species exist worldwide, only four² species have been documented in Kyrgyzstan. Despite this limited diversity, Kyrgyzstan harbors endemic and relict species that are threatened with extinction. One of these, the marsh frog *Pelophylax ridibundus*, is believed to have migrated from the northwest, probably facilitated by human activity. These species require protection under the Convention on Biological Diversity, adopted in Rio de Janeiro in 1992 and ratified by Kyrgyzstan in 1996.

Four main habitats can be identified along the 52.9 kilometres of the project ROW: 1) anthropogenically modified landscapes; 2) floodplain areas along the Chu River; 3) mid-mountain regions characterized by tree and shrub vegetation with herbaceous cover; and 4) rubbly foothill (adyrs) with sparse vegetation. Based on literature reviews and field observations from previous years, we have compiled a list of reptile species that are potentially present within the project ROW (see Table 2).

Table 2. A list of reptile species that may potentially inhabit the project site

No	Class	Family	Species	Common name	IUCN Red List	Kyrgyzstan Red Data Book
1	Amphibia	Bufonidae	<i>Bufo viridis</i>	European green toad	LC	VU B2ab
2		Ranidae	<i>Rana asiatica</i>	Asiatic Brown Frog	VU	VU B1ab
3	Reptilia	Anguidae	<i>Pseudopus apodus</i>	European Glass Lizard	LC	NT
4		Gekkonidae	<i>Mediodactylus russowii</i>	Transcaspien Bent-Toed Gecko	LC	Not listed
5		Lacertidae	<i>Eremias arguta darevskii</i>	Racerunner Darevskii	LC	Not listed
6		Lacertidae	<i>Eremias velox borkini</i>	Central Asian racerunner	LC	Not listed
7		Lacertidae	<i>Eremias stummeri</i>	Stummer's Racerunner	LC	Not listed
8		Scincidae	<i>Ablepharus desertii</i>	Desert Lidless Skink	LC	Not listed
9		Colubridae	<i>Elaphe dione</i>	Steppes Ratsnakes	LC	Not listed
10			<i>Hemorrhois ravergeri</i>	Spotted Whip Snake	LC	Not listed
11			<i>Psammophis lineolatus</i>	Steppe ribbon racer	LC	Not listed
12			<i>Natrix tessellata</i>	Dice Snake	LC	Not listed
13		Viperidae	<i>Vipera renardi tienshanica</i>	Eastern Steppe Viper	NT	VU A4bc
14		Crotalidae	<i>Gloydius caraganus</i>	Karaganda pitviper	LC	Not listed

Note: **IUCN** – species included in the Red List of the International Union for Conservation of Nature (EN – endangered; LC – least concern; VU- vulnerable); **Red book of Kyrgyzstan: B1:** A very restricted extent of occurrence (EOO), estimated to be less than 5,000 km², **a:** Severe fragmentation or the species exists at very few

¹ <http://www.reptile-database.org>

² Arbaev K.A., Abdyramanova N.T. "Amphibians of Kyrgyzstan". Bulletin of Issyk-Kul University, No. 44, 2017. [Link](#) [in Russian]

locations, **b**: Continuing decline in: (i): Extent of occurrence (EOO), (ii): Area of occupancy (AOO), (iii): Quality of habitat, (iv): Number of locations or subpopulations, and (v): Number of mature individuals. **B2**: A very restricted area of occupancy (AOO), estimated to be less than 500 km²; **VU A4**: A population reduction of at least 30% (Vulnerable) over a time frame, including past and future trends (up to three generations or 10 years, whichever is longer); **b**: The causes of decline are understood and relate to: A decrease in the area of occupancy (AOO) or extent of occurrence (EOO), Habitat quality deterioration, or Exploitation (e.g., hunting or collection); **c**: The decline in population is due to specific threats like habitat destruction, fragmentation, or environmental changes.

3.2 Field Results

The surveys were conducted on April 24–25, 2025. The total distance travelled during the survey was approximately 22.5 km. Six reptile species and no amphibians were recorded during the spring herpetological survey, totalling 145 specimens. One species among them — the Eastern steppe viper is listed as protected under the IUCN Red List (Near threatened) and the Kyrgyzstan Red Data Book (Vulnerable).

Site 1. Biotope on the northern slope of the Kyrgyz Range is represented by mid-mountain steppe. The plant community consists of a *Phlomoides*–meadow grass association (*Phlomoides pratensis* + *Poa pratensis*) and a sagebrush–forb association (*Artemisia santolinifolia* + *Artemisia dracunculus* + *Festuca valesiaca*).

The survey transect was laid out southward from the Datka-Kemin substation along the Zhel Aryk Gorge (Figure 2, Table 3). Three species were recorded in this area:

- *Asymblepharus alaicus* – Alay eyelid skink
- *Eremias arguta* – Steppe-runner
- *Vipera renardi* – Eastern steppe viper (observation point: 42°41.551'N; 75°48.509'E)

It is worth noting that on 04 June 2019, during our previous survey of the area, we recorded European legless lizard *Pseudopus apodus* at the following coordinates, located east of the Datka-Kemin substation: 42°42.541'N ' N; 75°49.973'E. It is possible we did not encounter it during the April 2025 surveys due to the early season, as this species is known to be more active during the warmer months.

Additionally, two other snake species may be encountered here, though neither was detected during the April 2025 surveys: the Tartar sand boa (*Eryx tataricus*; IUCN - LC; RDB – NT) and the Dione rat snake (*Elaphe dione*; IUCN - LC), both known to occur in the Chu Valley (Cadastre of the genetic fund of Kyrgyzstan, 2015). A Dione rat snake was photographed during raptor nest surveys along the Kemin-Balykchy OHTL in April 2025.

Table 3: Distribution of reptiles encountered during the spring 2025 surveys in Site 1

No	Species (English name)	Species (scientific name)	IUCN status	Kg RDB status	Number observed on the transect	Substation Datka- Kemin (1)	Zhel Aryk Gorge (2)	Zhel Aryk Gorge (3)
1	Alay eyelid skink	<i>Asymblepharus alaicus</i>	LC	-	17	-	5	12
2	Steppe runner	<i>Eremias arguta</i>	LC	-	6	2	4	-
3	Eastern steppe viper	<i>Vipera renardi</i>	NT	VU A4bc	1	-	1	-



Figure 3: Steppe-runner lizard (*Eremias arguta*), Zhel Aryk Gorge



Figure 4: Eastern steppe viper (*Vipera renardi*), Zhel Aryk Gorge

Site 2. Biotope on the southern slope of the Kungey Ala-Too Range (foothill plain) — the surveyed area is represented by desert-steppe and transitional Turano-Dzungarian desert-steppe vegetation. The plant community mainly consists of *Stipa glareosa* + *Helianthemum songaricum* and *Stipa glareosa* + *Sympegma regelii*. The soil cover is rocky-gravelly.

The survey transect was laid out westward from the solar substation through Kutmaldy area, Kayamat Kurkol area, Shirgiy area, up to Kakpak Kyrkoo area (Figure 2, Table 4).

Four species were recorded at this site:

- *Asymblepharus alaicus* — Alay eyelid skink (photo not taken)
- *Eremias stummeri* — Stummer's racerunner
- *Eremias velox* — Central Asian racerunner
- *Gloydus halys* — Common pit viper

Table 4: Distribution of reptiles encountered during the spring 2025 surveys in Site 2

No	Species	IUCN status	Kg RDB status	# of obs-s	Solar Substation (4)	Kutmaldy Area (5)	Kayamat Kurkol Area (6)	Shirgiy Area (7)	Kakpak Kyrkoo Area (8)
1	<i>Asymblepharus alaicus</i>	LC	-	2	-	2	-	-	-
2	<i>Eremias stummeri</i>	LC	-	63	12	17	10	15	9
3	<i>Eremias velox</i>	LC	-	42	9	7	12	9	5
4	<i>Gloydus halys</i>	LC	-	2	-	1	-	1	-



Figure 5: Foothills of Kungey Ala-Too



Figure 6: *Eremias stummeri* in the Kutmaldy area



Figure 7: *Eremias velox* – in the Kutmaldy area



Figure 8: *Gloydus halys* in the Shirgiy area

Site 3. Mid-mountain arid zone (foothill plain) dominated by xerophytic semi-shrubs (*Ephedra intermedia* + *Perovskia abrotanoides* + *Caragana leucophloea*).

The survey transect was laid out from the Baylamtal area to the Kokmoinok Valley (Figure 2, Table 5).

Two species were recorded at this site:

- Stummer’s racerunner *Eremias stummeri*
- Central Asian racerunner *Eremias velox*

Table 5: Distribution of reptiles encountered during the spring 2025 surveys in Site3

No	Species (English)	Species (scientific)	IUCN status	Kg RDB status	# of obs-s	Baylamtal area (9)	Kokmoinok valley (10)
1	Stummer’s racerunner	<i>Eremias stummeri</i>	LC	-	7	5	2
2	Central Asian racerunner	<i>Eremias velox</i>	LC	-	5	2	3

3.3 Limitations

One of the key limitations was that the central, more mountainous part of the OHTL route was not covered by spring 2025 surveys, due to logistical reasons related to the available transport and poor accessibility of the area.

4. Conclusion

A total of six reptile species were visually recorded along the surveyed section of the proposed OHTL ROW, with an additional three species likely to be encountered based on the literature review.

1. Among reptiles listed in the Red Data Book of Kyrgyzstan, the eastern steppe viper is present; however, its population density is low. There is also a high probability of encountering three additional species — the Tatar sand boa *Eryx tataricus* (IUCN - LC; RDB – NT), the European legless lizard *Pseudopus apodus* (IUCN - LC; RDB – NT), and the Dione rat snake *Elaphe dione* (IUCN - LC).
2. The most frequently observed species along the Kemin–Balykchy OHTL route are the Stummer's racerunner *Eremias stummeri* and Central Asian racerunner (*Eremias velox*).
3. No IUCN VU or above species were identified or considered likely to be present.

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Table 6: Distribution of reptiles in the project area

№	Species	Site 1			Site 2					Site 3		Total species observed
		Substation Datka-Kemin	Zhel Aryk Gorge	Zhel Aryk Gorge	Solar Substation	Kutmaldy Area	Kayamat Kurkol Area	Shirgiy Area	Kakpak Kyrkoo Area	Bailamtal area	Kokmoinok valley	
1	<i>Asymblepharu salaicus</i>	-	5	12	-	2	-	-	-	-	-	19
2	<i>Eremias arguta</i>	2	4	-	-	-	-	-	-	-	-	6
3	<i>Vipera renardi</i>	-	1	-	-	-	-	-	-	-	-	1
4	<i>Eremias stummeri</i>			-	12	17	10	15	9	5	2	70
5	<i>Eremias velox</i>			-	9	7	12	9	5	2	3	47
6	<i>Gloydus halys</i>	-	-	-	2	-	1	-	1	-	-	4
Total												147

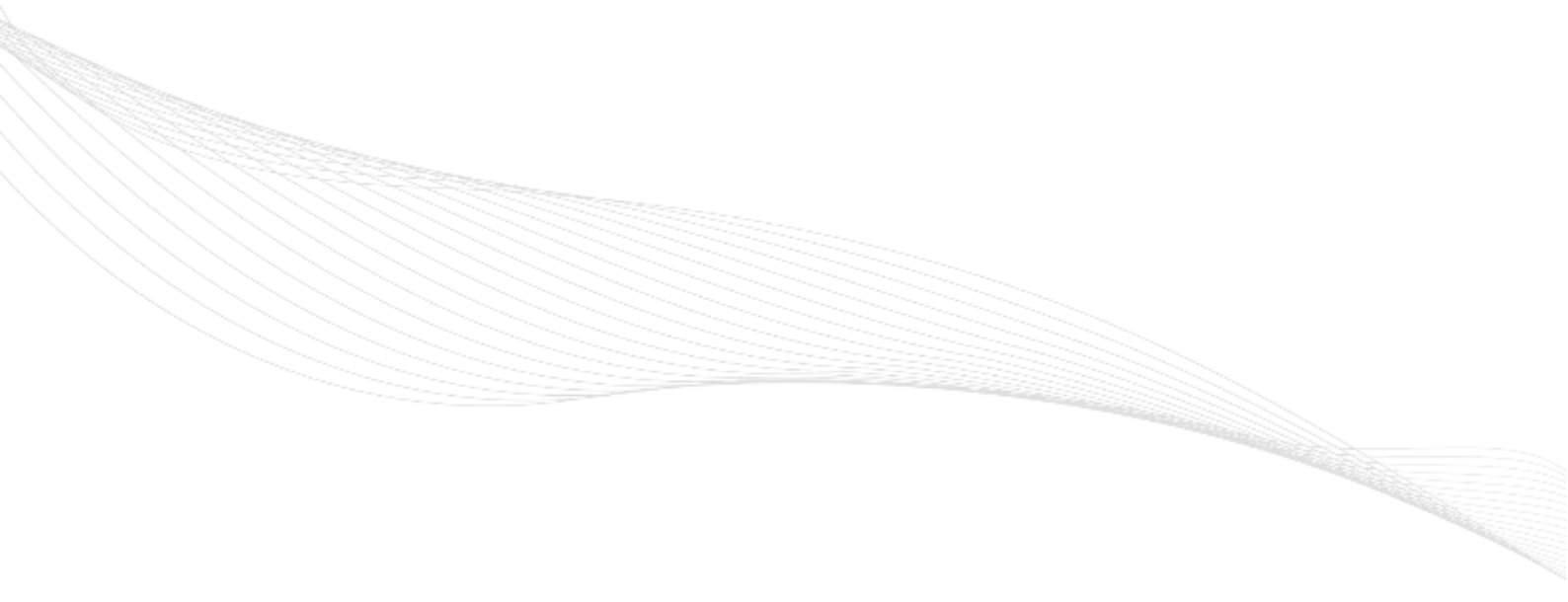


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Technical appendix 10: Bat roost survey report (Spring 2025)



Bat Roost Survey Report

Spring 2025

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Table of Contents

1. Introduction	5
2. Materials and Methods	7
3. Results	8
3.1 Literature review.....	8
3.2 Field observations - territory.....	12
3.3 Field observations – potential roosts.....	14
3.4 Limitations and uncertainties	18
4. Conclusion.....	19
5. References	19

Table of Figures

Figure 1: Proposed OHTL and planned substation.....	6
Figure 2: Survey track across the project area within 500 m and 2 km buffer zones – recommended survey territory by SABAA (Sowler et al, 2020).	7
Figure 4: Habitats suitable for roosting within a 500 m buffer	12
Figure 5: Landscapes of southern (left) and northern (right) parts of the proposed OHTL, gentle foothill areas where no natural caves or other cavities within 500 m buffer.....	13
Figure 6: Areas of relatively acceptable suitability.....	13
Figure 7: Areas of acceptable suitability, including canyons and mountainous valley areas with various crevices and cavities.....	13
Figure 8: Areas of acceptable roosting suitability, including the Chui River valley.....	14
Figure 9: The bridge across the river cannot be thoroughly observed, however, on the accessible parts of the construction, there are no signs of bat presence.....	14
Figure 10: The steep sandstone wall with numerous cavities and cracks – suitable for roosting, but impossible to inspect without any special equipment.....	15
Figure 11: A typical part of the sandstone canyon. Multiple potential shelters, no presence of bats.	15
Figure 12: The small cavity in the canyon. The debris flow and narrow entrance prevented surveys, but are suitable for bats.....	15
Figure 13: The grotto in the rock. Inspected, no signs of bats.	16
Figure 14: Typical landscape – sandstone canyon with crevices and cavities for roosting.....	16
Figure 15: Small cave 4 km from the proposed OHTL. No signs of bats.....	17
Figure 16: Potential bat roost sites observed during the surveys	17

Table of Tables

Table 1. List and status of bats species potentially inhabiting the project area.....9

1. Introduction

The European Bank for Reconstruction and Development (“EBRD”) is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic (“JSC NEGK”) to finance the construction of a 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the Kemin substation in Chui region and the Balykchy substation (or an alternative new substation) in Issyk-Kul region (see Figure 1). EBRD has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project, including baseline biodiversity studies.

The proposed (500kV) Kemin-Balykchi Interconnection (the “Project”) is a 52.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a substation to be built in Balykchy (Figure 1).

The OHTL ROW consists of a mosaic of habitats, including river valleys, riparian vegetation, deserts and semi-deserts, canyons, and cultivated gardens, all of which provide suitable roosting and foraging opportunities for bats. Numerous crevices and grottoes, as well as bridges and other constructions, offer potential roosting sites. A known bat roost was reported approximately 5 km from the OHTL ROW several years ago (private communication). The proposed OHTL ROW follows the alignment of two existing transmission lines for most of its length.

This report includes a literature review to compile a list of potential species inhabiting the Project OHTL ROW (“OHTL ROW”) and the results of the field survey. A field survey was conducted on April 16–17, 2025, at the beginning of the migration season. Potential roosts and signs of bat presence (individuals and droppings) were recorded. However, due to challenging terrain, steep slopes, and the absence of access paths, only a limited portion of the territory could be surveyed.

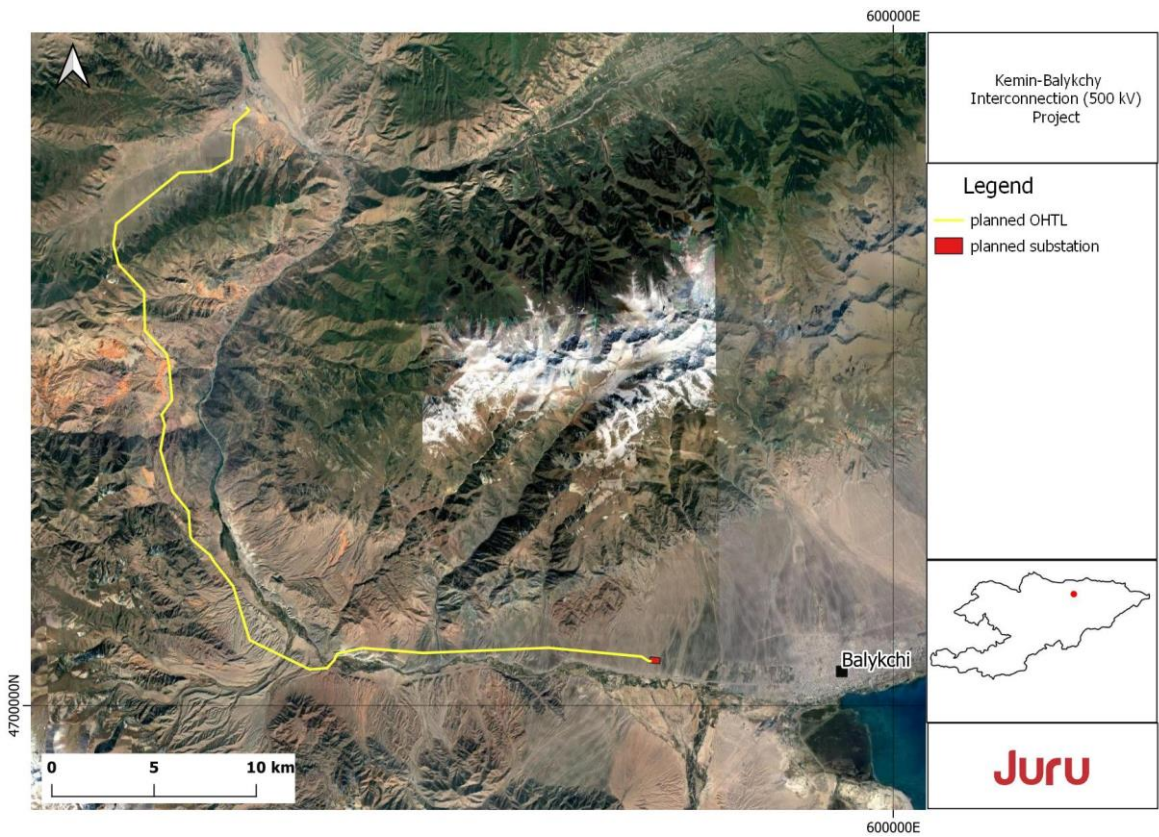


Figure 1: Proposed OHTL and planned substation

2. Materials and Methods

The survey methodology consisted of two stages:

Desktop review included analysis of detailed *Google Earth* satellite images and literature sources. The maps identified the locations (GPS coordinates) of potential bat roosts, such as canyons, bridges and buildings. Car and hiking trails were also laid out. Those locations and trails were transferred to the *Locus Map Pro* smartphone application for further use in the field. A list of species potentially inhabiting the territory was compiled according to the GBIF database and IBAT report.

Fieldwork. Fieldwork was conducted between 16 and 17 April 2025, and included a survey of potential roost locations identified during the desktop stage (Figure 2). When a potential roost was found, it was thoroughly examined, both for the presence of bats (visually or by voice), and for signs of their presence – droppings (excrement). Using flashlights, all crevices in vertical walls in buildings were examined. As for building ceilings, they are often made of numerous wooden planks or branches covered with reeds, which gives almost unlimited possibilities for bats to hide with no evidence of their presence as soon as their droppings mix with sheep and other farm animals' excrements on the ground.

Each potential roost was surveyed was mapped and photographed; a brief description was made, including notes on the suitability of each roost for bats.

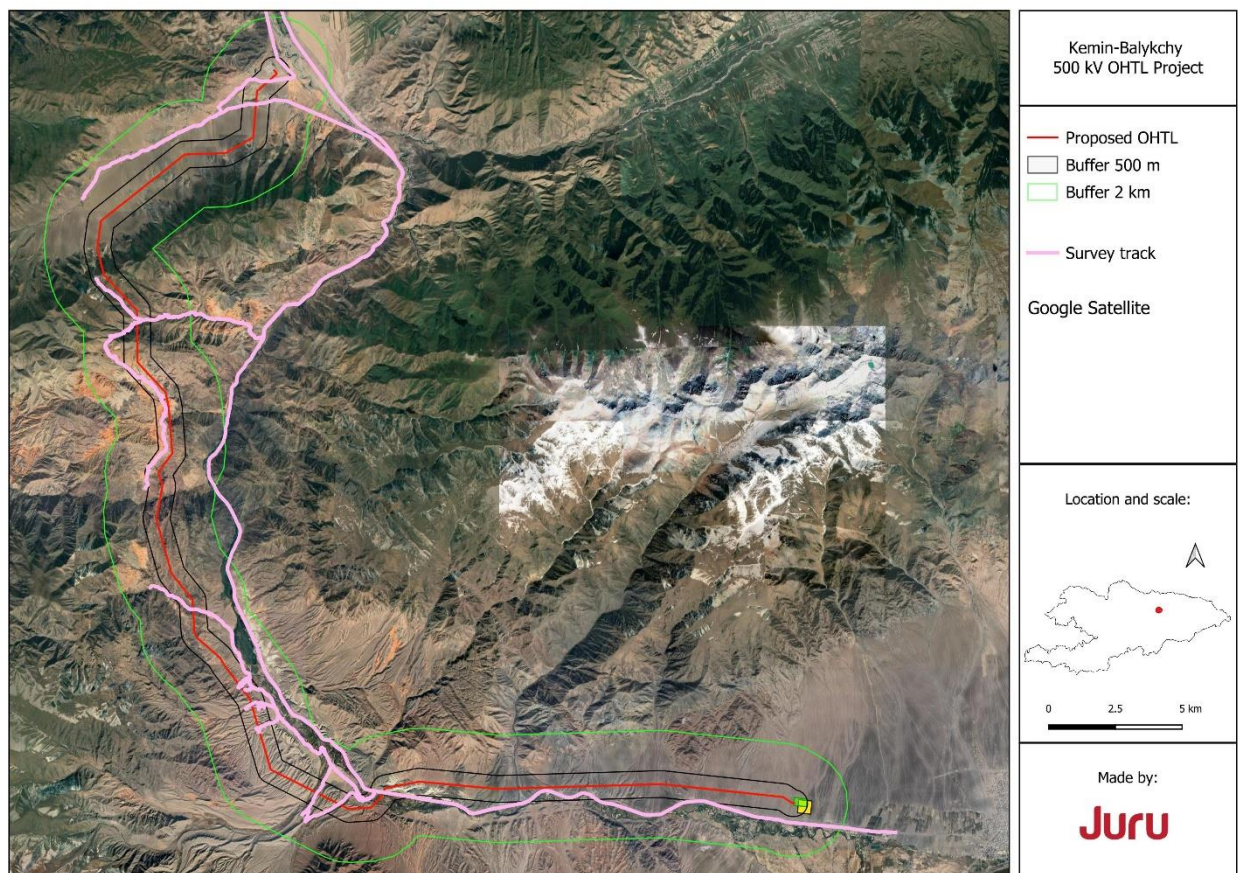


Figure 2: Survey track across the project area within 500 m and 2 km buffer zones – recommended survey territory by SABAA (Sowler et al, 2020).

To navigate the terrain and record tracks, a smartphone (*Redmi Note 11S*) was used with the *Locus Map Pro* application installed. A flashlight and gloves were taken into the field for the examination of the potential bat roosts.

3. Results

3.1 Literature review

The effects of power line construction on bats remain poorly understood. Currently, there is no clear evidence of a significant impact of OHTLs on insectivorous bats, however, recent research has demonstrated that insectivorous bats may be attracted to OHTLs during rainfall, as the lines emit light and draw in insects, increasing foraging activity near the infrastructure (Froidevaux, 2023). Bats are known for their strong site fidelity, and during the construction phase, they may be affected due to increased noise and disturbance.

According to the South African Guidelines, a minimum buffer of 2 km should be maintained between large bat roosts and OHTLs, and at least 500 meters for smaller roosts (Sowler, 2020). Since no signs of major roosts within a 2 km buffer were identified during the desktop survey, field roost surveys were conducted only within this 500 m buffer.

As a result of the literature review, a list of 19 species potentially inhabiting the area was compiled (presented in

Table 1 below). Because bats are poorly studied in the region combined with their bird-like way of life (including active flight, seasonal migrations taken by certain species, change of winter and summer roosts, not to mention swarming in separate locations) it should be taken into consideration that even species seemingly not so likely to inhabit the territory during surveys may be still found here under some special circumstances once in several years or decades.

Table 1: List and status of bats species potentially inhabiting the project area

ID	Species	IUCN Red list ¹	KRG RDB (2019) ²	CMS ³	Notes
1	Greater Horseshoe Bat <i>Rhinolophus ferrumequinum</i>	LC:D	-	II	Lives in caves, mines and other underground roosts, stone buildings (mosques and others).
2	Bukhara Horseshoe Bat <i>Rhinolophus bocharicus</i>	LC:S	VI (NT)	-	Lives in caves, mines and other underground roosts, stone buildings.
3	Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>	LC:D	VI (NT)	II	Lives in caves, mines and other underground roosts, abandoned buildings.
4	Blyth's Horseshoe Bat <i>Rhinolophus lepidus</i>	LC:U		-	Shelters – caves, adits, underground tunnels, grottoes, abandoned houses and stone tombs.
5	Lesser Mouse-eared Bat <i>Myotis blythii</i>	LC:D	-	II	Inhabits forest and arid landscapes. Lives in caves, grottoes and human constructions.

¹ The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX). The signs designated the population trend are: S – stable, D- decreasing, U - unknown

² KRZ RDB – Red Data Book of the Republic of Kyrgyzstan.

³ CMS - Convention on the Conservation of Migratory Species of Wild Animals, Appendix I, II (effective 17 May 2024).

ID	Species	IUCN Red list ¹	KRG RDB (2019) ²	CMS ³	Notes
6	Geoffroy's Bat <i>Myotis emarginatus</i>	LC:S	-	II	Prefers open (especially arid) landscapes. Lives in caves, grottoes and attics of large buildings.
7	Bukhara Mouse-eared Bat <i>Myotis bucharensis</i>	DD	1 (CR)		Inhabits mountainous landscapes, lives in caves, abandoned mines
8	David's myotis <i>Myotis davidii</i>	LC:U	-	II	Inhabits various, mainly arid, landscapes from the south of the forest zone to semi-deserts, usually associated with open habitats, including anthropogenic ones. Shelters are crevice-like shelters in buildings, rock crevices and caves.
9	Asian Barbastelle <i>Barbastella leucomelas</i>	LC:U	VI (NT)	II	Poorly studied species found mainly in mountains and foothills. Shelters are adits, caves, ruins, rock cracks.
10	Long-eared Bat <i>Plecotus strelkovi</i>	LC:U	-	-	Inhabits foothills and midlands, arid landscapes. Shelters are caves and adits, and possibly also human-made structures.
11	Noctule Bat <i>Nyctalus noctula</i>	LC:U	-	II	Inhabits landscapes from deserts to tropical rain forests and temperate mixed forests, in the mountains up to 2500 m above sea level. The main shelters are tree hollows and human buildings. They make seasonal migrations up to 1600 km.
12	Common pipistrelle bat <i>Pipistrellus pipistrellus</i>	LC:S	-	II	It inhabits various landscapes, but prefers anthropogenic lands; it often lives in human settlements, including cities. It settles in human buildings, less often in tree hollows and other crevice-like shelters.

ID	Species	IUCN Red list ¹	KRG RDB (2019) ²	CMS ³	Notes
13	Northern bat <i>Eptesicus nilssonii</i>	LC:S	-	II	Inhabits forested areas. Shelters are wooden buildings, hollows, rock cracks.
14	Serotine Bat <i>Eptesicus serotinus</i>	LC:S	-	II	Lives in various, mostly anthropogenic, landscapes. It usually settles in human buildings, less often in rock cracks.
15	Botta's serotine <i>Eptesicus ognevi</i>	LC:U	-	II	Shelters are rock crevices, caves, ruins and buildings.
16	Gobi big brown bat <i>Eptesicus gobiensis</i>	LC:U	-		Inhabits mainly open arid (desert and steppe) landscapes. Shelters are rock cracks and human structures.
17	Particoloured Bat <i>Vespertilio murinus</i>	LC:S	-	II	Lives in a wide variety of landscapes, including anthropogenic ones, in the mountains up to 3000 m above sea level. Shelters are human buildings and tree hollows.
18	Hemprich's Long-eared Bat <i>Otonycteris leucophaea</i>	DD	VII (LC)		It is confined to arid landscapes. Shelters are rock cracks and human structures.
19	European Free-tailed Bat <i>Tadarida teniotis</i>	LC:U	VII (LC)	II	It settles in small colonies (up to several dozen individuals) in vertical rock cracks, under overhanging rock ledges.

Thus, the area planned for construction may potentially serve as a habitat, feeding ground, breeding site, or migratory route for 17 bat species encountered in Kyrgyzstan.

3.2 Field observations - territory

The planned OHTL ROW passes through a variety of landscapes offering different conditions for bat roosting. Four habitat types were identified in relation to their suitability for roosting, as listed below and illustrated in **Error! Reference source not found.**

- 1) Areas unsuitable for roosting
- 2) Areas of relatively acceptable suitability
- 3) Areas of acceptable suitability
- 4) Highly attractive zones, including densely vegetated river valleys

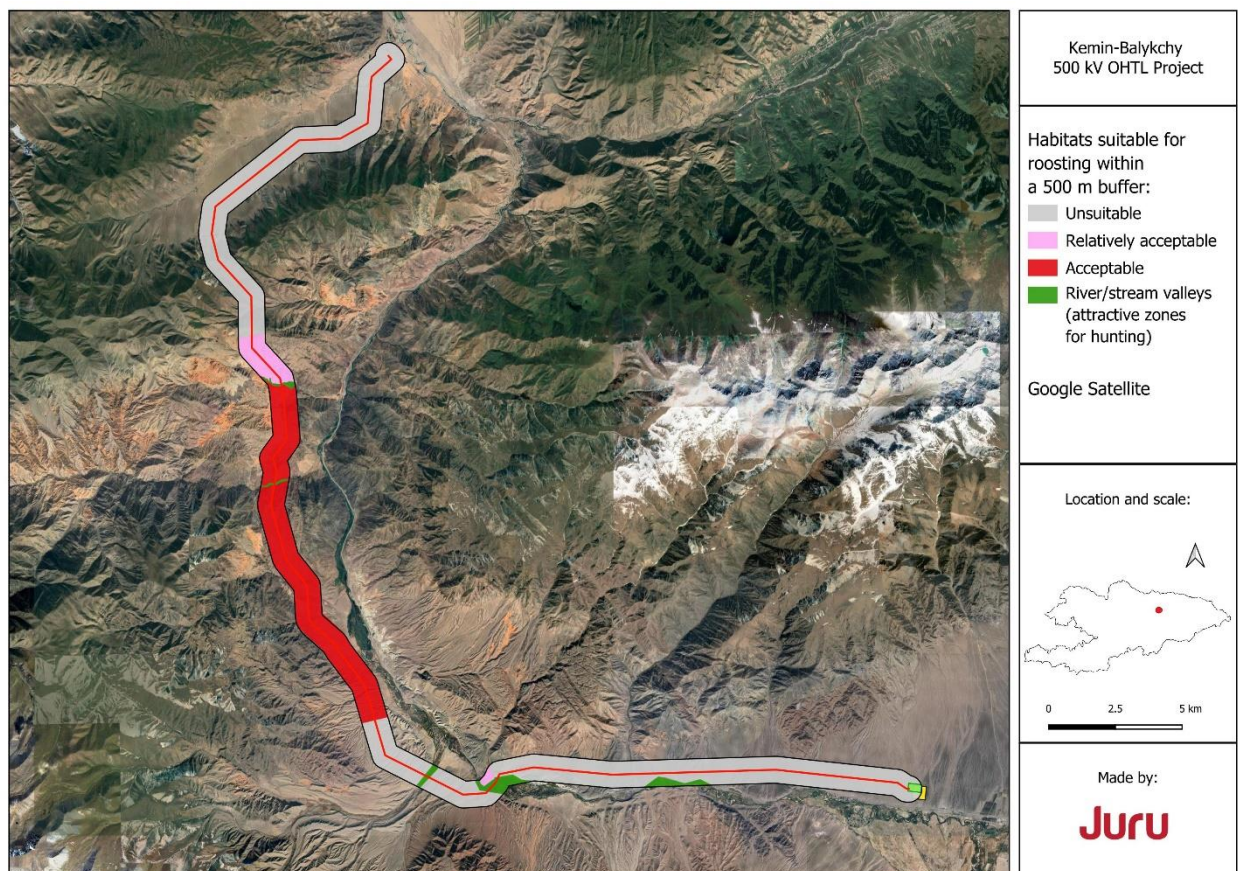


Figure 3: Habitats suitable for roosting within a 500 m buffer

The southernmost (22.3 km) and northernmost (14.1 km) sections of the OHTL ROW pass through foothill areas where no natural caves or other cavities are present, and small bat colonies may potentially inhabit only human-made structures, which are few. Overall, this section is considered unsuitable for roosting.

There is also a section of the route (2.1 km) where no landforms typically associated with caves or natural shelters were visually identified; however, their presence cannot be entirely ruled out and is considered relatively acceptable for roosting.

In contrast, the central part of the area (14 km), located in mountainous terrain, features numerous rock outcrops, canyons, and a high density of cracks, grottoes, and other natural shelters of various sizes and levels of human accessibility. Additionally, the OHTL route crosses the Chu River and several smaller mountain watercourses. The valleys of these rivers and streams are covered with woody and shrubby vegetation, which attracts a variety of insects that serve as a food base for bats. These areas are considered to be acceptable for roosting. These sections of the OHTL ROW are shown on Figure 3.



Figure 4: Landscapes of southern (left) and northern (right) parts of the proposed OHTL, gentle foothill areas where no natural caves or other cavities within 500 m buffer



Figure 5: Areas of relatively acceptable suitability



Figure 6: Areas of acceptable suitability, including canyons and mountainous valley areas with various crevices and cavities.



Figure 7: Areas of acceptable roosting suitability, including the Chui River valley

3.3 Field observations – potential roosts

During the investigation of accessible potential roosts, no signs of bat presence (such as individuals or droppings) were recorded. Some of the surveyed receptors are shown below.

In the southern part of the area, two bridges — one railway bridge and one highway bridge over the Chu River — were inspected (Figure 8). Although no signs of bat presence were recorded, these structures offer suitable roosting opportunities. The canyons and mountain slopes contain numerous potential shelters for bats, and the diversity of available roost types may potentially be utilized by different bat species.

At a distance of over 4 km from the OHTL, a small cave was identified on the bank of a stream. Signs of visits by local residents were observed (litter, foot prints), but no evidence of bat presence was recorded.

Examples of potential roost sites surveyed within the Project site are shown in Figures 8 - 13.



Figure 8: The bridge across the river cannot be thoroughly observed, however, on the accessible parts of the construction, there are no signs of bat presence.



Figure 9: The steep sandstone wall with numerous cavities and cracks – suitable for roosting, but impossible to inspect without any special equipment



Figure 10: A typical part of the sandstone canyon. Multiple potential shelters, no presence of bats



Figure 11: The small cavity in the canyon. The debris flow and narrow entrance prevented surveys, but are suitable for bats.



Figure 12: The grotto in the rock. Inspected, no signs of bats.



Figure 13: Typical landscape – sandstone canyon with crevices and cavities for roosting.



Figure 14: Small cave 4 km from the proposed OHTL. No signs of bats.

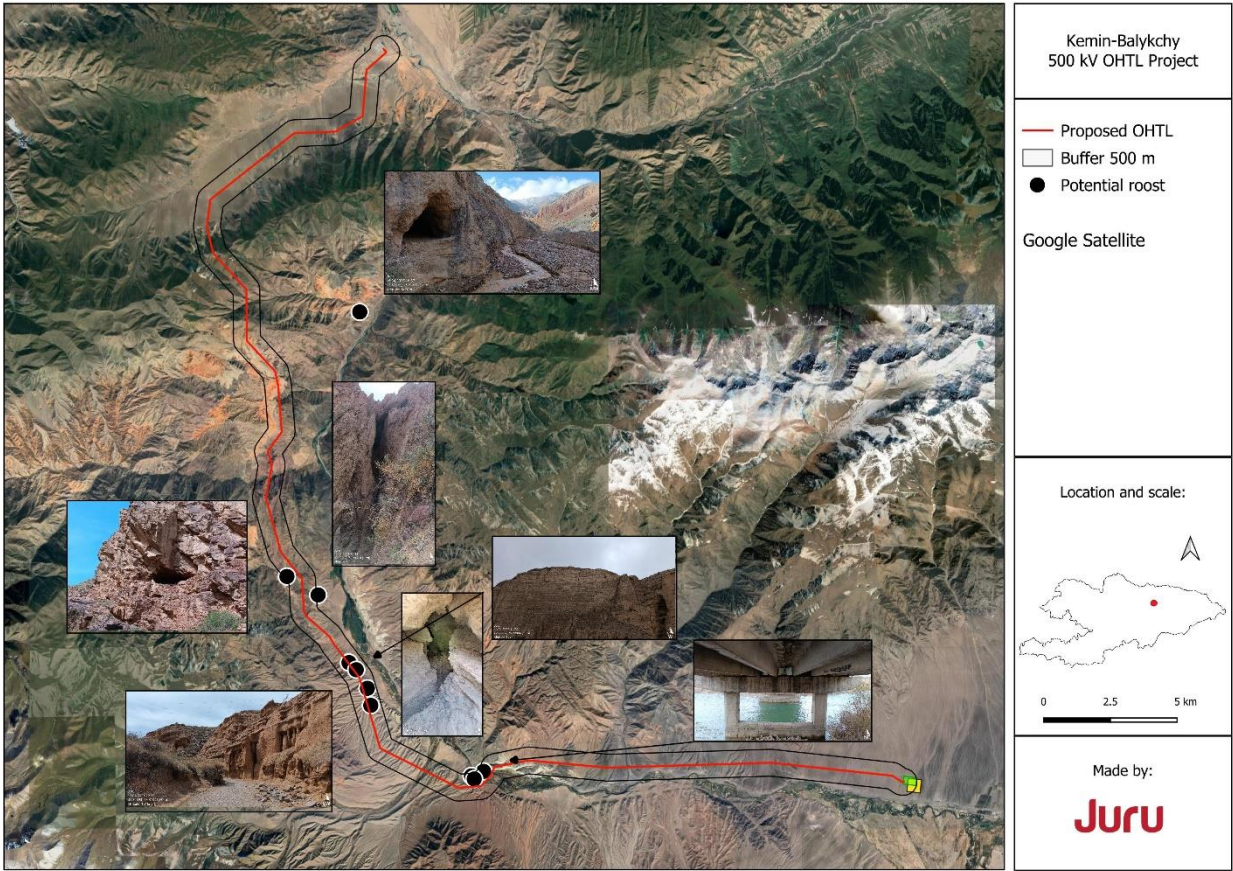


Figure 15: Potential bat roost sites observed during the surveys

3.4 Limitations and uncertainties

The field survey confirmed that the OHTL ROW offers suitable conditions for bat roosting, although no signs of current or recent use of the area by bats were observed at the sites that were surveyed. However, due to challenging terrain and the presence of numerous crevices located at inaccessible heights, it was not possible to examine the most promising potential roosting sites.

Assessing the likelihood of these roosts being used by bats is difficult, as bats are not limited to areas accessible to humans and may occupy hard-to-reach or high-altitude locations. The area contains a large number of potential roosting sites - rock formations and canyons with abundant cracks and cavities suitable for bats. The images above serve an illustrative purpose and do not indicate confirmed or likely roosts.

Additionally, considering the recreational use of the area, it is reasonable to assume that, other factors being equal, bats would prefer locations undisturbed by human activity. As these sites are usually less accessible/ inaccessible, this limits the ability to thoroughly inspect many roosting sites.

The survey was conducted in mid-April in a mountainous region characterized by a colder climate and sharp temperature fluctuations. During the survey, temperatures were unusually low (between +5°C and +10°C), which could potentially delay bat migration into the area. Furthermore, any guano potentially left from the previous year - a possible indirect sign of bat presence - may have been removed by insects or dispersed by wind, particularly at smaller roosts.

All these factors present significant challenges to identifying bat roosts. Therefore, the absence of direct signs of bats (such as individuals or droppings) should not be interpreted as evidence of their absence.

4. Conclusion

This roost survey was conducted in mid-April during an abnormal cold snap. Since this area is located in a mountainous region with a cooler climate and sharp temperature changes, there is a possibility that by mid-April, bats, if they live in the area, have not yet arrived from their wintering grounds to the summer roosts. However, if the absence of observations of bats could be attributed to their delayed migration, the complete absence of any signs of their activity at all potential roost sites surveyed likely indicates that the territory within 500 m buffer along the OHTL unlikely supports any significant concentrations of bats.

The proposed OHTL ROW traverses complex terrain, crossing major and minor watercourses, ridges, and canyons. Although no direct evidence of bat presence was recorded, it is highly probable that bats occupy inaccessible cavities and crevices identified during the survey, as well as caves that may exist within a 2 km buffer zone of the transmission line. The watercourse valleys are likely utilized as foraging habitats.

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Technical appendix 11: Fish survey (Spring 2025)



Fish Surveys Spring 2025

Kemin-Balykchy 500 kV OHTL Project

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Table of contents

1	Introduction.....	5
2	Materials and Methods.....	6
3	Results.....	8
3.1	Literature review.....	8
	Characteristics of the rivers	8
	Ichthyofauna	8
3.2	Field Results:.....	9
3.3	Native fish species	10
	Ili Marinka <i>Schizothorax pseudoaksaiensis</i> (IUCN: VU; RDB: not listed).....	10
	Scaless Osman <i>Gymnodiptychus dybowskii</i> (IUCN: LC; RDB: not listed).....	12
	Tibetan Stone Loach <i>Triplophysa stoliczkai</i> (IUCN: LC; RDB: not listed).....	13
	Chu Minnow <i>Rhynchocypris dementjevi</i> (IUCN: LC; RDB: not listed).....	15
3.4	Introduced Fish Species	16
	Interspecific Hybrid of Issyk-Kul Trout <i>Salmo ischchan gegarkuni</i> (Kessler, 1877) and Amu Darya Trout <i>Salmo oxianus</i>	16
	Issyk-Kul (Sevan) Trout <i>Salmo ischchan gegarkuni</i> (IUCN: not listed; RDB: not listed).....	17
	Amu Darya Trout <i>Salmo oxianus (trutta)</i> (IUCN: LC; RDB: not listed).....	18
	Rainbow Trout <i>Oncorhynchus mykiss</i> (IUCN: LC; RDB: not listed)	18
3.5	Hydrobiological observations:.....	20
4	Conclusion	24
	References	25
	Annex 1. Photographs of the researchers.....	26
	Annex 2. The pictures of the survey area	27

Table of Figures

Figure 1: Planned Kemin-Balykchy OHTL route.	5
Figure 2: Monitoring points of ichthyological and hydrobiological surveys.....	7
Figure 3: Ili Marinka (<i>Schizothorax pseudoaksaiensis</i>) (Herzenstein, 1889) from the middle reaches of the Chu River.....	11
Figure 4: Scaless Osman <i>Gymnodiptychus dybowskii</i> (Kessler, 1874) from the middle reaches of the Chu River.	12
Figure 5: Tibetan stone loach <i>Triplophysa stoliczkai</i> from the middle reaches of the Chu River.	14
Figure 6: Chu Minnow (<i>Rhynchocypris dementjevi</i>) from the middle reaches of the Chu River.	15
Figure 7: Hybrid form of Issyk-Kul Trout (<i>Salmo ischchan</i>) and Amu Darya Trout (<i>Salmo oxianus</i>) from the middle reaches of the Chu River.	17
Figure 8: Rainbow Trout (<i>Oncorhynchus mykiss</i>) from the middle reaches of the Chu River.....	19

Figure 9: Scaleless Osman (<i>Gymnoditychus dybowskii</i>) and Tibetan stone loach (<i>Triplophysa stoliczkai</i>) in a water-filled container.	22
Figure 10: Trout species <i>Salmo ischchan</i> and <i>Salmo oxianus</i> in a water-filled container.	23
Figure 11: Release of measured fish back into their native habitat.	23
Figure 12: One of the fish experts during surveys.	26
Figure 13: One of the fish experts during surveys.	26
Figure 14: Upstream view of the Chu River at Monitoring Point No. 1.	27
Figure 15: Downstream view of the Chu River at Monitoring Point No. 1.	28
Figure 16: Upstream view of the Chu River at Monitoring Point No. 2.	29
Figure 17: Downstream view of the Chu River at Monitoring Point No. 2.	30
Figure 18: Upstream view of Chu River at Monitoring Point No. 3.	31
Figure 19: Downstream view of Chu River at Monitoring Point No. 3.	32
Figure 20: Upstream view of the Chu River at Monitoring Point No. 4.	33
Figure 21: Downstream view of the Chu River at Monitoring Point No. 4.	34
Figure 22: Upstream view of the Konorchok River at Monitoring Point No. 5.	35
Figure 23: Downstream view of the Konorchok River at Monitoring Point No. 5.	36
Figure 24: Upstream view of the Konorchok River at Monitoring Point No. 6.	37
Figure 25: Downstream view of the Konorchok River at Monitoring Point No. 6.	38
Figure 26: Upstream view of the Chu River at Monitoring Point No. 7.	39
Figure 27: Downstream view of the Chu River at Monitoring Point No. 7.	40
Figure 28: Wastewater treatment plant in Balykchy discharging effluents into the Chu River.	41
Figure 29: Bacterial biofilm covering the riverbed, submerged branches, and algae in the middle reaches of the Chu River.	41

Table of tables

Table 1: Location of the Monitoring Points.	7
Table 2: Results of Ichthyological Sampling (Fish Catch) Upstream and Downstream.	10
Table 3: Biological Characteristics of the Ili Marinka (<i>Schizothorax pseudoaksaiensis</i> (Herzenstein, 1889)) from the Middle Reaches of the Chu River.	12
Table 4: Biological Characteristics of the Scaleless Osman (<i>Gymnoditychus dybowskii</i> Kessler, 1874) from the Middle Reaches of the Chu River.	13
Table 5: Biological Characteristics of the Tibetan Stone Loach <i>Triplophysa stoliczkai</i> from the Middle Reaches of the Chu River.	15
Table 6: Biological Characteristics of the Chu Minnow (<i>Rhynchocypris dementjevi</i> (Turdakov and Piskarev, 1954) from the Middle Reaches of the Chu River.	16
Table 7: Biological Characteristics of the hybrid trout Form (<i>Salmo ischchan</i> × <i>Salmo oxianus</i>) from the Middle Reaches of the Chu River.	18
Table 8: Biological Characteristics of Rainbow Trout (<i>Oncorhynchus mykiss</i> (Walbaum, 1792)) from the Middle Reaches of the Chu River.	19
Table 9: Hydrobiological Sampling Results (organisms/m ²) at Monitoring Points.	20
Table 8: Hydrochemical Parameters of the Chu and Konorchok River at Monitoring Points.	21

1 Introduction.

The European Bank for Reconstruction and Development (“EBRD”) is considering providing a sovereign loan to the Joint-Stock Company National Electric Grid of Kyrgyz Republic (“JSC NEGK”) to finance the construction of a 500 kV overhead transmission line (OHTL) in Kyrgyz Republic between the Kemin substation in Chui region and the Balykchy substation (or an alternative new substation) in Issyk-Kul region (see Figure 1). EBRD has appointed Juru Ltd. (Juru or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project, including baseline biodiversity studies. The proposed (500kV) Kemin — Balykchi Interconnection (the “Project”) is a 53.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a substation to be built in Balykchy (Figure 1).

The research on the species composition of the ichthyofauna includes a literature review supplemented with field work conducted in the middle reaches of the Chu River, specifically in the 15-31 km section from the mouth of the Chong-Kemin River, a right tributary of the Chu River, and in the left tributary, the Konorchek River, within a 1.87 km section from its mouth.

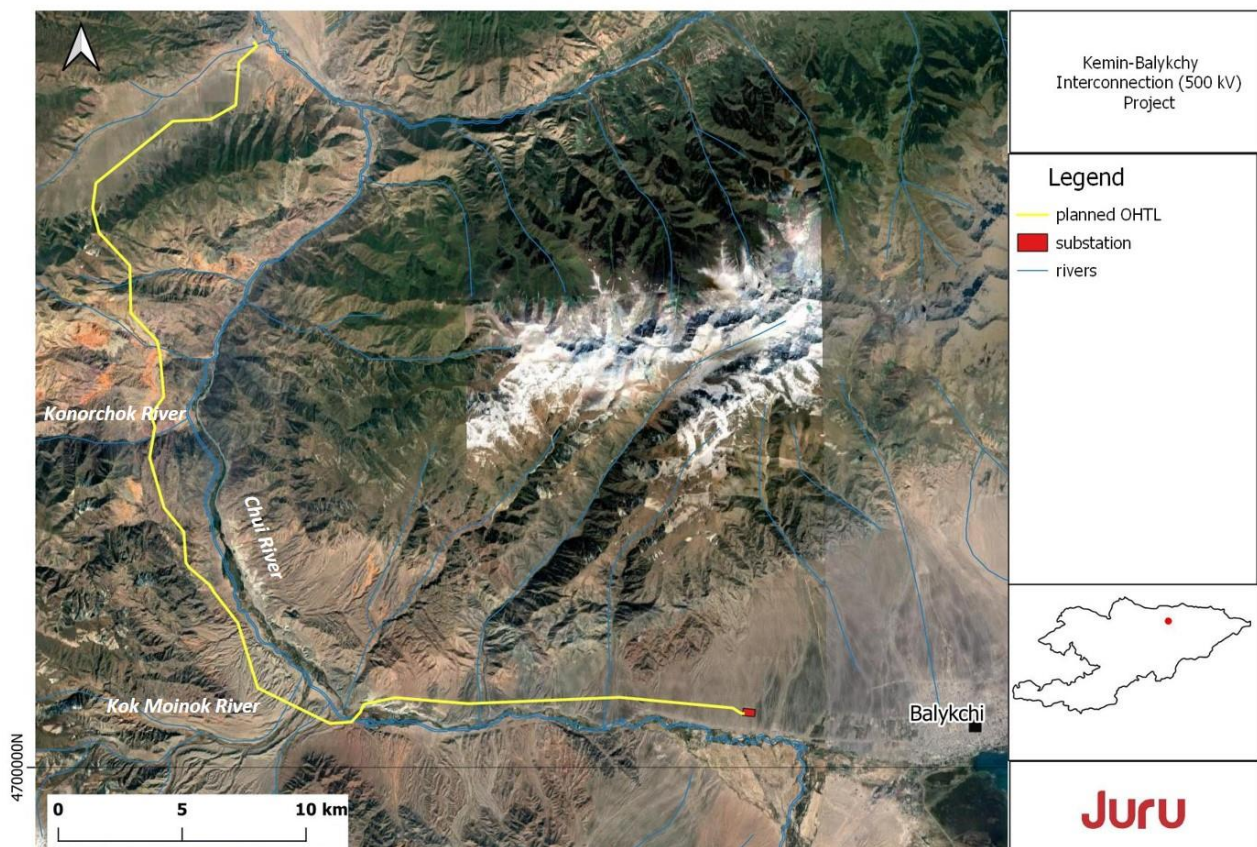


Figure 1: Planned Kemin-Balykchy OHTL route.

2 Materials and Methods

Hydrobiological research, including the collection and processing of zooplankton and zoobenthos samples, was conducted according to generally accepted methods by two local ichthyologists. Ichthyological and hydrobiological sampling was carried out from March 27, 2025, to March 29, 2025. Samples were collected at seven survey locations along the middle reaches of the Chu River and its tributary, Konorchok River (Figure 2). Hydrobiological sampling occurred at all seven points, occurring 100 meters (50m upstream and 50m downstream) from the monitoring point. Fish collection was conducted within a 50-meter radius of the monitoring location. Points five and six were sampled along the Konorchek River channel, while the others were sampled along the Chu River.

Qualitative and quantitative zoobenthos samples were collected by washing off bottom organisms from stones using a hydrobiological sampler with a capture area of 0.25 square meters. For processing, hydrobiological material was collected from one square meter for each sample; the biomaterial was fixed with 4% formalin. Three samples were taken at locations no more than one hundred meters apart, and the data from these samples were summed. In the laboratory, organisms were selected from the washed samples, weighed on torsion balances, and their qualitative composition was determined using an MBS-1 binocular microscope. Known identification keys were used to determine the species composition of benthic organisms.

Hydrochemical water parameters were measured using a U-50 Horiba multiparameter water quality meter. Fish were caught using hook gear and a fine-meshed seine net with lengths of 10 and 2 meters. The ichthyological material was processed according to the methodology outlined in "Methods of Fishery Research by Pravdin I.F. A Guide to the Study of Fish (Primarily Freshwater)." To calculate biomass, individual fish weights were estimated using linear weight-length relationship equations based on their measurements. Known identification keys were used to determine the species composition of benthic organisms.

To determine fish population density in the rivers, fish were caught using straining fishing gear (a standard seine net 2-10 m long) with a mesh size of 6 mm. Material processing was carried out both in the field and in the laboratory.

According to literature guides (Veselov 1977; <https://www.gbif.org>), the species identification of fish was determined, the abundance (by species) was counted, and the total length and length without the caudal fin, as well as body weight, were measured. The sex and maturity stage of fish subjected to biological analysis were determined in the field. For laboratory work, samples were labeled and fixed with a 10% formalin solution. The age of the fish was determined by scales according to guidelines. The names of taxonomic units of fish are given according to [gbif.org](https://www.gbif.org) and fishbiosystem.ru.

Table 1: Location of the Monitoring Points

Monitoring Point	Coordinates
Point 1	42°27'46.8"N 75°53'27.3"E
Point 2	42°28'42.5"N 75°52'03.2"E
Point 3	42°29'37.9"N 75°50'27.4"E
Point 4	42°30'21.0"N 75°49'44.7"E
Point 5	42°34'37.6"N 75°48'11.4"E
Point 6	42°34'09.1"N 75°47'02.6"E
Point 7	42°35'01.0"N 75°48'21.5"E

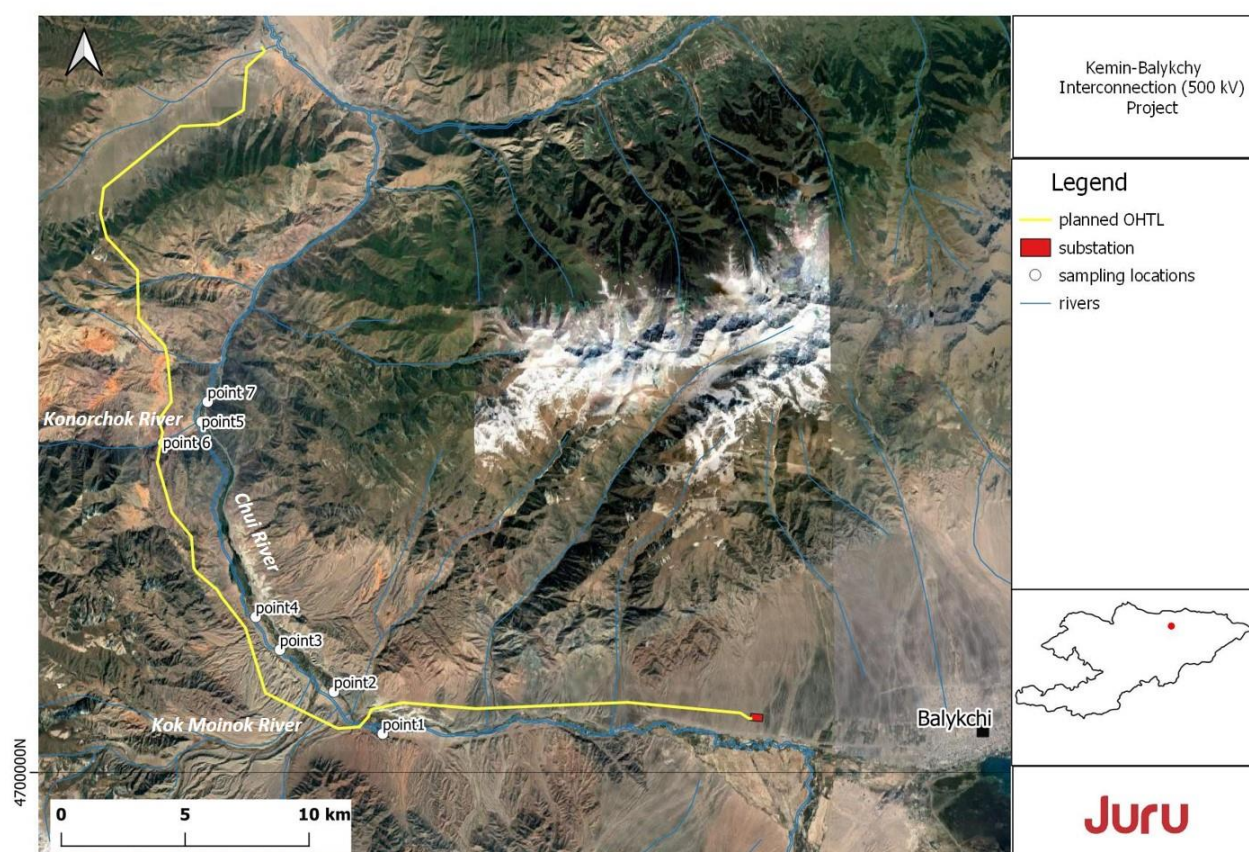


Figure 2: Monitoring points of ichthyological and hydrobiological surveys

To determine fish abundance, a simple count of the number of fish caught per average riverbank length of 50 meters was used. After species identification and ichthyometric measurements, all fish were safely released back into the river. Every captured fish was photographed by species. Images are attached in the chapter below

3 Results

3.1 Literature review

Characteristics of the rivers

The Chu River. The river itself flows through the territory of Kyrgyzstan and Kazakhstan. Its length is 1,030 km (together with the Karakoyun River - 1305 km), and the basin area (from the confluence with the Ulkenarna River to the village of Ulanbel) is 67,500 km². Within Kyrgyzstan, the river's length is 260 km, the average slope is 5°, and the basin area is 22,000 km², of which 65% is in mountainous regions and 35% in plains. In literature and official sources, the term "Chu River" usually refers to its section below the Orto-Tokoi Reservoir. Alternatively, according to the established scientific understanding, the Chu River originates in the Kochkor Valley (the confluence of the Joonaryk and Kochkor rivers) at an altitude of 1802 m. It then flows downwards, cutting through the Arsy and Karakoo mountain ranges, composed of metamorphosed gneisses and Proterozoic limestones, Silurian and Devonian granites, as well as the Ortotokei syenite massif, forming narrow gorges. Emerging into the Issyk-Kul depression, the river turns northwest 7 km west of the lake, heading towards the Boom Gorge. In this place, previously, before the construction of the Orto-Tokoi Reservoir, during summer floods when the Kochkor tributary swelled significantly, water sometimes overflowed the banks and entered Issyk-Kul through the KëtMaldy channel. From the Karazhylga tract (1600 m above sea level) to Taigaktash, over a distance of 22 km, the river flows through the narrow (channel width 15–20 m) and deep (60–70 m) canyon of Boom. In the middle part of the gorge, the river constantly erodes Paleozoic sedimentary rocks along the drainage area of the Konorchok River. After the confluence of the Chon-Kemin River (at an altitude of 1287 m), the Chu enters the Chuy Valley, transforming from a turbulent mountain stream into a plain river with a wide channel. At an altitude of 535 m above sea level, the Chu leaves the borders of Kyrgyzstan and flows further through the Kazakh steppes. The average annual runoff is 3.6 km³ (7.7% of the total river water volume of Kyrgyzstan), the average discharge is 71 m³/s, and the runoff module is 6.5 l/s·km². 54% of the runoff is formed in high-mountain regions above 3300 m.

The Konorchok River is a left tributary of the Chu River, flowing down from the northern slopes of the Kyrgyz Range. The total basin area of the Konorchok River is 105 square kilometers. The average annual water discharge reaches about 4 cubic meters per second, while during the March survey, the water discharge was minimal and amounted to less than one cubic meter per second. A feature of the Konorchok River is its increased turbidity during summer rains, and mudflows are also not uncommon on the river. There are no permanent human settlements along the Konorchok River.

Ichthyofauna

The ichthyofauna of the Chu River historically consisted exclusively of representatives of the order Cypriniformes, such as the Chu Minnow *Rhynchocypris dementjevi* (Turdakov and Piskarev, 1954) and the Turkestan gudgeon *Gobio gobio lepidolaemus* (Kessler, 1872), and fish of the high-mountain Asian faunistic complex represented by the following species: the Ili Marinka *Schizothorax pseudoaksaiensis* Herzenstein, 1889, the Scaleless Osman *Gymnodiptychus dybowskii* (Kessler, 1874), the Scaled Osman *Diptychus maculatus* (Steindachner, 1866), and the Tibetan loach *Triplophysa stoliczkai* (Steindachner, 1866). However, with the construction of the Orto-Tokoi Reservoir on the Chu River, upstream from the

project area, in the lower part of the Kochkor depression and the upper portion of the middle reaches of the Chu River, the hydrological regime of the Chu River underwent a complete change. The Ortotoi Reservoir was commissioned in 1956 and was built for irrigation purposes. In winter, water accumulates in the reservoir basin, completely blocking the flow downstream of the Chu River.

At the study site, only the surfacing groundwater from the lowered riverbed of the Chu River and the waters of two left tributaries—the Kok-Moinok and Konorchok rivers—remain. The Konorchok River is a left tributary of the Chu River and is weakly affected by human economic activity; the ichthyofauna of the river consists of the same fish species that inhabited the Chu River. Currently, the left tributary with constantly clean water is occupied by a single species, a hybrid of trout *Salmo ischchan* (Kessler, 1877) and *Salmo oxianus* (Kessler, 1874). The Konorchok River itself is characterized by high turbidity and periodic mudflows in the summer, during which time all the fish inhabiting the river are carried by the high water into the Chu River, from where they subsequently return to the Konorchok River. The scaled Osman *Diptychus maculatus* (Steindachner, 1866), which is currently very numerous in the upper reaches of the Chu River, and its right tributary, the Kara-Kuzhur River, has completely disappeared from the list of fish species that inhabited the middle reaches of the Chu River. The Turkistan gudgeon *Gobio gobio lepidolaemus* (Kessler, 1872) has been pushed downstream of the Chu River, where it is widespread both in the main channel of the Chu River and in numerous tributaries of the lower reaches of the river. As a result of the introduction of salmonid fish species carried out in the 1970s-1980s, two new species appeared in the ichthyofauna of the Chu River: the Issyk-Kul trout *Salmo ischchan* (Kessler, 1877), which was systematically introduced into the Ortotoi Reservoir by sexually mature individuals, and the Amu Darya trout *Salmo oxianus* (Kessler, 1874), which spread from the middle reaches to the very upper reaches of the tributaries of the Chu River.

Currently, in the middle reaches of the Chu River, there are no pure original forms of these trout species; hybrids between the Issyk-Kul and Amu Darya trout are found everywhere, forming a peculiar interspecific form *Salmo ischchan* (Kessler, 1877) and *Salmo oxianus* (Kessler, 1874). Recently, due to the active development of commercial rainbow trout *Oncorhynchus mykiss* (Walbaum, 1792) farming in the floodplain of the middle reaches of the Chu River, another alien fish species, the rainbow trout, has appeared in the river's ichthyofauna.

3.2 Field Results:

Species Composition: A total of six fish species were identified, with the main families being Cyprinidae, Nemacheilidae, and Salmonidae (Table 2). A hybrid between Amu Darya trout (*Salmo oxianus*) and Issyk-Kul trout (*Salmo ischchan*) were also discovered.

Distribution: The highest species diversity was found in the upper section of the Chu River (6 species), while the Konorchek River exhibited the lowest diversity (2 species).

Other factors relevant to ichthyofauna distribution and composition: Unseasonably low water levels in the Chui River due to an early water discharge from the Ortotoi reservoir. Pollution from the Balykchy wastewater treatment plant.

Of all the species, only Ili Marinka is listed in the IUCN Red List, with no other globally threatened or nationally protected species recorded during surveys (Table 2).

Table 2: Results of Ichthyological Sampling (Fish Catch) Upstream and Downstream

Species name (English)	Species name (scientific)	Status	IUCN	Kyrgyz RDB	Sampling point						
					1	2	3	4	5	6	7
Scaless Osman	<i>Gymnodiptychus dybowskii</i>	native	LC	CR	47	12	27	25	12		49
Tibetan Stone Loach	<i>Triplophysa stolickai</i>	native	LC	Not listed	16	8	16	13	19	7	78
Ili Marinka	<i>Schizothorax pseudoaksaiensis</i>	native	VU	Not listed	3	1	3	8	-	-	12
Rainbow Trout	<i>Oncorhynchus mykiss</i>	introduced	LC	Not listed	4	2	-	-	-	-	-
Chu Minnow	<i>Rhynchocypris dementjevi</i>	native	LC	Not listed	-	-	9	16	-	-	-
Hybrid trout (Issyk-Kul × Amu Darya)	<i>Salmo ischchan gegarkuni</i> / <i>Salmo oxianus</i>	introduced	NA	NA	-	-	9	7	-	-	9

3.3 Native fish species

Ili Marinka *Schizothorax pseudoaksaiensis* (IUCN: VU; RDB: not listed)

Class: Ray-finned fishes — Actinopterygii

Order: Cypriniformes

Family: Cyprinidae

Genus: Schizothorax

Range: Balkhash-Ili Basin, Chu River Basin

Habitat:

- Adults: Deep areas near shores, near logjams, in eddies.
- Juveniles: Shallow waters near sandbars, silted entrances to backwaters, slow-current zones.

Morphological Features: The head shows little to no lateral compression. The mouth is located inferiorly or subinferiorly on the head. In larger individuals, the snout looks nearly blunt, whereas smaller specimens exhibit a more conical form. The lower lip has a central interruption and generally lacks a horny sheath.

Regarding the barbels, large specimens have anterior barbels that don't always reach the eye, while the posterior barbels extend to or slightly beyond the eye. The scales are small and extend ventrally to the interbranchial space. The ventral cleft is of medium length, occasionally reaching the base of the pelvic fins (V). In specimens with a longer cleft, the skin's edge features small scales.

The intestine is shorter than that found in the Balkhash Marinka, measuring 112–393% (average 242.9%) of the body length. Coloration varies by age: juveniles display a silvery-white appearance, while adults exhibit pinkish-silvery coloration on their sides and back, with a silvery-white belly.



Figure 3: Ili Marinka (*Schizothorax pseudoaksaiensis*) (Herzenstein, 1889) from the middle reaches of the Chu River.

4–5 years: The body structure is less massive during this age range.

7–9 years: The body becomes taller and the head larger, possibly resulting from a shift to a piscivorous diet.

Males are characterized by smaller overall size and a shorter anal fin that does not reach the tail. They also display reduced anteventral, anteanal, and postdorsal distances.

Females feature a longer head, lower jaw bone, and higher anal fin. Those specifically from the Chu River exhibit a taller body with greater girth, more scales in the lateral line, and fewer denticles on the spine.

Biology:

Maturation: At 3–5 years.

Spawning: April–May, with some populations spawning until mid-July.

Migrations: No long migrations in the Chu River (spawning occurs in habitats).

Diet:

- Juveniles: Aquatic insects (chironomids, bugs), vegetation.
- Adults: Fish (loaches, Marinka fry), occasionally rodents. Plant consumption decreases with growth.

Growth: Accelerates with the shift to piscivory.

Fishery Significance: Had no substantial commercial value in the middle reaches of the Chu River. Caught with traps (fyke nets, hoop nets), more often with hook gear.

Table 3: Biological Characteristics of the Ili Marinka (*Schizothorax pseudoaksaiensis* (Herzenstein, 1889)) from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Length to the End of the Caudal Peduncle (cm)	Mean Weight (g)
1	12.7	11.3	21
2	16.5	15.1	44
3	18.2	16.3	69
4	22.1	19.8	118

Scaless Osman *Gymnodiptychus dybowskii* (IUCN: LC; RDB: not listed)

Class: Ray-finned fishes — Actinopterygii

Order: Cypriniformes

Family: Cyprinidae

Genus: *Gymnodiptychus*

The species inhabits the Chu River Basin extensively, ranging from the lower reaches (extending downstream to Kamyschanovka) through the middle and upper reaches, including various tributaries.



Figure 4: Scaless Osman *Gymnodiptychus dybowskii* (Kessler, 1874) from the middle reaches of the Chu River.

Morphological Features: Adult specimens display coloration ranging from light to dark golden, occasionally with a greenish tint. Dark-colored individuals feature numerous dark violet spots above and below the lateral line, while lighter specimens have sparse spotting or none at all. The head matches the dorsal coloration and features small dark spots on the cheeks and opercula. The eyes are distinctively outlined by an orange or red ring.

The dorsal and caudal fins are gray with a yellowish tint, with dark-colored individuals showing spotting on these fins. The pectoral, pelvic, and anal fins exhibit a pinkish coloration. Juvenile specimens appear silvery with a dark back, small spots, and pale fins. The mouth is positioned inferiorly and features fleshy lips, with the lower lip showing a characteristic interruption.

Reproduction: Sexual maturity occurs at different ages between sexes: males mature at 3-4 years (reaching 7-10 cm length), while females mature later at 4-5 years (12-14 cm length). Spawning takes place from May - July when water temperatures reach 9-10°C, with eggs deposited on sandy-pebble bottoms. The eggs are large (2-2.6 mm), orange-colored, and adhere to stones. While the normal sex ratio is 1:1, males tend to dominate during the spawning season.

Table 4: Biological Characteristics of the Scaleless Osman (*Gymnodiptychus dybowskii* Kessler, 1874) from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Length to End of Caudal Peduncle (cm)	Mean Weight (g)
1	10.1	8.3	7.2
2	13.3	11.2	17.8
3	14.3	12.6	24.7
4	16.2	13.6	47.1

Diet: Adults are primarily benthivorous, feeding mainly on mayfly, stonefly, chironomid and caddisfly larvae, as well as amphipods and mollusks. They rarely consume vegetation and aerial insects. Juveniles feed on plankton (including rotifers and *Daphnia*), small benthic organisms, and insect larvae (with chironomids constituting up to 40% of their diet).

Migration and Habitat: The species exhibits predictable migration patterns: upstream movement during spawning season (May-August) and downstream movement for overwintering (August-October).

Fishery Importance: The species held no significant commercial value in the middle reaches of the Chu River. It was caught alongside *Marinka* using fish traps (fyke nets and hoop nets), though it was more frequently caught with hook gear.

Tibetan Stone Loach *Triplophysa stoliczkai* (IUCN: LC; RDB: not listed)

Class: Actinopterygii (Ray-finned fishes)

Order: Cypriniformes

Family: Nemacheilidae

Genus: *Triplophysa*



Figure 5: Tibetan stone loach *Triplophysa stoliczkai* from the middle reaches of the Chu River.

Distribution in the Chu River Basin. Although traditionally considered to host the Tien Shan form, the baseline species described here is the Tibetan stone loach.

Morphological Characteristics: The dorsal fin (D IV 7–8, occasionally 9) has a truncated appearance, while the anal fin has a formula of A III 5. The caudal peduncle's length equals or exceeds the head length, with a height of 5.1–7.8% of body length and a width-to-height ratio of approximately 1:1.

The head is flattened with large eyes (diameter approximately half the interorbital width). The nostrils are set close together, with the anterior nostrils featuring short tubes. The barbels show distinctive patterns: anterior barbels reach the corner of the mouth, median barbels extend to the eyes, and posterior barbels extend beyond the eyes.

A prominent diagnostic trait is the skin fold extending from the eye to the snout tip, which is particularly visible in larger specimens. The body lacks scales but possesses a distinct lateral line. Coloration varies from gray to yellowish-brown or dark brown, with a pale ventrum. Irregular dark spots form rows across the dorsum, flanks, head, and fins.

Reproduction: Reproduction occurs through fractional spawning from late March through summer when water temperatures reach 8–10°C. The adhesive eggs are deposited on sandy substrate. Female fecundity ranges from 3,587 to 10,658 eggs (in specimens measuring 69–102 mm length), with first clutch egg sizes ranging from 0.36 to 0.43 mm. Sexual maturation occurs at 2–3 years when fish reach 50–70 mm length. The sex ratio is approximately 1:1, with a slight bias toward males. Typical specimens measure 90–100 mm, though maximum recorded length reaches 155 mm.

Diet: Summer feeding reveals a primary reliance on algae (with 100% occurrence of diatoms and 93% occurrence of cyanobacteria). Animal prey consists mainly of chironomid larvae (57% occurrence), with occasional consumption of oligochaetes, crustaceans, and mayfly larvae.

Table 5: Biological Characteristics of the Tibetan Stone Loach *Triplophysa stoliczkai* from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Length to End of Caudal Peduncle (cm)	Mean Weight (g)
2	8.2	6.7	4.1
3	10.5	8.6	8.9
4	12.9	11	12.7

Chu Minnow *Rhynchocypris dementjevi* (IUCN: LC; RDB: not listed)

Class: Actinopterygii (Ray-finned fishes)

Order: Cypriniformes

Family: Cyprinidae

Genus: *Rhynchocypris*



Figure 6: Chu Minnow (*Rhynchocypris dementjevi*) from the middle reaches of the Chu River.

Distribution

The species inhabits the middle and lower reaches of the Chu River basin.

Morphology: The body is deep and laterally compressed, with body depth measuring 17–30% of standard length. The caudal peduncle is short and deep, with its length approximately equal to maximum body depth and shorter than head length. The eyes are large, longer than the snout and nearly equal to interorbital width.

The mouth is terminal and large. The dorsal fin originates behind the vertical line of the pelvic fin base. All fins are rounded and small, with dorsal and anal fins having 6–7 (rarely 5) branched rays, and pectoral fins containing 9–17 rays (typically 11–13).

The scales are small and often non-overlapping, with the lateral line usually absent. The belly is fully covered with tightly set scales. Gill rakers number 4–11 (typically 7–8). Vertebrae count ranges from 29–37 (most often 32–35). The gut is short, measuring shorter than or equal to body length. Pharyngeal teeth are biserial, with the main row containing 4–5 teeth (rarely 3) and the secondary row having 1–2 teeth (usually 1, sometimes reduced).

The flanks and dorsum display diffuse dark stripes that intensify toward the tail. The ventrum and area below the lateral stripe are pale. The dorsum is darker, with a golden or greenish tint. Small, distinct dark spots appear on the flanks. The peritoneum shows weak pigmentation.

Biology

Two distinct size groups exist: juveniles (less than 27 mm) that do not participate in spawning, and mature individuals (35 mm or greater). Sexual dimorphism is evident with females being larger than males.

Sexual maturity is reached at 25–30 mm. Fecundity ranges from 132 to 2,105 eggs, varying with size. Spawning occurs fractionally from mid-April through August.

Maximum recorded measurements include a length of 55 mm (65 mm total length), weight of 3.3 g, and age of 7 years. The diet consists primarily of benthic organisms and aerial insects.

Table 6: Biological Characteristics of the Chu Minnow (Rhynchocypris dementjevi (Turdakov and Piskarev, 1954) from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Standard Length (cm)	Mean Weight (g)
2	4.8	4.2	3.1

3.4 Introduced Fish Species

Interspecific Hybrid of Issyk-Kul Trout *Salmo ischchan gegarkuni* (Kessler, 1877) and Amu Darya Trout *Salmo oxianus*

Class: Actinopterygii (Ray-finned fishes)

Order: Salmoniformes

Family: Salmonidae

Genus: *Salmo*

Both trout species were systematically released into the Chu River basin. Over time, due to their coexistence in the same biotopes and similar reproductive ecology, the formation of hybrid trout forms in the middle reaches of the Chu River was inevitable. Meanwhile, in the upper tributaries of the Chu River, the pure form of Amu Darya Trout persists, while the original Issyk-Kul Trout has virtually disappeared from the Chu River basin.



Figure 7: Hybrid form of Issyk-Kul Trout (*Salmo ischchan*) and Amu Darya Trout (*Salmo oxianus*) from the middle reaches of the Chu River.

Issyk-Kul (Sevan) Trout *Salmo ischchan gegarkuni* (IUCN: not listed; RDB: not listed)

The Issyk-Kul Trout has dorsal fins with D III–IV 8–10 rays and anal fins with A III 8–9 rays. Its lateral line contains 109–117 scales, while the first gill arch features 16–22 gill rakers. The upper jaw does not extend beyond the posterior edge of the eye. During breeding season, males develop a distinctive hook-like cartilaginous protrusion on the lower jaw.

History Introduction. In the 1930s, Sevan Trout (*Salmo ischan gegarkuni*) from Lake Sevan in Armenia were introduced into Lake Issyk-Kul. After adapting to its new environment, the trout was classified as a subspecies: *Salmo ischchan issykogegarkuni* (Lushin, 1951). Between 1973–1983, mature individuals were relocated to the Orto-Tokoy Reservoir in the Chu River, where they successfully established a self-sustaining population.

Distribution. The species is found within the reservoir itself and in the tributary rivers.

Biology:

Typically, specimens grow up to 45 cm in length and weigh approximately 1.5 kg, though rare individuals may reach 69 cm and 5 kg. Sexual maturity is reached at 3–4 years, when fish attain a length of 26–30 cm and weight of 400–500 g.

Spawning occurs from October through December in shallow river sections characterized by fast currents and pebble-cobble substrate. The optimal water temperature for spawning ranges from 2–7°C. Fecundity varies between 1,000–6,500 eggs, with an average of approximately 1,000 eggs per kilogram of body weight.

Amu Darya Trout *Salmo oxianus (trutta)* (IUCN: LC; RDB: not listed)

The species has dorsal fins with III–IV 9–11 rays and anal fins with II–III 8–9 rays. Along the lateral line, scales number between 97–120, and gill rakers range from 16–22. The coloration is distinctive, with flanks covered in bright red, black, and brown spots. Juveniles display 7–9 transverse bands that fade as they age. The caudal fin features a characteristic notch.

Distribution. The native range includes the Upper Amu Darya and its tributary, the Kyzyl-Suu River, located in the Chon-Alai District of Osh Region. Regarding introduction history, the species was introduced to the Karakol River (an eastern tributary of the Chu) in the 1980s and subsequently spread to other rivers in the region.

Biology:

The species can reach 45 cm in length and exceed 1 kg in weight. Sexual maturity occurs at 3–4 years when individuals reach 15–20 cm in length. Spawning takes place during September–October in areas with sandy-stony substrate. Fecundity ranges from 400–3,500 eggs, with eggs being notably large (3.5–5 mm in diameter). The diet is piscivorous, with the species feeding on benthic organisms and insects.

Table 7: Biological Characteristics of the hybrid trout Form (*Salmo ischchan* × *Salmo oxianus*) from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Standard Length (cm)	Mean Weight (g)
1	14	12.5	25
2	22	19	91
3	24	21	146

Rainbow Trout *Oncorhynchus mykiss* (IUCN: LC; RDB: not listed)

Class: Actinopterygii (Ray-finned fishes)

Order: Salmoniformes

Family: Salmonidae

Genus: *Oncorhynchus* (Pacific salmon)

The Rainbow Trout has established a self-sustaining population in the lower reaches of the Chu River Basin near Tokmok city in a protected area. In the middle reaches, it was previously absent but is now increasing in numbers due to trout farm development. The species was introduced to the Tokmok area (a groundwater discharge zone) from Czechoslovakia in 1972.

Originally native to western North America, ranging from Alaska to California, the rainbow trout is now widely distributed globally, including throughout Europe and Kyrgyzstan.

Morphology: The body is salmoniform and streamlined, adapted to withstand strong currents of up to 3.5 meters per second. The coloration features a greenish to dark violet dorsum, with a silvery-white ventrum. Both the body and fins are covered in black spots, speckles, and streaks.

The lateral line contains 120–145 scales (with an overall range of 115–161). The mouth is large and terminal, with the upper jaw extending past the eye. The fins include a dorsal fin with 10–12 rays, an anal fin with 8–12 rays, and a characteristic adipose fin. The first gill arch contains 17–21 gill rakers, and the vertebral count ranges from 60–66.

Diet: Juvenile Rainbow Trout feed on plankton and the larvae of stoneflies, mayflies, and chironomids. Adults have a more varied diet consisting of insects (including caddisflies, beetles, and water striders), crustaceans (primarily amphipods), mollusks, and aquatic vegetation.

Reproduction: The Rainbow Trout is a polycyclic, lithophilic spawner. Spawning occurs in spring when water temperatures reach 3–8°C, typically in river headwaters. During the spawning process, females deposit eggs in gravel, which males then fertilize before the nest is buried under pebbles. Fecundity ranges from 400–3,500 eggs, with egg diameters measuring 3.5–5 mm. Sexual maturation occurs at 3–4 years, though this is temperature-dependent. Sex becomes identifiable at 95–104 days of development when water temperatures are 13.4–14.5°C.

Table 8: Biological Characteristics of Rainbow Trout (*Oncorhynchus mykiss* (Walbaum, 1792)) from the Middle Reaches of the Chu River

Age (years)	Mean Total Length (cm)	Mean Standard Length (cm)	Mean Weight (g)
1	19.5	17	91
2	30	26.5	366



Figure 8: Rainbow Trout (*Oncorhynchus mykiss*) from the middle reaches of the Chu River.

3.5 Hydrobiological observations

Table 9: Hydrobiological Sampling Results (organisms/m²) at Monitoring Points

Sampling point	Location	Taxonomy						
		Vermes	Plecoptera	Ephemeroptera	Chironomidae	Trichoptera	Gammarus	Stratiomyidae
Point 1	Upstream (ind./m ²)	13	4	5	–	–	2	3
	Downstream (ind./m ²)	7	2	2	2	3	4	–
Point 2	Upstream (ind./m ²)	19	5	4	–	–	1	–
	Downstream (ind./m ²)	12	1	3	–	1	–	–
Point 3	Upstream (ind./m ²)	29	4	6	7	–	3	1
	Downstream (ind./m ²)	23	3	3	9	–	–	–
Point 4	Upstream (ind./m ²)	19	4	5	2	–	4	–
	Downstream (ind./m ²)	24	3	4	4	–	2	2
Point 5	Upstream (ind./m ²)	–	9	8	–	–	–	4
	Downstream (ind./m ²)	–	7	11	–	–	–	3
Point 6	Upstream (ind./m ²)	–	7	10	–	–	–	–
	Downstream (ind./m ²)	–	3	8	–	–	–	–
Point 7	Upstream (ind./m ²)	11	5	9	6	1	2	2
	Downstream (ind./m ²)	8	4	7	5	–	1	2

Winter Flow Rates:

- Monitoring Site 1: ~1 m³/s (base winter flow)
- Downstream sites: Increased flow due to inflow from the Kok-Moynok River
- Monitoring Point 7: Reached 4 m³/s (augmented by the Konorchek River and groundwater discharge)
- Study Period Flow: 70–80 m³/s, significantly higher than the winter baseline.

For sampling point 6, the river showed winter ice formation, including both surface and anchor ice, which likely affects fish behavior in the following ways:

- Spring: Upstream migration for spawning
- Summer: Movement to feeding grounds (foraging)
- Winter: Downstream migration to the Chu River for overwintering

Table 10: Hydrochemical Parameters of the Chu and Konorchok River at Monitoring Points

Sampling point	Point 1	Point 2	Point 3	Point 4	Point 7	Point 5	Point 6
	Chu River					Konorchok River	
Depth (m)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Oxygen (mg/L)	9.16	9.16	9.16	9.16	9.02	10.11	10.11
Temperature (°C)	3.46	3.46	3.46	3.46	4.01	2.73	2.73
pH	7.1	7.1	7.1	7.1	7.08	6.98	6.98
Mineralization (g/L)	0.162	0.162	0.162	0.162	0.151	0.69	0.69
Transparency (m)	0.79	0.79	0.79	0.79	0.51	0.15	0.15

Limitations and uncertainties:

1. **Fish Distribution:** Species that typically inhabit the main channel during low-flow periods are dispersed into side channels, backwaters, and floodplain pools, which alters their detectability and sampling efficiency.
2. **Anthropogenic Stressors:** Severe negative impacts on the Chu River's ecosystem from sewage discharges near the town of Balykchy, upstream from the Project site (location: 42°27'22.6"N, 76°06'50.6"E). The wastewater treatment plant releases untreated or partially treated effluents directly into the river, degrading water quality and benthic habitats. This has severely affected fish populations and aquatic invertebrates, with key ecological consequences including:
 - **Disruption of Fish Spawning:** Degraded water quality has eliminated suitable spawning conditions for native fish species, and food sources (zoobenthos) have significantly declined, disrupting the aquatic food web.
 - **Loss of Habitat for Rheophilic Invertebrates:** Stone-dwelling invertebrates, such as mayflies and caddisflies, can no longer find refuge among rocks due to sediment smothering from sewage sludge and toxic algal blooms fueled by nutrient pollution.

During the collection of ichthyological and hydrobiological data, several challenges were encountered, primarily due to the irregular seasonal water-level regime of the Chu River. The river's flow is regulated by the upstream Ortotokoy Reservoir Dam, which typically releases water

downstream in the first 10 days of May. However, in 2025, due to exceptionally high water levels in 2024, the dam began releasing water as early as the first decade of March to prevent reservoir overflow, which resulted in water levels of the Chu River downstream from the reservoir dropping to unseasonably low levels.

3. **Combined Stressors:** Sewage discharge combined with hydrological instability caused by dam operations, including extreme water-level fluctuations beyond natural ranges, has compounded the damage. This has resulted in a drastic decline in total fish and invertebrate biomass in the middle Chu River.
4. **Monitoring Limitations:** Reliable population estimates were possible at Site 7 (42°35'01.0"N, 75°48'21.5"E), where the Konorchek River tributary provides critical spawning grounds for species such as the scaleless Osman (*Gymnoditychus dybowskii*) and Tibetan stone loach (*Triplophysa stoliczkai*). Despite pollution, higher baseline biodiversity persists at this site.

The images below provide examples of the fish samples collected, illustrating the specimens for reference.



Figure 9: Scaleless Osman (*Gymnoditychus dybowskii*) and Tibetan stone loach (*Triplophysa stoliczkai*) in a water-filled container.



*Figure 10: Trout species *Salmo ischchan* and *Salmo oxianus* in a water-filled container.*



Figure 11: Release of measured fish back into their native habitat.

4 Conclusion

The current state of the Chu River, especially its middle reaches, has undergone significant changes due to anthropogenic impact, mainly related to the creation of the Orto-Tokoi Reservoir in 1956. This has led to a radical alteration of the river's hydrological regime, which has negatively affected the local ichthyofauna and which is reflected in the survey work performed.

Changes in species composition: The original ichthyofauna, represented mainly by cyprinids (Chu Minnow, Turkestan gudgeon, Ili Marinka, scaleless and scaled Osmans, Tibetan loach), has significantly decreased. Although all except the Turkestan gudgeon were found during our survey work, including the Ili Marinka classified as IUCN VU

Some species, such as the Scaled Osman, have completely disappeared from the middle reaches, and the Turkestan gudgeon has been displaced to the lower reaches as reflected by our survey results, where neither of these species were observed.

As a result of introductions in the 1970s–1980s, new species appeared – Issyk-Kul and Amu Darya Trout, as well as their hybrids, which have generally been considered to be dominant, although only low numbers were found in our survey locations.

In recent years, Rainbow Trout has appeared in the river due to the development of fish farms.

Hydrological changes: In winter, the river flow practically ceases, leading to a sharp reduction in water volume (down to 4.3 m³/s compared to 100 m³/s in summer).

This disrupts the natural habitat conditions for fish, especially during spawning and wintering periods and is a particularly vulnerable period for these species.

Remaining areas of biodiversity: The Konorchok River remains an important spawning tributary for the Scaleless Osman and the Tibetan Loach, but here too, the replacement of native species with a hybrid form of trout is observed in the upper reaches of the river, especially in the left tributary, the Kashka-Suu River, where the trout hybrid is the only fish species. The planned OHTL will cross this tributary once, so no major effect on the river's biodiversity is expected.

Although the Ili Marinka is not listed in the Red Book of the Kyrgyz Republic, within its habitat range, limited to the basins of two rivers, the Chu and the Ili, the Ili Marinka is a very rare species outside these river basins. Globally, the species is assessed in the IUCN Red List as VU, with restricted area of occupancy. In Kyrgyzstan, the range of the Ili Marinka is restricted to the middle and lower reaches of the Chu River. Given that throughout its former range in the Chu River basin, the Ili Marinka has become an extremely rare species.

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Annex 1. Photographs of the researchers



Figure 12: One of the fish experts during surveys



Figure 13: One of the fish experts during surveys

Annex 2. The pictures of the survey area



Figure 14: Upstream view of the Chu River at Monitoring Point No. 1



Figure 15: Downstream view of the Chu River at Monitoring Point No. 1



Figure 16: Upstream view of the Chu River at Monitoring Point No. 2



Figure 17: Downstream view of the Chu River at Monitoring Point No. 2



Figure 18: Upstream view of Chu River at Monitoring Point No. 3



Figure 19: Downstream view of Chu River at Monitoring Point No. 3



Figure 20: Upstream view of the Chu River at Monitoring Point No. 4



Figure 21: Downstream view of the Chu River at Monitoring Point No. 4



Figure 22: Upstream view of the Konorchok River at Monitoring Point No. 5



Figure 23: Downstream view of the Konorchok River at Monitoring Point No. 5



Figure 24: Upstream view of the Konorchok River at Monitoring Point No. 6



Figure 25: Downstream view of the Konorchok River at Monitoring Point No. 6



Figure 26: Upstream view of the Chu River at Monitoring Point No. 7



Figure 27: Downstream view of the Chu River at Monitoring Point No. 7



Figure 28: Wastewater treatment plant in Balykchy discharging effluents into the Chu River.



Figure 29: Bacterial biofilm covering the riverbed, submerged branches, and algae in the middle reaches of the Chu River.

Technical appendix 12: VP Bird Monitoring report (Autumn 2024)



VP Bird Monitoring Report

Autumn 2024

**48 km Kemin — Balykchy
Interconnection (500 kV)
Project**

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Table of Content

1. Introduction	4
2. Materials and methods	8
3. Findings and Results	10
4. Key species descriptions	16
5. Conclusion.....	20
6. Bibliography.....	21
7. Annex.....	22
Annex 1. Vantage points	22
Annex 2. Results of the observation	27

Table of Figures

Figure 1. Project features	5
Figure 2. 48 km Kemin-Balykchi Interconnection (500kV)	5
Figure 3. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site	6
Figure 4. Screenshot IBA "Western Issyk Kul Lake"	7
Figure 5. Vantage points	8
Figure 6. Threatened species observed during the survey	13
Figure 7. Frequency of meetings with threatened bird species per vantage point.....	14
Figure 8. Vantage point 01.....	22
Figure 9. Vantage point 02.....	23
Figure 10. Vantage point 03	23
Figure 11. Vantage point 04	24
Figure 12. Vantage point 05	24
Figure 13. Vantage point 06	25
Figure 14. Vantage point 07	25
Figure 15. Vantage point 08	26

Table of Tables

Table 1: Vantage points coordinates and biotope description	9
Table 2: Schedule of the survey and effort level (hours)	9
Table 3: Species observed on the project site.....	10
Table 4: Distribution of species included in the Kyrgyzstan Red Data Book by VP	14
Table 5. Summary of meetings with species included in the Kyrgyz RDB and IUCN as NT and above.....	15

1. Introduction

Overhead transmission lines (OHTL) can cause fatal collisions for birds, especially for bustards, cranes, and large bodied waterbirds. These structures are also associated with bird electrocutions, primarily affecting raptors, vultures, and other large birds that tend to perch and/or nest on towers. The risk of electrocution is particularly high when pylons are constructed with hazardous designs and situated in high-risk areas. For high voltage OHTL, risks of bird collisions are considered to be high, but bird electrocution risk is generally considered to be low, as industry-standard designs generally have wide spacing of electrified parts, and conductors suspended below, rather than above support structures.,

The proposed (500kV) Kemin — Balykchy Interconnection (or the “Project”) is a 48 km stretch of OHTL that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built in Balykchy (Figure 1 and Figure 2). This line is located close to Issyk-Kul Lake, which is designated Ramsar site (Figure 3) and the eastern part of Issyk-Kul Lake was designated as an IBA “Eastern Issyk-Kul Lake” in 2006 (Figure 4).

This report presents the results of ornithological monitoring conducted for the primary purpose of characterizing the species composition of bird species that are potentially susceptible to OHTL collision and/or electrocution impacts within the project's area of influence.

These surveys assessed the abundance and spatial distribution of bird species, the nature of the stay, daily activity of birds during autumn migration, additionally to identify bird species of conservation concern, as listed in the IUCN Red List and the Kyrgyzstan Red Book.

This report presents the primary materials from bird Vantage Point (VP) surveys conducted in the territory during September, October and November 2024.

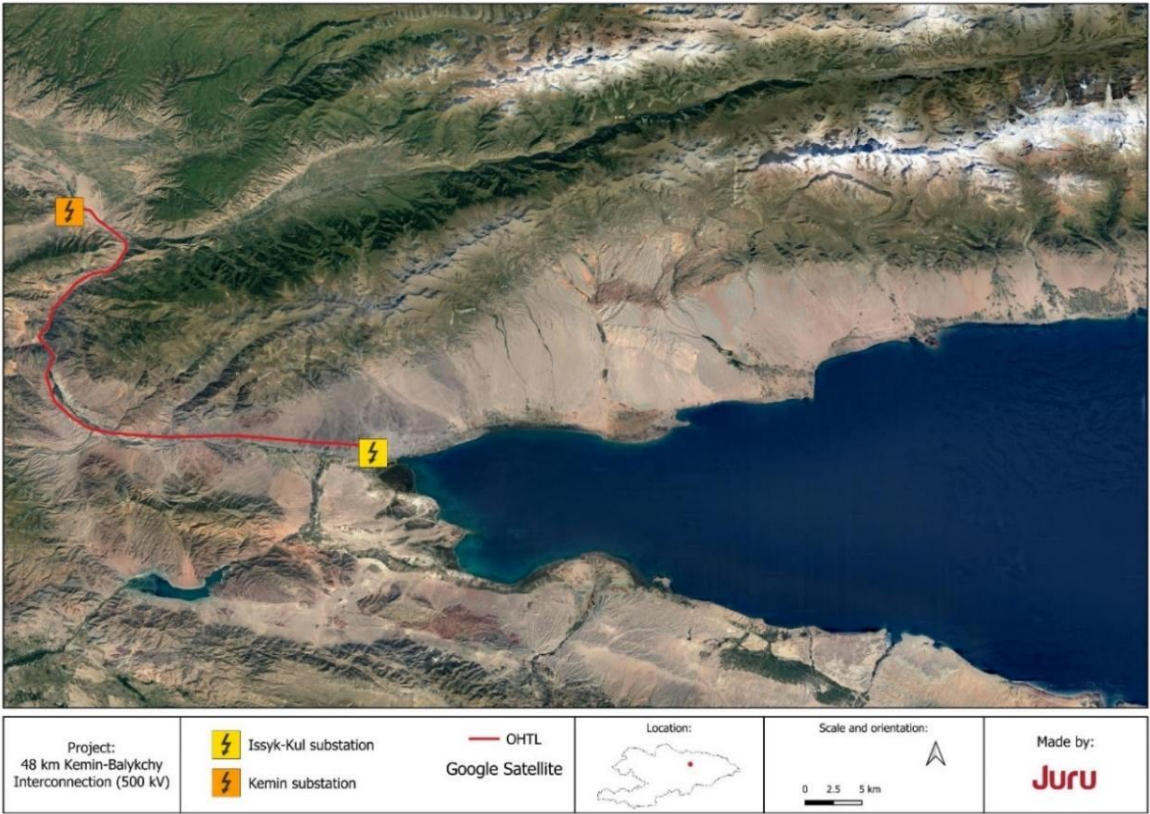


Figure 1. Project features

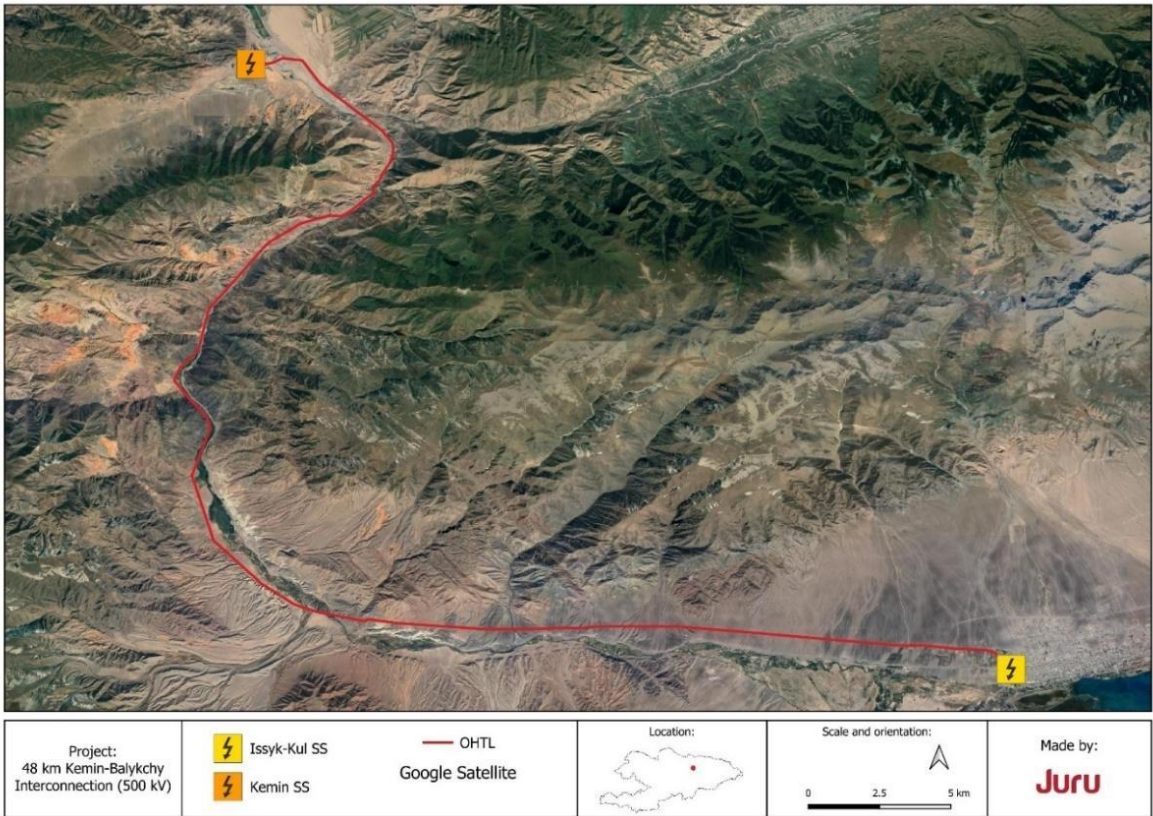


Figure 2. 48 km Kemin-Balykchy Interconnection (500kV)

The initial 48 kilometers route shown is only a preliminary and not a final version of the OHTL route, as is the currently stated length of the proposed OHTL - 57 km with an elevation difference of 759 metres. The proposed OHTL runs across several habitats: semi-desert, rocky desert, gorges, floodplain, foothills (adyrs) and gardens. It passes through the Boom Gorge, crosses the Chu River several times, and runs near the existing OHTL.

The line is located less than 2 km from Issyk-Kul Lake, which is designated as a Ramsar site¹ (Figure 3). Additionally western part of Issyk-Kul Lake was designated as Important bird area (hereinafter IBA) “Western Issyk-Kul Lake” in 2006 (Figure 4). This IBA hosts 267 bird species and is important as breeding territory of Pallas’s sandgrouse (*Syrhaptes paradoxus*), Saker falcon (*Falco cherrug*), and wintering waterbird species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*), as well as wintering waterbird aggregation site². According to historical data every year from 25 to 80 thousand individuals of 30 bird species winter in this area. Foothill zone of the surrounding mountains hosts Saker falcon, Golden eagle, Egyptian vulture and other vultures.

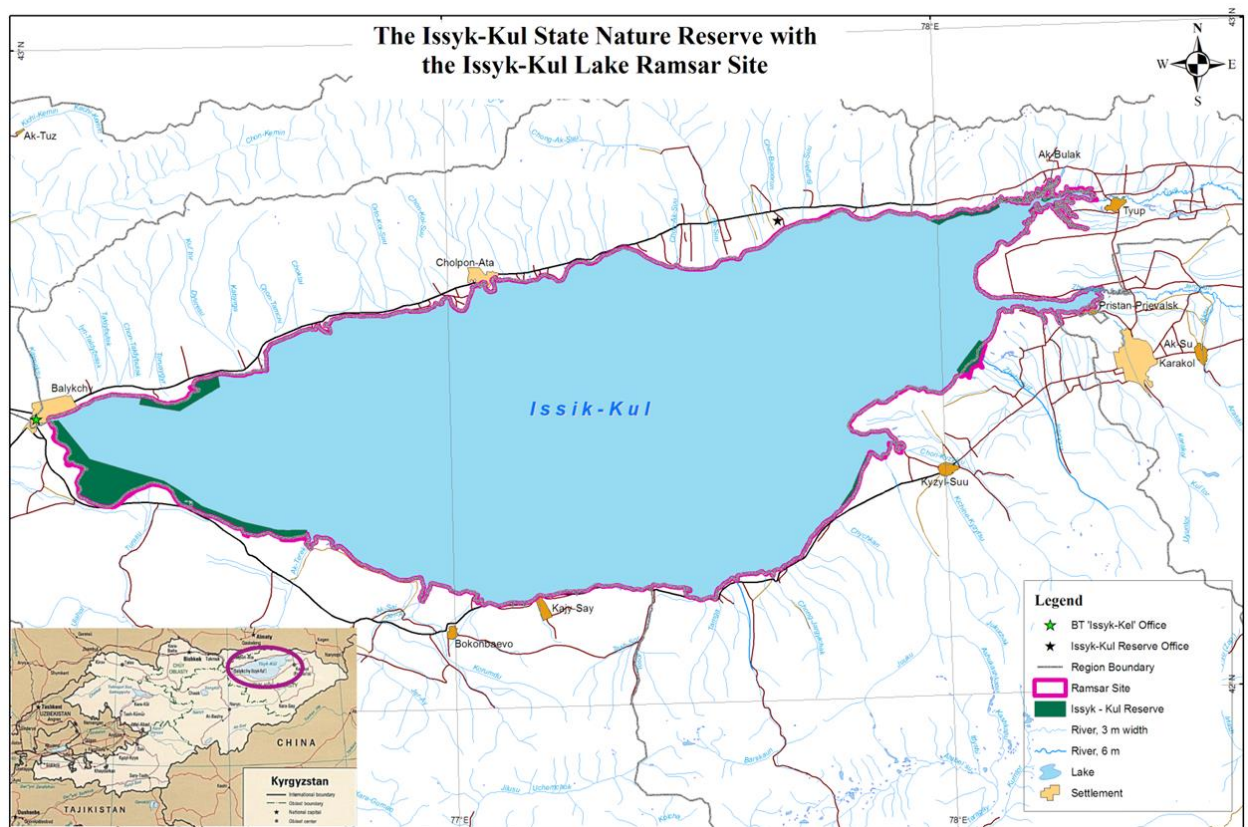


Figure 3. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site

1 (Ramsar Sites, 2024)

2 (BirdLife International (2024) Important Bird Area factsheet: Western Issyk Kul Lake (Kyrgyzstan), 2024)

Western Issyk Kul Lake

[Summary](#)[Text account](#)[Data table and detailed info](#)[Map](#)[Reference and further resources](#)

Country/territory: Kyrgyzstan

Central coordinates: 42° 26' 53" North (42.45°) 76° 15' 17" East (76.26°)

Area: 2,700 ha

Altitude: 1609-1609 m

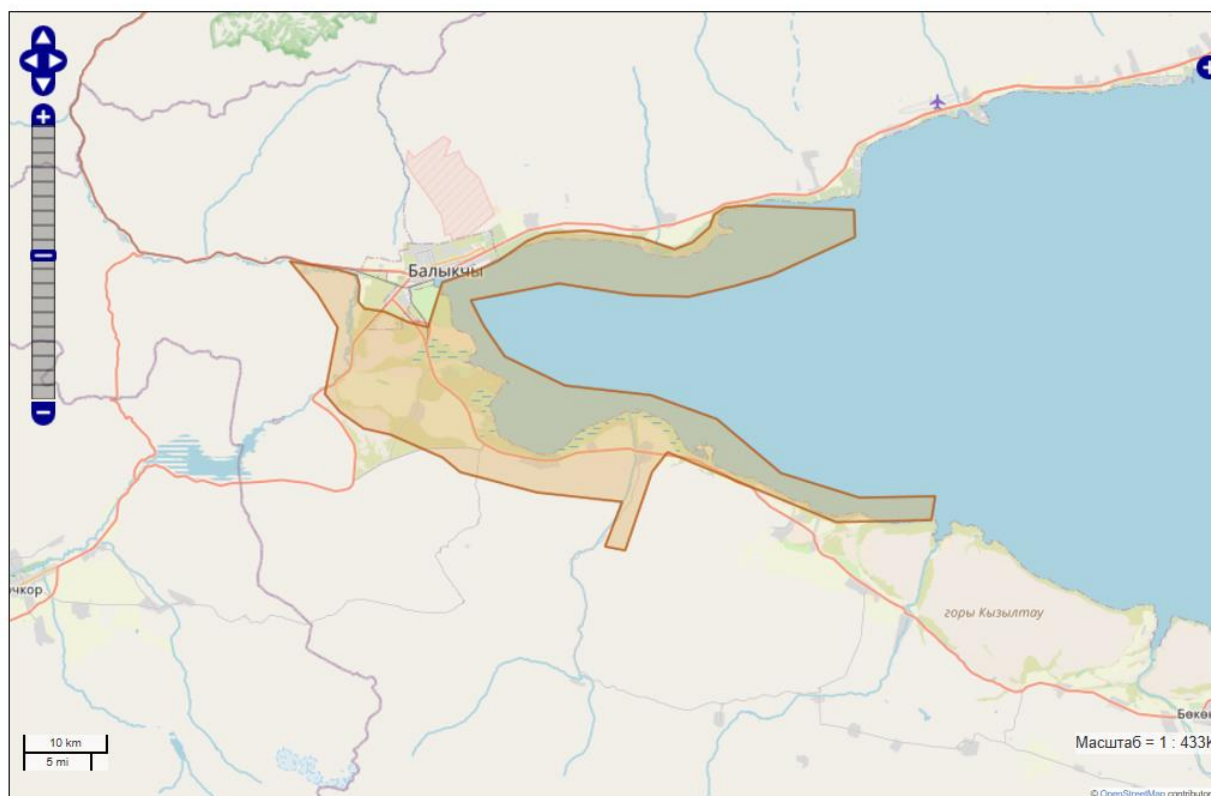


Figure 4. Screenshot IBA "Western Issyk-Kul Lake"

2. Materials and methods

Throughout the autumn survey period, which extended from 4 September to 11 November, 2024, ten 1.5-2.5 hours VP surveys were conducted at eight VPs in representative habitats (Table 1). The points were located to cover the OHTL as completely as possible (Figure 5. Vantage points).

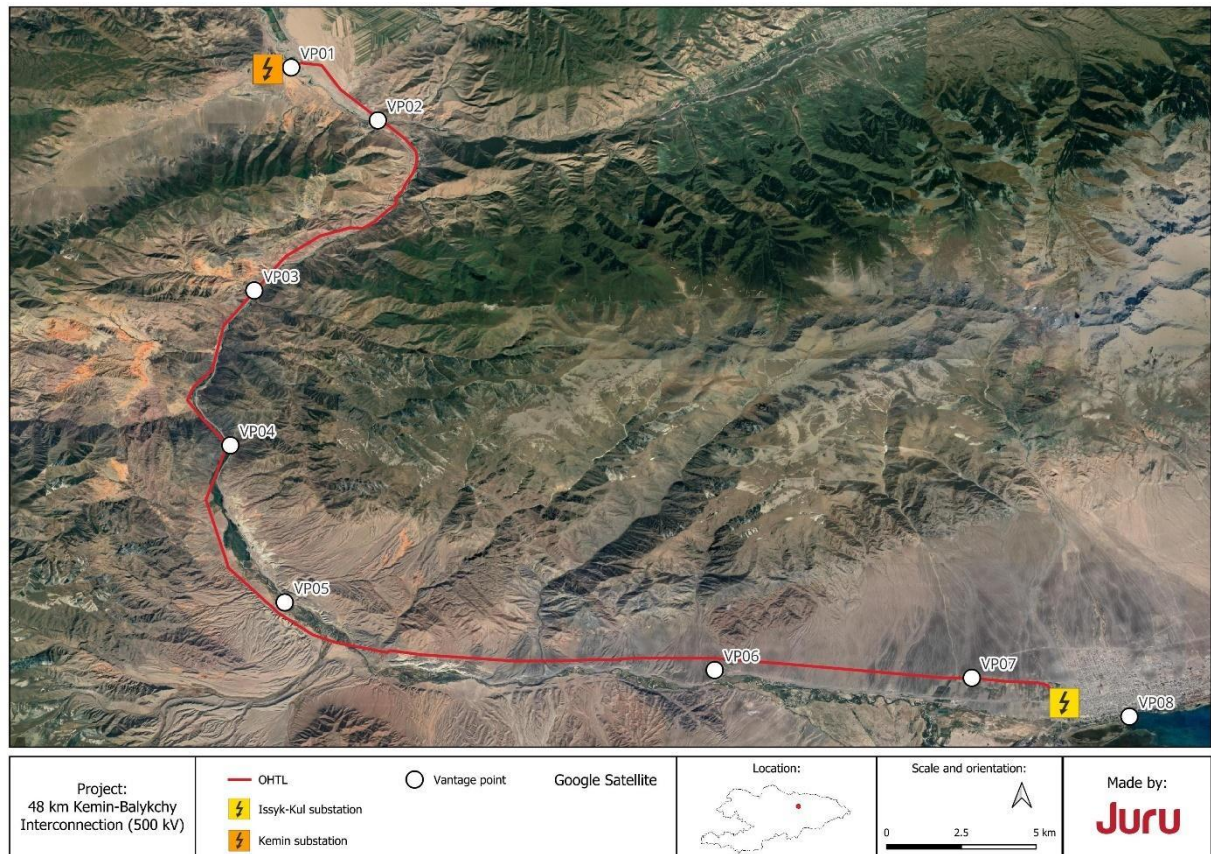


Figure 5. Vantage points

On an average day, one to four VP surveys were completed, resulting in a total of 20 survey hours per VP location, or 160 total hours of VP survey over the course of the season (

Table 2).

The VP survey methods followed the guidelines outlined by Scottish Natural Heritage (SNH) in 2017 (Scottish Natural Heritage (SNH). Recommended bird survey methods to inform impact assessment of onshore wind farms, 2017). for bird assessment. While industry-standard collision risk modelling methods using VP survey data as inputs have only been developed for modelling collisions of birds with wind turbines, VP surveys are, nonetheless, the standard, and most suitable survey methodology for characterising the use of airspace by key bird groups that can be impacted by powerlines, including raptors, vultures, migrating waterbirds, and others. These surveys aimed to monitor sensitive bird species within the survey area, gathering valuable data on their presence, behaviour, and abundance.

Table 1: Vantage points coordinates and biotope description

Survey Points	Coordinates (dd)		Biotope (see Annex 1)
	N	E	
VP01	42.713709°	75.843865°	Fallow land near the Chu River, less than 2 km away — agricultural fields
VP02	42.692218°	75.879070°	The beginning of the canyon with trees and shrubs along the banks of the Chu River
VP03	42.623138°	75.828866°	Scree slope with eastern exposure, devoid of vegetation
VP04	42.560278°	75.819167°	Mountain gorge and Chu River with signs of excavations
VP05	42.496796°	75.843678°	Left bank of the Chu River with sandy alluvial soils and shrub vegetation
VP06	42.469005°	76.015956°	Alluvial cone on the southern exposure of the ridge
VP07	42.465120°	76.126961°	The slope of the southern exposure of the ridge with fallow lands and young bushes
VP08	42.450126°	76.184493°	Gently sandy shore of Lake Issyk-Kul with grassy vegetation

Table 2: Schedule of the survey and effort level (hours)

Date/VP	VP01	VP02	VP03	VP04	VP05	VP06	VP07	VP08
04/09	2.5	2.5						
05/09			2	2	2	2	2	
06/09								2
20/09				2	2	2	2	2
21/09	2	2	2	2				
22/09	2	2	2	2				
23/09	2	2	2	2				
24/09					2	2	2	2
28/09	2	2	2	2				
29/09					2	2	2	2
12/10					2	2	2	2
13/10					2	2	2	2
14/10					2	2	2	2
15/10	2	2	2	2				
16/10	2	2	2	2				
17/10	1.5	1.5	2					
01/11	2	2	2	2				
02/11					2	2	2	2
03/11					2	2	2	2
10/11					2	2	2	2
11/11	2	2	2	2				
Total hours	20	20	20	20	20	20	20	20
Sum							160	

During the observations, photographing of birds was carried out, which is used to confirm the correct determination of species and obtain additional data on the number of individuals.

The following equipment was used

- two binoculars (BUSHNELL TROPHY 8x42)
- camera (Canon EOS 5D Mark 4 with lens Canon EF 500mm f4.5 and Canon EF 600mm f4)
- spotting scope (Levenhuk Blaze BASE 60)

3. Findings and Results

As a result of the survey, 78 bird species were observed on the Vantage points (Table 3). Nine of them, specifically the Whooper Swan (*Cygnus cygnus*), Saker Falcon (*Falco cherrug*), Ferruginous Duck (*Aythya nyroca*), Himalayan Griffon (*Gyps himalayensis*), Bearded Vulture (*Gypaetus barbatus*), Cinereous Vulture (*Aegypius monachus*), Booted Eagle (*Hieraaetus pennatus*), Steppe Eagle (*Aquila nipalensis*), Golden Eagle (*Aquila chrysaetos*) are listed in the Red Data Book of Kyrgyz Republic³ and The IUCN Red List⁴ includes four Near Threatened (NT) species and two endangered species among these observations.

Below in the table, species, their IUCN Red list and Kyrgyz Red Data Book status, susceptibility to electrocution and collision⁵, and number are provided.

Table 3: Species observed on the project site

	Latin name	Common name	Kyrgyz RDB status	IUCN Red list status	Susceptibility to electrocution ⁶	Susceptibility to collision ⁶	Total observation
1	<i>Cygnus olor</i>	Mute Swan		LC	0	II	30
2	<i>Cygnus cygnus</i>	Whooper Swan	VII (LC)	LC	0	II	40
3	<i>Tadorna ferruginea</i>	Ruddy Shelduck		LC	0	II	20
4	<i>Mareca penelope</i>	Eurasian Wigeon		LC	0	II	14
5	<i>Anas platyrhynchos</i>	Mallard		LC	0	II	14
6	<i>Aythya nyroca</i>	Ferruginous Duck	VI (NT)	NT	0	II	2
7	<i>Alectoris chukar</i>	Chukar		LC	0	II	55
8	<i>Tachybaptus ruficollis</i>	Little Grebe		LC	0	II	20
9	<i>Podiceps cristatus</i>	Great Crested Grebe		LC	0	II	26
10	<i>Podiceps nigricollis</i>	Eared Grebe		LC	0	II	17
11	<i>Columba livia</i>	Rock Pigeon		LC	I-II	II	788
12	<i>Columba oenas</i>	Stock Dove		LC	I-II	II	2

³ (Red Data Book of Kyrgyz Republic, 2006)

⁴ (International Union for Conservation of Nature and Natural Resources, 2024)

⁵ (Martin Martin, 2022)

⁶ Severity of impacts (actual or potential) on bird populations: electrocution mortality and power line collision for different bird families in Eurasia. 0 – no reported or likely casualties; I – reported fatalities, but no apparent threat to the bird populations of that family; II – high regional or local losses, but no significant impact on the overall conservation status of the species; III – casualties are a significant mortality factor, threatening an imperiled species regionally or on a larger scale.

	Latin name	Common name	Kyrgyz RDB status	IUCN Red list status	Susceptibility to electrocution ⁶	Susceptibility to collision ⁶	Total observation
13	<i>Streptopelia decaocto</i>	Eurasian Collared-dove		LC	I-II	II	13
14	<i>Spilopelia senegalensis</i>	Laughing Dove		LC	I-II	II	11
15	<i>Cuculus canorus</i>	Common Cuckoo		LC	0	I-II	1
16	<i>Fulica atra</i>	Eurasian Coot		LC	0	II	127
17	<i>Charadrius dubius</i>	Little Ringed Plover		LC	I	II-III	6
18	<i>Actitis hypoleucos</i>	Common Sandpiper		LC	I	II-III	2
19	<i>Tringa totanus</i>	Common Redshank		LC	I	II-III	5
20	<i>Calidris temminckii</i>	Temminck's Stint		LC	I	II-III	5
21	<i>Larus ridibundus</i>	Black-headed Gull		LC	I	II	54
22	<i>Larus canus</i>	Common Gull		LC	I	II	1
23	<i>Larus cachinnans</i>	Caspian Gull		LC	I	II	6
24	<i>Sterna hirundo</i>	Common Tern		LC	0-I	I-II	20
25	<i>Phalacrocorax carbo</i>	Great Cormorant		LC	I	I	10
26	<i>Ardea alba</i>	Great Egret		LC	I	II	6
27	<i>Ardea cinerea</i>	Gray Heron		LC	I	II	10
28	<i>Gypaetus barbatus</i>	Bearded Vulture	VI (NT)	NT	II-III	I-II	2
29	<i>Aegypius monachus</i>	Cinereous Vulture	VI (NT)	NT	II-III	I-II	2
30	<i>Gyps himalayensis</i>	Himalayan Griffon	VII (LC)	NT	II-III	I-II	26
31	<i>Hieraaetus pennatus</i>	Booted Eagle	VI (NT)	LC	II-III	I-II	2
32	<i>Aquila nipalensis</i>	Steppe Eagle	VI (NT)	EN	II-III	I-II	3
33	<i>Aquila chrysaetos</i>	Golden Eagle	VI (NT)	LC	II-III	I-II	8
34	<i>Circus aeruginosus</i>	Western Marsh Harrier		LC	II-III	I-II	9
35	<i>Accipiter nisus</i>	Eurasian Sparrowhawk		LC	II-III	I-II	4
36	<i>Milvus migrans</i>	Black Kite		LC	II-III	I-II	49
37	<i>Buteo buteo</i>	Common Buzzard		LC	II-III	I-II	3
38	<i>Buteo japonicus</i>	Eastern Buzzard		LC	II-III	I-II	7
39	<i>Buteo rufinus</i>	Long-legged Buzzard		LC	II-III	I-II	20
40	<i>Upupa epops</i>	Eurasian Hoopoe		LC	I	I-II	4
41	<i>Coracias garrulus</i>	European Roller		LC	I-II	I-II	13

	Latin name	Common name	Kyrgyz RDB status	IUCN Red list status	Susceptibility to electrocution ⁶	Susceptibility to collision ⁶	Total observation
42	<i>Falco tinnunculus</i>	Eurasian Kestrel		LC	II-III	I-II	11
43	<i>Falco cherrug</i>	Saker Falcon	IV (EN)	EN	II-III	I-II	1
44	<i>Oriolus kundoo</i>	Indian golden oriole		LC	I	I-II	3
45	<i>Lanius phoenicuroides</i>	Red-tailed Shrike		LC	I	I-II	4
46	<i>Pica pica</i>	Eurasian Magpie		LC	II	I-II	388
47	<i>Corvus frugilegus</i>	Rook		LC	II	I-II	811
48	<i>Cyanistes cyanus</i>	Azure Tit		LC	II	I-II	42
49	<i>Parus major</i>	Great Tit		LC	II	I-II	49
50	<i>Galerida cristata</i>	Crested Lark		LC	II	I-II	88
51	<i>Parus cinereus</i>	Cinereous tit		LC	II	I-II	4
52	<i>Acrocephalus stentoreus</i>	Clamorous Reed-warbler		LC	II	I-II	1
53	<i>Hirundo rustica</i>	Barn Swallow		LC	II	I-II	3
54	<i>Delichon urbicum</i>	Western House-Martin		LC	II	I-II	21
55	<i>Phylloscopus collybita</i>	Common Chiffchaff		LC	II	I-II	5
56	<i>Phylloscopus trochiloides</i>	Greenish Warbler		LC	II	I-II	13
57	<i>Curruca communis</i>	Common Whitethroat		LC	II	I-II	1
58	<i>Regulus regulus</i>	Goldcrest		LC	II	I-II	1
59	<i>Troglodytes troglodytes</i>	Eurasian Wren		LC	II	I-II	1
60	<i>Sturnus vulgaris</i>	European Starling		LC	II	I-II	82
61	<i>Acridotheres tristis</i>	Common Myna		LC	II	I-II	170
62	<i>Turdus merula</i>	Eurasian Blackbird		LC	II	I-II	13
63	<i>Muscicapa striata</i>	Spotted Flycatcher		LC	II	I-II	13
64	<i>Phoenicurus erythronotus</i>	Rufous-backed Redstart		LC	II	I-II	13
65	<i>Saxicola rubicola</i>	European stonechat		LC	II	I-II	1
66	<i>Oenanthe oenanthe</i>	Northern Wheatear		LC	II	I-II	6
67	<i>Oenanthe isabellina</i>	Isabelline Wheatear		LC	II	I-II	1
68	<i>Oenanthe pleschanka</i>	Pied Wheatear		LC	II	I-II	2
69	<i>Passer domesticus</i>	House Sparrow		LC	II	I-II	19
70	<i>Passer montanus</i>	Eurasian Tree Sparrow		LC	II	I-II	321

	Latin name	Common name	Kyrgyz RDB status	IUCN Red list status	Susceptibility to electrocution ⁶	Susceptibility to collision ⁶	Total observation
71	<i>Motacilla cinerea</i>	Gray Wagtail		LC	II	I-II	4
72	<i>Motacilla personata</i>	White Wagtail		LC	II	I-II	43
73	<i>Motacilla alba</i>	White Wagtail		LC	II	I-II	6
74	<i>Anthus spinoletta</i>	Water Pipit		LC	II	I-II	1
75	<i>Fringilla coelebs</i>	Common Chaffinch		LC	II	I-II	24
76	<i>Fringilla montifringilla</i>	Brambling		LC	II	I-II	8
77	<i>Carduelis caniceps</i>	Eastern Goldfinch		LC	II	I-II	15
78	<i>Emberiza calandra</i>	Corn Bunting		LC	II	I-II	4

The threatened species occurred at every VP. The most meeting with the threatened species were at VP02 and VP03 (Figure 7).

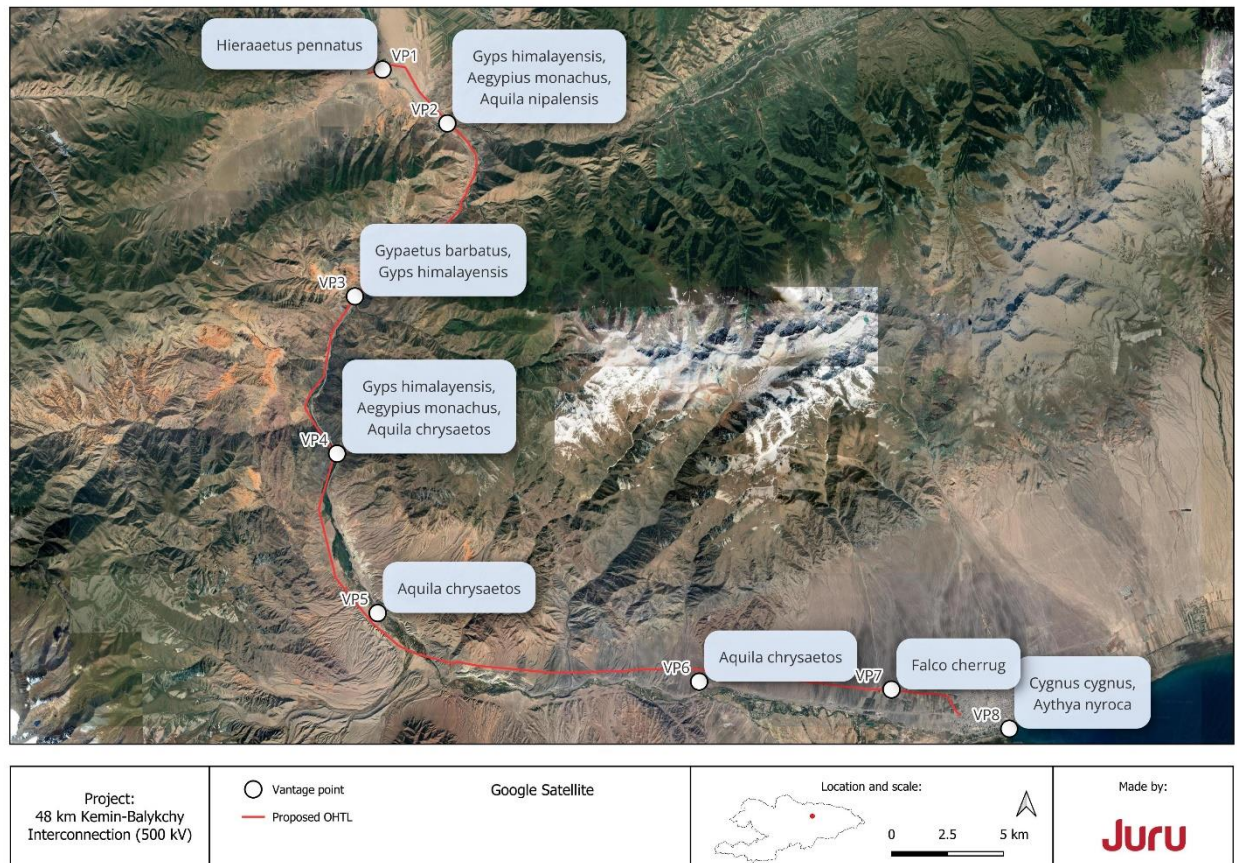


Figure 6. Threatened species observed during the survey

Table 4: Distribution of species included in the Kyrgyzstan Red Data Book by VP

	VP01	VP02	VP03	VP04	VP05	VP06	VP07	VP08	Grand Total
<i>Cygnus cygnus</i>								40	40
<i>Aythya nyroca</i>								2	2
<i>Falco cherrug</i>							1		1
<i>Gypaetus barbatus</i>			2						2
<i>Gyps himalayensis</i>		10	13	3					26
<i>Aegypius monachus</i>		1		1					2
<i>Aquila nipalensis</i>		3							3
<i>Aquila chrysaetos</i>				2	1	2			5
<i>Hieraaetus pennatus</i>	2								2
Overall	2	14	15	6	1	2	1	42	83

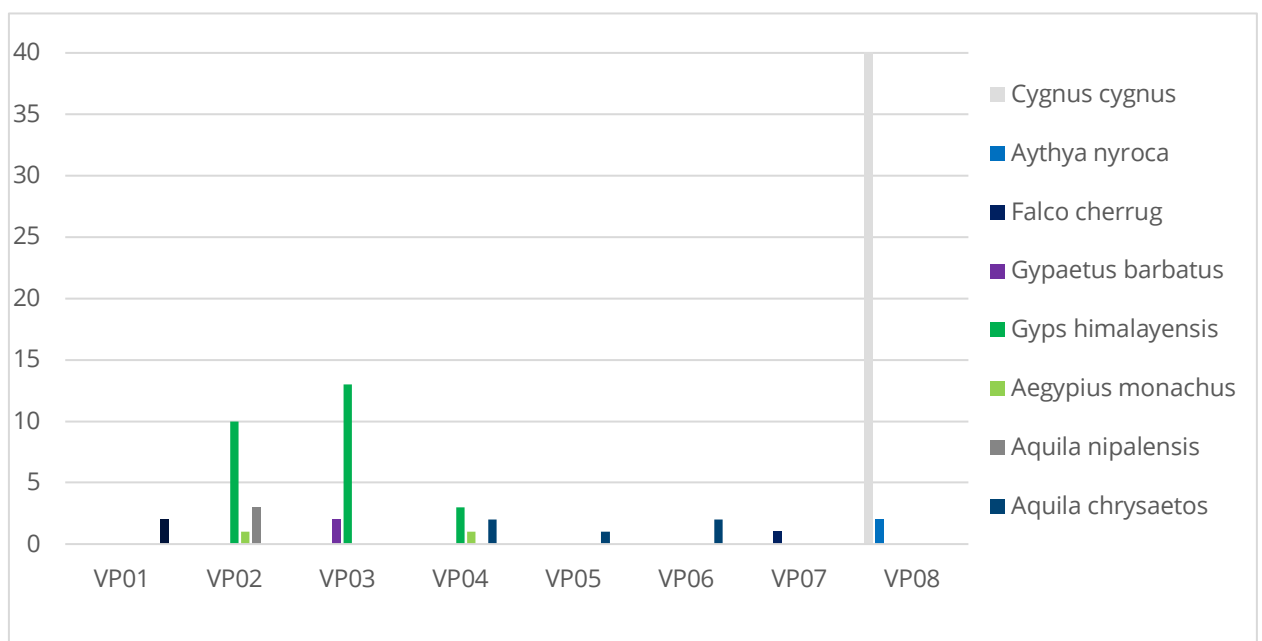


Figure 7. Frequency of meetings with threatened bird species per vantage point

Table 5. Summary of meetings with species included in the Kyrgyz RDB and IUCN as NT and above.

Date	VP	Weather	Latin name	Number	Meeting time	Altitude	Comment	RDB Status	IUCN status
04.09.2024	VP01	Sunny	<i>Hieraaetus pennatus</i>	1	13:50	100	soaring	VI (NT)	LC
04.09.2024	VP01	Sunny	<i>Hieraaetus pennatus</i>	1	15:15	100	soaring	VI (NT)	LC
21.09.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	2	12:37	300	soaring	VII (LC)	NT
23.09.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	2	12:37	300	soaring	VII (LC)	NT
15.10.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	2	12:19	300	soaring	VII (LC)	NT
15.10.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	1	12:38	200	flight	VII (LC)	NT
15.10.2024	VP02	Cloudy	<i>Aegypius monachus</i>	1	12:46	300	soaring	VI (NT)	NT
16.10.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	1	11:45	200	soaring	VII (LC)	NT
16.10.2024	VP02	Cloudy	<i>Gyps himalayensis</i>	2	11:54	300	soaring	VII (LC)	NT
16.10.2024	VP02	Cloudy	<i>Aquila nipalensis</i>	1	12:40	200	flight	VI (NT)	EN
17.10.2024	VP02	Rain	<i>Aquila nipalensis</i>	2	10:47	200	on the rock	VI (NT)	EN
21.09.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	3	10:10	200	soaring	VII (LC)	NT
28.09.2024	VP03	Sunny	<i>Gyps himalayensis</i>	1	12:42	150	soaring	VII (LC)	NT
28.09.2024	VP03	Sunny	<i>Gyps himalayensis</i>	2	12:47	200	flight	VII (LC)	NT
15.10.2024	VP03	Rain	<i>Gypaetus barbatus</i>	1	09:56	200	soaring	VI (NT)	NT
16.10.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	1	11:14	200	flight	VII (LC)	NT
17.10.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	1	13:50	300	soaring	VII (LC)	NT
17.10.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	2	13:54	250	flight	VII (LC)	NT
01.11.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	1	12:50	200	soaring	VII (LC)	NT
01.11.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	1	13:23	200	flight	VII (LC)	NT
11.11.2024	VP03	Cloudy	<i>Gypaetus barbatus</i>	1	10:05	50	flight	VI (NT)	NT
11.11.2024	VP03	Cloudy	<i>Gyps himalayensis</i>	1	10:53	200	soaring	VII (LC)	NT
05.09.2024	VP04	Sunny	<i>Aquila chrysaetos</i>	1	10:06	300	flight	VI (NT)	LC
05.09.2024	VP04	Sunny	<i>Aquila chrysaetos</i>	1	10:19	100	on the rock	VI (NT)	LC
05.09.2024	VP04	Sunny	<i>Gyps himalayensis</i>	3	10:36	400	soaring	VII (LC)	NT
05.09.2024	VP04	Sunny	<i>Aegypius monachus</i>	1	10:40	300	soaring	VI (NT)	NT
24.09.2024	VP05	Sunny	<i>Aquila chrysaetos</i>	1	08:39	200	flight	VI (NT)	LC
02.11.2024	VP06	Rain	<i>Aquila chrysaetos</i>	1	10:19	200	flight	VI (NT)	LC
10.11.2024	VP06	Sunny	<i>Aquila chrysaetos</i>	1	13:38	300	flight	VI (NT)	LC
13.10.2024	VP07	Cloudy	<i>Falco cherrug</i>	1	10:19	100	flight	IV (EN)	EN
06.09.2024	VP08	Cloudy	<i>Aythya nyroca</i>	2	07:31	0	on the water	VI (NT)	NT
13.10.2024	VP08	Cloudy	<i>Cygnus cygnus</i>	6	07:36	0	on the water	VII (LC)	LC
14.10.2024	VP08	Rain	<i>Cygnus cygnus</i>	6	07:47	0	on the water	VII (LC)	LC
02.11.2024	VP08	Cloudy	<i>Cygnus cygnus</i>	16	15:09	0	on the water	VII (LC)	LC
03.11.2024	VP08	Cloudy	<i>Cygnus cygnus</i>	8	15:01	0	on the water	VII (LC)	LC
10.11.2024	VP08	Sunny	<i>Cygnus cygnus</i>	4	07:10	0	on the water	VII (LC)	LC

4. Key species descriptions

Whooper swan (*Cygnus cygnus*) – VII category; IUCN: (LC)

Status: Classified as a least concern, rare, nesting species.

Distribution: Common during seasonal migrations and wintering. During migration, it is found in all large reservoirs of the republic. Mass wintering in the shallow waters of Lake Issyk-Kul.

Habitats: Shallow areas of large water bodies rich in underwater vegetation.

During the survey, groups of 4–16 individuals were observed several times sitting on the water. This species exhibits a medium susceptibility to collision from overhead transmission lines (OHTL).

Ferruginous Duck (*Aythya nyroca*) – VI category; IUCN: (NT)

Status: Classified as a near threatened.

Distribution: Migrates through Chu, Issyk-Kul Valleys, highland lakes of Inner Tyan-Shan. The number of ducks in Issyk-Kul is 1-2 pairs for 5 km transect.

Habitats: Lakes, reservoirs, ponds with rich weed vegetation and bodies of water with rich aquatic vegetation and inhabited by small aquatic animals.

A pair of ducks was observed on the lake only once, on 9 September. This species exhibits a medium susceptibility to collision from overhead transmission lines (OHTL).



Saker falcon (*Falco cherrug*) – IV category; IUCN: (EN)

Status: Classified as endangered, sharply decreased, sedentary species with migratory subspecies.

Distribution: Middle and upper mountain belt from 1300 to 3000 m above sea level.

Habitats: Low desert mountains and dry foothills of large ranges, river canyons, cliffs, tugai, floodplain forests, mixed spruce forests, cliffs and precipices.

During the survey at VP07, individual of the Saker was observed at height 100 meters. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).

Bearded vulture (*Gypaetus barbatus*) – VI category; IUCN: (NT)

Status: Classified as a near threatened, naturally threatened, sedentary, locally widespread species.

Distribution: In the Kyrgyz Republic, it can be found on all major ridges of the Western, Northern, Central, and Inner Tien Shan, as well as the Pamir-Alai (Arlettaz R. and others, 1992)

Habitats: The species primarily inhabits the middle and upper mountain belt at altitudes of 1,000-4,300 meters above sea level. It nests on rocky cliffs. Periodically, during the non-breeding season, certain individuals exhibit migration to flat regions.

During the survey, lone birds were observed twice at VP03. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).



Himalayan Griffon (*Gyps himalayensis*) – VII category; IUCN: (NT)

Status: Classified as a near threatened, sedentary, the only species within the genus in the fauna of the Kyrgyz Republic. Monotypic species.

Distribution: Himalayas, Hindu Kush, Tibet, Kunlun, Altyn-Tag, Nan Shan. In the Tian Shan it inhabits the Alai, Turkestan, Fergana, and Kyrgyz ranges; Teskey Ala-Too, Central and Inner Tian Shan ranges. (Red Book of Kyrgyz SSR, 1985; Stepanyan, 1990)

Habitats: Inhabits the subalpine and alpine zones of the Tian Shan, in areas with wild hoofed animals and herds of domestic animals. It prefers to nest in places with rocky exposures.

During the survey, 1–3 individuals of Himalayan Griffon were recorded 16 times at VP02, VP03, and VP04. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).



Cinereous vulture (*Aegypius monachus*) - VI category; IUCN: (NT)

Status: Classified as near threatened, sedentary, and a mosaic widespread species.

Distribution: The species is common throughout the territory of Kyrgyzstan on the nesting. (Birds of Kyrgyzstan, 1959; Dandliker and others, 1992)

Habitats: It primarily occupies the lower and middle mountain belt and feeds on carrion from ungulates.

The Cinereous vulture was noted twice, at VP02 and VP04, at a height of approximately 300 meters. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).

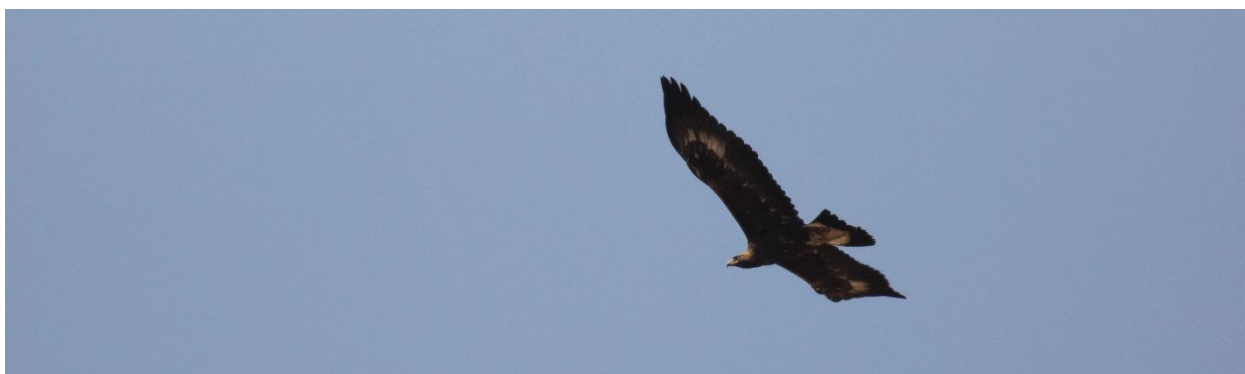
**Golden eagle (*Aquila chrysaetos*) - VI category, IUCN: (LC)**

Status: Least Concern, sedentary, with locally widespread distribution, in the Kyrgyz Republic, subspecies *Aquila chrysaetos daphanea* inhabits. (Severtsov, 1873)

Distribution: Occurs throughout Kyrgyzstan mountains. (Shukurov, 1981)

Habitats: Golden eagles inhabit remnant mountains of deserts, loess cliffs of foothills, and rock formations in the middle and upper mountain zones. They build nests on rocks, cliffs, trees, and structures like power transmission line supports. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).

Lone individuals were recorded several times at VP04, VP05, and VP06, with flight altitudes ranging from 100 to 300 meters.



Booted Eagle (*Hieraaetus pennatus*) VI category, IUCN: (LC)

Monotypic species. Rare bird, scantily explored. Inhabits mountainous deciduous, and rarer - in coniferous forests. Numbers are not available. Breeding bird arrives in April and lays 1-2 eggs. Uses for food birds, rarer - in rodents and lizards. Nest destruction and illegal game shooting are major limiting factors. There is no data on breeding in captivity. No special measures to protect the species were undertaken, but hunting after Booted Eagle is prohibited. It is recommended to establish protected areas around nesting sites.

The booted eagle was observed twice at observation point VP01. This species exhibits a medium-high susceptibility to electrocution from overhead transmission lines (OHTL).

**Steppe eagle (*Aquila nipalensis*) – VI category, IUCN: (EN)**

Status: Near threatened, migratory bird.

Distribution: The steppe eagle is observed in Kyrgyzstan during its autumn and spring migrations.

Habitats: Dry steppes and northern deserts. It prefers semi-deserts, low xerophytic mountains, and foothills of high mountain ranges in areas inhabited by rodents. In the mountains, it can be found at elevations of up to 2,000 meters.

1-2 birds were observed at VP02 twice, at height 200 meters.

This species exhibits a medium to high susceptibility to electrocution from overhead transmission lines (OHTL).



5. Conclusion

The bird VP surveys were conducted in accordance with the plan from September to November 2024 at 8 vantage points. In total, 160 hours of bird monitoring were carried out. During the survey, 78 bird species were observed in the area, seven of which are listed in the National Red Data Book and/or the IUCN Red List with a status of NT or higher. Additionally, 18 recorded species have a medium-high level of susceptibility to collision and/or electrocution. Species with the highest level of susceptibility to collision or electrocution, such as bustards or cranes, were not observed. No additional threats, such as poaching or landscape fires, were identified.

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7. Annex

Annex 1. Vantage points



Figure 8. Vantage point 01



Figure 9. Vantage point 02



Figure 10. Vantage point 03



Figure 11. Vantage point 04



Figure 12. Vantage point 05



Figure 13. Vantage point 06



Figure 14. Vantage point 07



Figure 15. Vantage point 08

Annex 2. Results of the observation

Table 6: Primary data

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Columba livia</i>	4	13:40	25	flight
2	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Milvus migrans</i>	1	13:42	30	flight
3	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Corvus frugilegus</i>	1	13:44	0	on the ground
4	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Hieraaetus pennatus</i>	1	13:50	100	soaring
5	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Oenanthe oenanthe</i>	2	14:00	0	on the ground
6	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Motacilla personata</i>	3	14:09	0	on the ground
7	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Milvus migrans</i>	2	14:14	30	soaring
8	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Cyanistes cyanus</i>	1	14:19	20	flight
9	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Actitis hypoleucos</i>	1	14:23	0	on the ground
10	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Phylloscopus trochiloides</i>	1	14:28	3	on the tree
11	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Pica pica</i>	2	14:34	30	flight
12	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Hirundo rustica</i>	3	14:41	15	flight
13	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Passer montanus</i>	12	14:44	0	on the ground
14	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Columba livia</i>	2	14:49	40	flight
15	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Acridotheres tristis</i>	8	14:52	0	on the ground
16	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Muscicapa striata</i>	1	14:55	3	on the tree
17	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Pica pica</i>	1	14:57	40	flight
18	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Columba livia</i>	7	15:03	25	flight
19	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Delichon urbicum</i>	1	15:06	15	flight
20	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Hieraaetus pennatus</i>	1	15:15	100	soaring
21	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Milvus migrans</i>	1	15:22	20	flight
22	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Columba livia</i>	4	15:29	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
23	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Columba livia</i>	2	15:41	0	on the ground
24	04.09.2024	VP01	42.713709°	75.843865°	13:39-16:10	Sunny	<i>Corvus frugilegus</i>	31	15:53	100	soaring
25	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Columba livia</i>	3	16:21	15	flight
26	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Coracias garrulus</i>	2	16:22	2	on the bush
27	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Corvus frugilegus</i>	5	16:26	40	flight
28	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Alectoris chukar</i>	4	16:29	0	on the ground
29	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Motacilla personata</i>	1	16:34	0	on the ground
30	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Coracias garrulus</i>	1	16:44	10	flight
31	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Acridotheres tristis</i>	2	16:55	10	on the rock
32	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Columba livia</i>	3	17:19	15	on the rock
33	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Pica pica</i>	1	17:24	15	flight
34	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Emberiza calandra</i>	1	17:25	20	flight
35	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Corvus frugilegus</i>	8	17:29	30	flight
36	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Columba livia</i>	3	17:33	50	flight
37	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Coracias garrulus</i>	1	17:37	1	on the bush
38	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Pica pica</i>	1	17:44	50	flight
39	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Alectoris chukar</i>	12	17:50	0	on the ground
40	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Columba livia</i>	11	18:01	30	flight
41	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Pica pica</i>	1	18:15	20	flight
42	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Columba livia</i>	3	18:20	20	flight
43	04.09.2024	VP02	42.690571°	75.884568°	16:15-18:15	Sunny	<i>Acridotheres tristis</i>	2	18:37	2	on the tree
44	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	2	07:15	30	flight
45	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Pica pica</i>	1	07:24	20	flight
46	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Columba livia</i>	7	07:30	30	flight
47	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Pica pica</i>	1	07:37	50	flight
48	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Columba oenas</i>	2	07:44	50	flight
49	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	3	07:51	20	flight
50	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Cyanistes cyanus</i>	1	08:03	0	on the ground
51	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Phylloscopus trochiloides</i>	1	08:05	2	on the tree
52	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Motacilla personata</i>	2	08:12	0	on the ground

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
53	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Pica pica</i>	1	08:20	20	on the slope
54	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Motacilla cinerea</i>	1	08:21	0	on the ground
55	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	6	08:39	15	flight
56	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Columba livia</i>	8	08:45	30	flight
57	05.09.2024	VP03	42.623138°	75.828866°	07:00-09:00	Sunny	<i>Coracias garrulus</i>	1	08:57	10	on the slope
58	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Columba livia</i>	12	09:18	50	flight
59	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Phoenicurus erythronotus</i>	1	09:20	2	on the tree
60	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Pica pica</i>	1	09:22	20	flight
61	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Corvus frugilegus</i>	2	09:24	20	flight
62	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Muscicapa striata</i>	1	09:26	2	on the tree
63	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Columba livia</i>	2	09:28	50	flight
64	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Phylloscopus trochiloides</i>	1	09:30	1	in the bush
65	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Phalacrocorax carbo</i>	1	09:31	20	flight
66	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Acrocephalus stentoreus</i>	1	09:33	1	in the reeds
67	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Falco tinnunculus</i>	1	09:38	40	soaring
68	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Phylloscopus trochiloides</i>	1	09:46	2	on the tree
69	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Cyanistes cyanus</i>	1	09:55	1	on the tree
70	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Corvus frugilegus</i>	11	10:02	2	on the tree
71	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Phoenicurus erythronotus</i>	1	10:04	2	on the tree
72	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Aquila chrysaetos</i>	1	10:06	300	flight
73	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Corvus frugilegus</i>	3	10:07	50	flight
74	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Upupa epops</i>	2	10:09	20	flight
75	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Muscicapa striata</i>	1	10:10	1	in a bush
76	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Muscicapa striata</i>	2	10:12	2	on the tree
77	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Oriolus kundoo</i>	2	10:16	2	on the tree
78	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Aquila chrysaetos</i>	1	10:19	100	on the mountaunside
79	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Corvus frugilegus</i>	11	10:20	10	on the OHTL
80	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Gyps himalayensis</i>	3	10:36	400	soaring high in the sky
81	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Aegypius monachus</i>	1	10:40	300	soaring
82	05.09.2024	VP04	42.577462°	75.802566°	09:15-11:15	Sunny	<i>Corvus frugilegus</i>	1	10:48	10	flight
83	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Pica pica</i>	1	11:22	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
84	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Corvus frugilegus</i>	3	11:24	15	flight
85	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Milvus migrans</i>	1	11:27	50	flight
86	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Passer montanus</i>	9	11:31	0	on the ground
87	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Columba livia</i>	5	11:33	20	flight
88	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Muscicapa striata</i>	1	11:36	1	in the bush
89	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Oenanthe oenanthe</i>	2	11:40	0	on the ground
90	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Falco tinnunculus</i>	1	11:42	50	flight
91	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Columba livia</i>	1	11:47	30	flight
92	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Delichon urbicum</i>	3	12:06	15	flight
93	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Corvus frugilegus</i>	3	12:12	30	flight
94	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Pica pica</i>	1	12:24	20	flight
95	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Delichon urbicum</i>	3	12:31	100	soaring
96	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Motacilla personata</i>	1	12:32	5	flight
97	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Circus aeruginosus</i>	1	12:35	10	flight
98	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Pica pica</i>	1	12:40	4	flight
99	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Phylloscopus trochiloides</i>		12:52	1	on the tree
100	05.09.2024	VP05	42.496796°	75.843678°	11:22-13:22	Sunny	<i>Corvus frugilegus</i>	1	13:13	30	flight
101	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Oenanthe pleschanka</i>	1	13:45	0	on the ground
102	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Aquila chrysaetos</i>	1	13:50	50	hunting
103	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Falco tinnunculus</i>	1	13:57	50	flight
104	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Oenanthe oenanthe</i>	1	14:07	0	on the ground
105	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Galerida cristata</i>	3	14:15	10	flight
106	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Buteo rufinus</i>	1	14:32	100	flight
107	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Corvus frugilegus</i>	2	14:40	30	flight
108	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Pica pica</i>	1	15:01	50	flight
109	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Coracias garrulus</i>	1	15:15	20	flight
110	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Alectoris chukar</i>	11	15:22	0	on the ground
111	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Pica pica</i>	1	15:33	20	flight
112	05.09.2024	VP06	42.469005°	76.015956°	13:45-15:45	Cloudy	<i>Columba livia</i>	3	15:40	30	flight
113	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Buteo rufinus</i>	1	16:08	20	flight
114	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Lanius phoenicuroides</i>	1	16:11	1	on the tree

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
115	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Buteo rufinus</i>	1	16:20	25-30	on the OHTL
116	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Muscicapa striata</i>	1	16:26	1	on the tree
117	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Pica pica</i>	2	16:34	20	flight
118	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Parus major</i>	1	16:49	1	on the tree
119	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Oenanthe isabellina</i>	1	16:51	0	on the ground
120	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Phylloscopus trochiloides</i>	1	16:57	1	on the tree
121	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Passer montanus</i>	3	17:03	1	on the tree
122	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Carduelis caniceps</i>	15	17:09	1	on the bush
123	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Pica pica</i>	1	17:17	20	on the OHTL
124	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Corvus frugilegus</i>	2	17:30	30	flight
125	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Pica pica</i>	1	17:33	15	flight
126	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Columba livia</i>	6	17:43	50	flight
127	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Buteo rufinus</i>	2	17:49	100	soaring
128	05.09.2024	VP07	42.465120°	76.126961°	16:08-18:08	Sunny	<i>Muscicapa striata</i>	1	18:06	5	flight
129	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Tringa totanus</i>	2	07:08	0	on the ground
130	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Columba livia</i>	3	07:08	20	flight
131	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Motacilla personata</i>	2	07:09	0	on the ground
132	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Pica pica</i>	3	07:19	20	flight
133	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Fulica atra</i>	6	07:26	0	on the water
134	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Aythya nyroca</i>	2	07:31	0	on the water
135	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Calidris temminckii</i>	5	07:37	0	on the ground
136	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Actitis hypoleucos</i>	1	07:40	0	on the ground
137	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Larus ridibundus</i>	9	07:44	0	on the water
138	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Sterna hirundo</i>	12	07:50	0	on the water
139	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Columba livia</i>	7	07:59	0	on the ground
140	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Tachybaptus ruficollis</i>	2	08:01	0	on the water
141	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	8	08:12	20	flight
142	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Circus aeruginosus</i>	1	08:14	10	soaring
143	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Parus major</i>	2	08:23	1	on the bush
144	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Cyanistes cyanus</i>	1	08:35	1	on the bush
145	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Pica pica</i>	3	08:36	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
146	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Muscicapa striata</i>	2	08:44	1	on the tree
147	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Spilopelia senegalensis</i>	2	08:46	2	on the tree
148	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	08:51	30	flight
149	06.09.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Charadrius dubius</i>	4	08:58	0	on the shore
150	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Larus ridibundus</i>	7	06:50	1	flight
151	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Motacilla personata</i>	2	06:54	0	on the shore
152	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	07:10	20	flight
153	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Fulica atra</i>	7	07:16	0	on the water
154	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Columba livia</i>	5	07:20	0	on the water
155	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Charadrius dubius</i>	2	07:36	0	on the water
156	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Cyanistes cyanus</i>	1	07:44	1	on the tree
157	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Sterna hirundo</i>	8	07:55	1	flight
158	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Larus ridibundus</i>	2	07:56	1	flight above the water
159	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Podiceps cristatus</i>	6	08:01	0	on the water
160	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Tachybaptus ruficollis</i>	2	08:03	0	on the water
161	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Columba livia</i>	3	08:06	0	on the shore
162	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	08:12	20	flight
163	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Acridotheres tristis</i>	4	08:19	2	on the tree
164	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Passer domesticus</i>	7	08:22	1	on the tree
165	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Sturnus vulgaris</i>	7	08:24	10	flight
166	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Pica pica</i>	2	08:36	20	flight
167	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Parus major</i>	1	08:40	1	on the tree
168	20.09.2024	VP08	42.449183°	76.183739°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	4	08:42	20	flight
169	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Pica pica</i>	1	09:00	20	flight
170	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Phylloscopus collybita</i>	1	09:12	1	on the tree
171	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	1	09:19	20	flight
172	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Buteo rufinus</i>	1	09:22	50	flight
173	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Parus major</i>	2	09:40	1	on the tree
174	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	1	09:53	15	flight
175	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Pica pica</i>	2	10:12	20	flight
176	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	3	10:26	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
177	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Acridotheres tristis</i>	2	10:34	1	on the tree
178	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Lanius phoenicuroides</i>	2	10:44	1	on the tree
179	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Pica pica</i>	2	10:46	20	flight
180	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Buteo rufinus</i>	1	10:49	10	sitting on OTHL
181	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	1	10:51	20	flight
182	20.09.2024	VP07	42.465120°	76.126961°	09:00-11:00	Cloudy	<i>Passer montanus</i>	4	10:58	0	on the ground
183	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Pica pica</i>	2	11:15	20	flight
184	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Acridotheres tristis</i>	6	11:23	0	on the ground
185	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Sturnus vulgaris</i>	4	11:27	5	flight
186	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Delichon urbicum</i>	5	11:37	5	soaring
187	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Alectoris chukar</i>	8	11:39	1	passed by
188	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Anthus spinoletta</i>	1	11:45	0	on the ground
189	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Sylvia communis</i>	2	11:56	1	on the bush
190	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Alectoris chukar</i>	6	12:16	1	on the ground
191	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Corvus frugilegus</i>	5	12:26	20	flight
192	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Pica pica</i>	2	12:34	10	on the slope
193	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Passer montanus</i>	3	12:48	0	on the ground
194	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Galerida cristata</i>	3	12:50	0	on the ground
195	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Columba livia</i>	2	12:53	20	flight
196	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Corvus frugilegus</i>	1	12:54	10	flight
197	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Pica pica</i>	1	13:02	10	flight
198	20.09.2024	VP06	42.469005°	76.015956°	11:10-13:10	Cloudy	<i>Columba livia</i>	3	13:07	20	flight
199	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Corvus frugilegus</i>	1	14:30	20	flight
200	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Circus aeruginosus</i>	1	14:45	3	flight
201	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Ardea cinerea</i>	2	14:50	10	flight
202	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Columba livia</i>	1	14:53	15	flight
203	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Phoenicurus erythronotus</i>	1	15:07	1	on the tree
204	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Corvus frugilegus</i>	1	15:19	10	flight
205	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Pica pica</i>	2	15:24	15	flight
206	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Falco tinnunculus</i>	1	15:30	50	flight
207	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Motacilla personata</i>	2	15:39	0	on the ground

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
208	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Columba livia</i>	3	15:54	20	flight
209	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Acridotheres tristis</i>	2	16:06	10	flight
210	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Milvus migrans</i>	1	16:12	50	flight
211	20.09.2024	VP05	42.496796°	75.843678°	14:25-16:25	Rain	<i>Corvus frugilegus</i>	3	16:21	20	flight
212	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Phylloscopus trochiloides</i>	1	16:51	1	on the tree
213	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Corvus frugilegus</i>	2	16:59	10	flight
214	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Pica pica</i>	1	17:07	20	flight
215	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Parus major</i>	1	17:17	1	on the tree
216	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Cyanistes cyanus</i>	1	17:24	1	on the tree
217	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Corvus frugilegus</i>	2	17:35	1	on the tree
218	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Columba livia</i>	5	17:45	20	flight
219	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Acridotheres tristis</i>	2	17:50	20	flight
220	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Oriolus kundoo</i>	1	17:51	1	on the tree
221	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Phalacrocorax carbo</i>	1	17:58	5	flight
222	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Anas platyrhynchos</i>	2	18:03	10	flight
223	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Pica pica</i>	1	18:14	20	flight
224	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Corvus frugilegus</i>	2	18:17	10	flight
225	20.09.2024	VP04	42.577462°	75.802566°	16:45-18:45	Rain	<i>Streptopelia decaocto</i>	2	18:28	2	on the tree
226	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	2	06:47	20	flight
227	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	06:52	10	flight
228	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Motacilla personata</i>	2	07:02	0	on the ground
229	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Columba livia</i>	3	07:14	20	flight
230	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	07:15	15	flight
231	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Cyanistes cyanus</i>	1	07:22	1	on the tree
232	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Phylloscopus collybita</i>	1	07:31	1	on the tree
233	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Columba livia</i>	2	07:37	20	flight
234	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Anas platyrhynchos</i>	1	07:49	5	flight
235	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Ardea cinerea</i>	1	07:55	5	flight
236	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	2	08:03	20	flight
237	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	2	08:12	20	flight
238	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Phalacrocorax carbo</i>	1	08:16	10	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
239	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Circus aeruginosus</i>	1	08:24	15	flight
240	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	2	08:25	20	flight
241	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Motacilla personata</i>	1	08:36	5	flight
242	21.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	9	08:44	10	flight
243	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Cyanistes cyanus</i>	1	09:00	1	on the slope
244	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Parus major</i>	1	09:04	0	on the ground
245	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Pica pica</i>	2	09:09	20	flight
246	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	3	09:14	30	flight
247	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Acridotheres tristis</i>	6	09:23	0	on the ground
248	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Coracias garrulus</i>	2	09:35	5	on the slope
249	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Motacilla personata</i>	2	09:40	0	on the ground
250	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Pica pica</i>	3	09:46	20	flight
251	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	2	09:57	30	flight
252	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Gyps himalayensis</i>	3	10:10	200	soaring
253	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	1	10:24	20	flight
254	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Buteo rufinus</i>	1	10:36	50	soaring
255	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Columba livia</i>	3	10:40	20	flight
256	21.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Pica pica</i>	2	10:54	30	flight
257	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Oenanthe pleschanka</i>	1	11:15	0	on the ground
258	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	2	11:18	20	flight
259	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	1	11:24	20	flight
260	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Falco tinnunculus</i>	1	11:32	100	soaring
261	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	1	11:33	20	flight
262	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	2	11:45	20	flight
263	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Acridotheres tristis</i>	7	11:50	0	on the ground
264	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Coracias garrulus</i>	4	12:20	20	flight
265	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Motacilla personata</i>	1	12:28	0	on the ground
266	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Gyps himalayensis</i>	2	12:37	300	soaring
267	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Columba livia</i>	1	12:43	20	flight
268	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	2	12:50	30	flight
269	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	1	12:57	10	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
270	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Phoenicurus erythronotus</i>	1	13:01	1	on the bush
271	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	2	13:07	20	flight
272	21.09.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Turdus merula</i>	1	13:12	1	on the bush
273	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Galerida cristata</i>	2	14:24	0	on the ground
274	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Motacilla personata</i>	1	14:34	0	on the ground
275	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Acridotheres tristis</i>	2	14:39	0	on the ground
276	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Turdus merula</i>	1	14:46	10	flight
277	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Cyanistes cyanus</i>	2	14:58	1	down near the water
278	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Oenanthe oenanthe</i>	1	15:15	0	on the ground
279	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Motacilla cinerea</i>	1	15:19	1	down near the water
280	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	15:27	10	flight
281	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Milvus migrans</i>	1	15:39	100	soaring
282	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Pica pica</i>	2	15:40	10	flight
283	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Accipiter nisus</i>	1	15:47	50	flight
284	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Passer montanus</i>	5	15:58	0	on the ground
285	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Spilopelia senegalensis</i>	2	16:02	5	flight
286	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Columba livia</i>	1	16:13	20	on the ground
287	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Pica pica</i>	2	16:14	20	flight
288	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	1	16:19	50	flight
289	21.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Cuculus canorus</i>	1	16:23	20	flight
290	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	06:47	10	flight
291	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	2	06:50	20	flight
292	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Columba livia</i>	1	06:56	20	flight
293	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Motacilla personata</i>	2	07:02	0	on the ground
294	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	1	07:17	30	flight
295	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	07:24	20	flight
296	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Cyanistes cyanus</i>	1	07:35	5	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
297	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Acridotheres tristis</i>	3	07:44	0	on the ground
298	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	1	07:48	20	flight
299	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Passer montanus</i>	5	08:05	0	on the ground
300	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	4	08:17	50	flight
301	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Pica pica</i>	3	08:27	20	flight
302	22.09.2024	VP01	42.713709°	75.843865°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	08:39	30	flight
303	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Motacilla personata</i>	2	09:01	0	on the ground
304	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Corvus frugilegus</i>	2	09:14	20	flight
305	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Pica pica</i>	1	09:30	30	flight
306	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Falco tinnunculus</i>	1	09:45	50	flight
307	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Pica pica</i>	1	09:55	10	flight
308	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Columba livia</i>	7	10:12	50	flight
309	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Acridotheres tristis</i>	4	10:18	0	on the ground
310	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Pica pica</i>	2	10:27	20	flight
311	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Columba livia</i>	20	10:44	50	flight
312	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Corvus frugilegus</i>	1	10:52	10	flight
313	22.09.2024	VP02	42.690571°	75.884568°	09:00-11:00	Rain	<i>Pica pica</i>	1	10:59	5	flight
314	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Pica pica</i>	1	11:14	10	flight
315	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Corvus frugilegus</i>	2	11:28	20	flight
316	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Buteo rufinus</i>	1	11:48	150	soaring
317	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Motacilla personata</i>	2	11:55	0	on the ground
318	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Corvus frugilegus</i>	1	12:04	20	flight
319	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Pica pica</i>	2	12:19	20	flight
320	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Delichon urbicum</i>	9	12:37	5-10	local movements
321	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Pica pica</i>	1	12:38	0	on the ground
322	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Corvus frugilegus</i>	6	12:40	50	flight
323	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Corvus frugilegus</i>	1	12:48	20	flight
324	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Milvus migrans</i>	2	13:01	100	soaring
325	22.09.2024	VP03	42.623138°	75.828866°	11:10-13:10	Rain	<i>Columba livia</i>	6	13:06	15	flight
326	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Anas platyrhynchos</i>	3	14:26	5	flight above the water

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
327	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	14:32	10	flight
328	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Tadorna ferruginea</i>	5	14:37	5	flight above the water
329	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Pica pica</i>	3	14:48	20	flight
330	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	14:52	2	flight
331	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Acridotheres tristis</i>	3	15:03	0	on the ground
332	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Passer montanus</i>	8	15:07	0	on the ground
333	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Columba livia</i>	3	15:15	20	flight
334	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Phylloscopus collybita</i>	1	15:28	1	on the tree
335	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Pica pica</i>	1	15:39	1	on the tree
336	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Oriolus larvatus</i>	1	15:49	1	on the tree
337	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	16:01	20	flight
338	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Columba livia</i>	6	16:13	10	flight
339	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Phoenicurus erythronotus</i>	1	16:18	1	on the tree
340	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Muscicapa striata</i>	3	16:21	1	on the tree
341	22.09.2024	VP04	42.577462°	75.802566°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	16:24	20	flight
342	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Phylloscopus collybita</i>	1	06:46	1	on the tree
343	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Cyanistes cyanus</i>	1	06:52	1	on the tree
344	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Milvus migrans</i>	3	06:59	150	soaring
345	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	07:03	1	on the tree
346	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Motacilla personata</i>	1	07:12	0	on the ground
347	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	2	07:19	20	flight
348	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	2	07:23	20	flight
349	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Larus ridibundus</i>	1	07:33	10	flight above the water
350	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Larus cachinnans</i>	2	07:41	10	flight above the water
351	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Phalacrocorax carbo</i>	1	07:46	10	flight above the water
352	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Parus major</i>	1	08:02	1	on the tree
353	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Columba livia</i>	7	08:12	10	flight
354	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	1	08:21	1	on the tree
355	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	3	08:22	20	flight
356	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Phalacrocorax carbo</i>	2	08:30	5	flight above the water
357	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Pica pica</i>	1	08:34	20	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
358	23.09.2024	VP04	42.577462°	75.802566°	06:45-08:45	Cloudy	<i>Corvus frugilegus</i>	1	08:42	20	flight
359	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Alectoris chukar</i>	12	09:03	0	on the ground
360	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	8	09:07	20	flight
361	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Pica pica</i>	2	09:19	20	flight
362	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Galerida cristata</i>	6	09:22	3	on the slope
363	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	9	09:36	30	flight
364	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Columba livia</i>	4	09:37	10	on the slope
365	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Streptopelia decaocto</i>	2	09:49	20	flight
366	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Motacilla personata</i>	2	10:02	0	on the ground
367	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Motacilla cinerea</i>	2	10:12	0	on the ground
368	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	2	10:23	10	on the slope
369	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Pica pica</i>	1	10:34	20	flight
370	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Buteo rufinus</i>	1	10:45	150	flight
371	23.09.2024	VP03	42.623138°	75.828866°	09:00-11:00	Cloudy	<i>Corvus frugilegus</i>	2	10:56	30	flight
372	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Corvus frugilegus</i>	4	11:10	20	flight
373	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Saxicola rubicola</i>	1	11:20	0	on the ground
374	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Milvus migrans</i>	1	11:25	100	soaring
375	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Pica pica</i>	2	11:29	20	flight
376	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Corvus frugilegus</i>	3	11:32	30	flight
377	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Passer montanus</i>	8	11:40	0	on the ground
378	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Emberiza calandra</i>	1	11:41	1	on the bush
379	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Columba livia</i>	2	11:49	0	on the ground
380	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Pica pica</i>	2	12:02	30	flight
381	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Corvus frugilegus</i>	5	12:16	50	flight
382	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Milvus migrans</i>	2	12:28	150	soaring
383	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Gyps himalayensis</i>	2	12:37	300	soaring
384	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Pica pica</i>	1	12:55	30	flight
385	23.09.2024	VP02	42.690571°	75.884568°	11:10-13:10	Cloudy	<i>Columba livia</i>	6	13:04	30	flight
386	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Pica pica</i>	2	14:25	20	flight
387	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Accipiter nisus</i>	1	14:34	100	soaring
388	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	10	14:41	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
389	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Acridotheres tristis</i>	6	14:46	0	on the ground
390	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Columba livia</i>	12	15:00	100	flight
391	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	2	15:02	0	on the ground
392	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Upupa epops</i>	1	15:16	0	on the ground
393	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Pica pica</i>	4	15:23	20	flight
394	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	3	15:24	50	flight
395	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Passer montanus</i>	15	15:34	0	on the ground
396	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Spilopelia senegalensis</i>	2	15:40	20	flight
397	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Cyanistes cyanus</i>	1	15:57	1	on the bush
398	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Motacilla personata</i>	2	16:02	0	on the ground
399	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Corvus frugilegus</i>	5	16:03	50	flight
400	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Pica pica</i>	1	16:14	50	flight
401	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Motacilla</i>	1	16:21	0	on the ground
402	23.09.2024	VP01	42.713709°	75.843865°	14:25-16:25	Cloudy	<i>Phylloscopus trochiloides</i>	1	16:23	1	on the bush
403	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Corvus frugilegus</i>	4	06:50	20	flight
404	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Pica pica</i>	2	06:53	50	flight
405	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Acridotheres tristis</i>	3	07:04	10	flight
406	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Motacilla personata</i>	2	07:14	0	on the ground
407	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Passer montanus</i>	5	07:26	0	on the ground
408	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Pica pica</i>	3	07:33	20	flight
409	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Spilopelia senegalensis</i>	3	07:45	20	flight
410	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Columba livia</i>	5	07:56	30	flight
411	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Pica pica</i>	1	08:10	2	on the tree
412	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Corvus frugilegus</i>	2	08:23	10	flight
413	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Passer montanus</i>	6	08:24	0	on the ground
414	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Phylloscopus trochiloides</i>	1	08:31	1	on the bush
415	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Aquila chrysaetos</i>	1	08:39	200	flight
416	24.09.2024	VP05	42.496796°	75.843678°	06:45-08:45	Sunny	<i>Pica pica</i>	1	08:43	10	flight
417	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Columba livia</i>	7	09:01	70	flight
418	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Pica pica</i>	2	09:06	20	flight
419	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Galerida cristata</i>	7	09:16	0	on the ground

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
420	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Phylloscopus trochiloides</i>	1	09:24	0	on the ground
421	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Motacilla personata</i>	2	09:35	0	on the ground
422	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Motacilla alba</i>	2	09:37	0	on the ground
423	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Upupa epops</i>	1	09:42	3	on the slope
424	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Pica pica</i>	2	09:59	5	on the slope
425	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Corvus frugilegus</i>	2	10:10	20	flight
426	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Columba livia</i>	8	10:12	30	flight
427	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Pica pica</i>	1	10:23	20	flight
428	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Buteo buteo</i>	1	10:36	70	soaring
429	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Pica pica</i>	2	10:44	0	on the ground
430	24.09.2024	VP06	42.469005°	76.015956°	09:00-11:00	Sunny	<i>Corvus frugilegus</i>	1	10:57	10	flight
431	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Passer montanus</i>	2	11:15	0	on the ground
432	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Parus cinereus</i>	1	11:23	2	on the tree
433	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Corvus frugilegus</i>	1	11:40	2	on the tree
434	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Pica pica</i>	2	11:46	20	flight
435	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Milvus migrans</i>	2	11:49	50	soaring
436	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Pica pica</i>	2	11:54	2	on the tree
437	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Phylloscopus trochiloides</i>	1	12:03	1	in the bush
438	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Parus major</i>	2	12:14	2	on the tree
439	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Phoenicurus erythronotus</i>	1	12:20	1	on the tree
440	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Lanius phoenicuroides</i>	1	12:29	2	on the bush
441	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Galerida cristata</i>	7	12:42	0	on the ground
442	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Emberiza calandra</i>	2	12:47	2	on the tree
443	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Buteo rufinus</i>	1	12:59	100	soaring
444	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Columba livia</i>	3	13:07	50	flight
445	24.09.2024	VP07	42.465120°	76.126961°	11:15-13:15	Sunny	<i>Pica pica</i>	1	13:14	20	flight
446	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Tringa totanus</i>	1	14:26	0	on the shore
447	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Pica pica</i>	2	14:33	0	on the shore
448	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Fulica atra</i>	12	14:34	0	on the water
449	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Larus ridibundus</i>	2	14:34	2	flight above the water
450	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Podiceps cristatus</i>	3	14:35	0	on the water

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
451	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Columba livia</i>	2	14:40	50	flight
452	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Parus major</i>	1	14:52	2	on the bush
453	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Cyanistes cyanus</i>	2	15:00	2	on the tree
454	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Sturnus vulgaris</i>	16	15:01	4	on the tree
455	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Ardea alba</i>	2	15:14	0	on the shore
456	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Tachybaptus ruficollis</i>	2	15:26	0	on the water
457	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Corvus frugilegus</i>	3	15:29	20	flight
458	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Accipiter nisus</i>	1	15:34	50	flight
459	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Pica pica</i>	2	15:36	20	flight
460	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Columba livia</i>	6	15:40	50	flight
461	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Motacilla personata</i>	1	15:44	0	on the shore
462	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Columba livia</i>	3	15:59	0	on the shore
463	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Larus ridibundus</i>	4	16:07	3	flight above the water
464	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Sturnus vulgaris</i>	7	16:17	50	flight
465	24.09.2024	VP08	42.449183°	76.183739°	14:25-16:25	Sunny	<i>Larus ridibundus</i>	1	16:22	0	on the shore
466	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Corvus frugilegus</i>	2	06:49	10	flight
467	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Columba livia</i>	3	06:56	100	flight
468	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Pica pica</i>	2	07:01	30	flight
469	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Passer montanus</i>	3	07:12	0	on the ground
470	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Parus major</i>	2	07:16	1	on the bush
471	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Pica pica</i>	1	07:28	50	flight
472	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Acridotheres tristis</i>	12	07:35	30	flight
473	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Buteo rufinus</i>	1	07:44	50	soaring
474	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Columba livia</i>	5	07:59	20	flight
475	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Corvus frugilegus</i>	2	08:12	20	flight
476	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Motacilla personata</i>	1	08:19	0	on the ground
477	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Milvus migrans</i>	3	08:34	150	soaring
478	28.09.2024	VP01	42.713709°	75.843865°	06:55-08:55	Sunny	<i>Corvus frugilegus</i>	2	08:41	20	flight
479	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Phoenicurus erythronotus</i>	1	09:12	1	on the bush
480	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Pica pica</i>	1	09:14	50	flight
481	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Columba livia</i>	12	09:18	100	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
482	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	2	09:29	10	flight
483	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Columba livia</i>	5	09:36	50	flight
484	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Motacilla personata</i>	1	09:47	0	on the ground
485	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Pica pica</i>	1	09:55	10	flight
486	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Falco tinnunculus</i>	2	10:01	100	soaring
487	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Pica pica</i>	2	10:09	20	flight
488	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Milvus migrans</i>	1	10:16	50	flight
489	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	4	10:26	20	flight
490	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	1	10:33	10	flight
491	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Passer montanus</i>	3	10:47	0	on the ground
492	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Parus major</i>	1	10:56	1	on the bush
493	28.09.2024	VP02	42.690571°	75.884568°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	1	11:09	20	flight
494	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Pica pica</i>	2	11:15	20	flight
495	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Corvus frugilegus</i>	4	11:25	20	flight
496	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Coracias garrulus</i>	1	11:34	5	flight
497	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Milvus migrans</i>	2	11:39	100	soaring
498	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Columba livia</i>	3	11:47	50	flight
499	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Acridotheres tristis</i>	2	12:01	10	on the slope
500	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Phylloscopus collybita</i>	1	12:02	5	on the slope
501	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Corvus frugilegus</i>	6	12:19	50	flight
502	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Passer montanus</i>	2	12:29	10	on the slope
503	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Cyanistes cyanus</i>	1	12:36	0	on the ground
504	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Pica pica</i>	3	12:37	20	flight
505	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Corvus frugilegus</i>	1	12:39	20	flight
506	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Gyps himalayensis</i>	1	12:42	150	soaring
507	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Gyps himalayensis</i>	2	12:47	200	flight
508	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Buteo rufinus</i>	1	12:50	100	flight
509	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Pica pica</i>	3	13:08	50	flight
510	28.09.2024	VP03	42.623138°	75.828866°	11:15-13:15	Sunny	<i>Motacilla personata</i>	2	13:12	0	on the ground
511	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Pica pica</i>	3	14:30	30	flight
512	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Milvus migrans</i>	2	14:35	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
513	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Circus aeruginosus</i>	1	14:39	10	flight above the water
514	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Ardea cinerea</i>	1	14:45	10	flight
515	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Corvus frugilegus</i>	2	14:46	20	flight
516	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Phylloscopus trochiloides</i>	1	14:50	1	on the tree
517	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Parus major</i>	2	14:57	2	on the tree
518	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Cyanistes cyanus</i>	1	15:08	2	on the tree
519	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Parus major</i>	1	15:17	1	on the tree
520	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Falco tinnunculus</i>	1	15:26	50	soaring
521	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Corvus frugilegus</i>	2	15:33	20	flight
522	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Columba livia</i>	3	15:34	50	flight
523	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Pica pica</i>	2	15:36	20	flight
524	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Corvus frugilegus</i>	1	15:47	10	flight
525	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Corvus frugilegus</i>	1	15:58	20	flight
526	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Pica pica</i>	1	16:07	50	flight
527	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Parus major</i>	1	16:12	2	on the tree
528	28.09.2024	VP04	42.577462°	75.802566°	14:30-16:30	Sunny	<i>Pica pica</i>	2	16:20	20	flight
529	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	1	07:01	20	flight
530	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Acridotheres tristis</i>	4	07:06	30	flight
531	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Pica pica</i>	2	07:17	40	flight
532	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Phoenicurus erythronotus</i>	2	07:24	1	on the tree
533	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Circus aeruginosus</i>	1	07:36	5	flight above the water
534	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	2	07:45	1	on the tree
535	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Parus major</i>	1	07:57	1	on the tree
536	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Cyanistes cyanus</i>	2	8:0	1	on the tree
537	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Phoenicurus erythronotus</i>	1	08:12	1	on the tree
538	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	8	08:13	50	flight
539	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Pica pica</i>	2	08:16	20	flight
540	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Motacilla personata</i>	1	08:25	1	flight
541	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Milvus migrans</i>	1	08:30	100	soaring
542	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	6	08:36	20	flight
543	29.09.2024	VP05	42.496796°	75.843678°	07:00-09:00	Sunny	<i>Pica pica</i>	2	08:52	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
544	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	2	09:11	20	flight
545	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	3	09:16	50	flight
546	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Columba livia</i>	9	09:24	50	flight
547	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	1	09:30	10	flight
548	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Galerida cristata</i>	4	09:35	0	on the ground
549	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	2	09:43	30	flight
550	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Buteo rufinus</i>	1	09:44	100	flight
551	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	1	09:56	20	flight
552	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Passer montanus</i>	6	10:02	0	on the ground
553	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	1	10:14	20	flight
554	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	1	10:21	10	flight
555	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	2	10:32	0	on the ground
556	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Columba livia</i>	5	10:42	50	flight
557	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Pica pica</i>	2	10:53	20	flight
558	29.09.2024	VP06	42.469005°	76.015956°	09:10-11:10	Sunny	<i>Buteo rufinus</i>	1	10:54	100	flight
559	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Sturnus vulgaris</i>	9	11:20	50	flight
560	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Pica pica</i>	1	11:34	20	flight
561	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Corvus frugilegus</i>	2	11:36	30	flight
562	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Buteo rufinus</i>	2	11:40	100	soaring
563	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Pica pica</i>	1	11:49	1	on the tree
564	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Parus major</i>	2	12:03	3	on the tree
565	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Phoenicurus erythronotus</i>	2	12:17	2	on the tree
566	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Corvus frugilegus</i>	1	12:28	20	flight
567	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Pica pica</i>	2	12:38	1	on the tree
568	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Columba livia</i>	6	12:45	20	flight
569	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Cyanistes cyanus</i>	1	12:54	2	on the tree
570	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Pica pica</i>	1	13:06	20	flight
571	29.09.2024	VP07	42.465120°	76.126961°	11:20-13:20	Sunny	<i>Corvus frugilegus</i>	1	13:17	20	flight
572	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Cyanistes cyanus</i>	1	14:35	2	on the tree
573	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Pica pica</i>	1	14:44	20	flight
574	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Fulica atra</i>	12	14:51	0	on the water

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
575	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Cygnus olor</i>	3	15:0	0	on the water
576	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Larus cachinnans</i>	2	15:12	5	flight
577	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Pica pica</i>	1	15:18	20	flight
578	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Columba livia</i>	3	15:26	0	on the shore
579	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Spilopelia senegalensis</i>	2	15:34	0	on the shore
580	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Acridotheres tristis</i>	3	15:39	2	on the tree
581	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Motacilla personata</i>	1	15:40	0	on the shore
582	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Corvus frugilegus</i>	4	15:50	50	flight
583	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Parus major</i>	2	15:52	1	on the tree
584	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Regulus regulus</i>	1	16:01	1	on the tree
585	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Corvus frugilegus</i>	2	16:05	30	flight
586	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Columba livia</i>	8	16:13	50	flight
587	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Larus ridibundus</i>	2	16:23	0	on the water
588	29.09.2024	VP08	42.449183°	76.183739°	14:35-16:35	Sunny	<i>Tachybaptus ruficollis</i>	2	16:31	0	on the water
589	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Fulica atra</i>	12	06:59	0	on the water
590	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Larus ridibundus</i>	3	07:00	0	on the water
591	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Motacilla personata</i>	1	07:19	0	on the shore
592	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Motacilla alba</i>	2	07:19	0	on the shore
593	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Podiceps cristatus</i>	4	07:26	0	on the water
594	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Tachybaptus ruficollis</i>	4	07:26	0	on the water
595	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Podiceps nigricollis</i>	3	07:26	0	on the water
596	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Larus ridibundus</i>	2	07:39	0	on the shore
597	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Larus cachinnans</i>	1	08:00	5	flight
598	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Columba livia</i>	2	08:05	30	flight
599	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Acridotheres tristis</i>	2	08:19	30	flight
600	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Tringa totanus</i>	1	08:22	0	on the shore
601	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Pica pica</i>	2	08:25	50	flight
602	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Parus major</i>	1	08:30	1	on the tree
603	12.10.2024	VP08	42.449183°	76.183739°	06:55-08:55	Sunny	<i>Corvus frugilegus</i>	8	08:50	40	flight
604	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Galerida cristata</i>	5	09:10	0	on the ground
605	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Parus major</i>	1	09:14	1	on the tree

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
606	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Cyanistes cyanus</i>	1	09:21	1	on the tree
607	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Phylloscopus trochiloides</i>	1	09:33	1	on the tree
608	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	3	09:40	50	flight
609	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Pica pica</i>	1	09:50	30	flight
610	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Buteo rufinus</i>	1	10:03	100	soaring
611	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	2	10:20	20	flight
612	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Parus cinereus</i>	1	10:35	1	on the tree
613	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Pica pica</i>	2	10:47	1	on the tree
614	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Acridotheres tristis</i>	2	10:52	2	on the tree
615	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Corvus frugilegus</i>	3	11:02	50	flight
616	12.10.2024	VP07	42.465120°	76.126961°	09:10-11:10	Sunny	<i>Pica pica</i>	2	11:10	50	flight
617	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Pica pica</i>	2	11:15	50	flight
618	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Columba livia</i>	12	11:28	50	flight
619	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Columba livia</i>	3	11:34	30	flight
620	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Buteo rufinus</i>	1	11:44	100	soaring
621	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Pica pica</i>	2	12:02	20	flight
622	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Parus major</i>	1	12:20	1	on the bush
623	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Falco tinnunculus</i>	1	12:32	100	flight
624	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Pica pica</i>	1	12:50	30	flight
625	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Acridotheres tristis</i>	7	13:01	0	on the ground
626	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Pica pica</i>	3	13:10	20	flight
627	12.10.2024	VP06	42.469005°	76.015956°	11:15-13:15	Sunny	<i>Corvus frugilegus</i>	8	13:15	50	flight
628	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Pica pica</i>	1	14:30	20	flight
629	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Milvus migrans</i>	2	14:31	50	soaring
630	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Acridotheres tristis</i>	6	14:44	0	on the ground
631	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Passer montanus</i>	14	14:58	0	on the ground
632	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Pica pica</i>	1	15:10	30	flight
633	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Corvus frugilegus</i>	3	15:26	50	flight
634	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Circus aeruginosus</i>	1	15:34	30	flight
635	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Ardea alba</i>	1	15:41	20	flight
636	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Ardea cinerea</i>	1	15:50	20	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
637	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Columba livia</i>	3	16:02	20	flight
638	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Pica pica</i>	3	16:20	30	flight
639	12.10.2024	VP05	42.496796°	75.843678°	13:30-16:30	Sunny	<i>Corvus frugilegus</i>	1	16:28	50	flight
640	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Larus ridibundus</i>	2	07:01	0	on the water
641	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Larus canus</i>	1	07:12	0	on the water
642	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:12	20	flight
643	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Fulica atra</i>	17	07:13	0	on the water
644	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	4	07:28	30	flight
645	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Cygnus cygnus</i>	6	07:36	0	on the water
646	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Cygnus olor</i>	3	07:36	0	on the water
647	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Larus cachinnans</i>	1	07:45	10	flight
648	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Cyanistes cyanus</i>	1	08:00	1	on the tree
649	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Parus major</i>	1	08:17	1	on the tree
650	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Fulica atra</i>	9	08:20	0	on the water
651	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Tachybaptus ruficollis</i>	2	08:35	0	on the water
652	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	08:46	20	flight
653	13.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	08:58	30	flight
654	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Corvus frugilegus</i>	2	09:15	20	flight
655	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Pica pica</i>	2	09:28	20	flight
656	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Galerida cristata</i>	3	09:30	0	on the ground
657	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Columba livia</i>	6	09:45	50	flight
658	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Pica pica</i>	1	09:56	50	flight
659	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Milvus migrans</i>	1	10:08	100	soaring
660	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Falco cherrug</i>	1	10:19	100	flight
661	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Pica pica</i>	2	10:25	40	flight
662	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Parus major</i>	1	10:43	1	on the tree
663	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Acridotheres tristis</i>	2	10:58	20	flight
664	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Pica pica</i>	1	11:02	50	flight
665	13.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Cloudy	<i>Corvus frugilegus</i>	3	11:12	40	flight
666	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Aquila chrysaetos</i>	1	11:39	150	flight
667	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Pica pica</i>	2	12:02	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
668	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Columba livia</i>	2	12:19	50	flight
669	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Pica pica</i>	3	12:30	30	flight
670	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Corvus frugilegus</i>	2	12:44	30	flight
671	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Corvus frugilegus</i>	8	13:04	20	flight
672	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Pica pica</i>	1	13:19		flight
673	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Passer montanus</i>	12	13:21	0	on the ground
674	13.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Cloudy	<i>Corvus frugilegus</i>	6	13:31	50	flight
675	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Circus aeruginosus</i>	1	14:41	15	flight
676	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Corvus frugilegus</i>	3	14:53	30	flight
677	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Pica pica</i>	2	15:08	30	flight
678	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Phalacrocorax carbo</i>	1	15:27	40	flight
679	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Ardea alba</i>	1	15:32	50	flight
680	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Pica pica</i>	2	15:40	20	flight
681	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Corvus frugilegus</i>	1	15:51	10	flight
682	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Milvus migrans</i>	1	16:03	100	soaring
683	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Columba livia</i>	8	16:12	30	flight
684	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Columba livia</i>	2	16:21	20	flight
685	13.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Cloudy	<i>Corvus frugilegus</i>	2	16:37	0	on the ground
686	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Circus aeruginosus</i>	1	07:04	5	flight
687	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Pica pica</i>	2	07:17	30	flight
688	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Columba livia</i>	2	07:28	0	on the shore
689	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Fulica atra</i>	4	07:34	0	on the water
690	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Phalacrocorax carbo</i>	1	07:40	0	on the water
691	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Cygnus cygnus</i>	6	07:47	0	on the water
692	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Cygnus olor</i>	5	07:55	0	on the water
693	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Larus ridibundus</i>	3	08:04	0	on the water
694	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Motacilla alba</i>	2	08:12	0	on the shore
695	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Pica pica</i>	1	08:23	0	on the shore
696	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Tachybaptus ruficollis</i>	1	08:32	0	on the water
697	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Podiceps cristatus</i>	3	08:39	0	on the water
698	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Corvus frugilegus</i>	2	08:50	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
699	14.10.2024	VP08	42.449183°	76.183739°	07:00-09:00	Rain	<i>Passer domesticus</i>	9	08:56	2	on the tree
700	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Pica pica</i>	1	09:17	20	flight
701	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Corvus frugilegus</i>	2	09:28	30	flight
702	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Columba livia</i>	3	09:31	50	flight
703	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Pica pica</i>	1	09:40	30	flight
704	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Acridotheres tristis</i>	8	09:52	10	flight
705	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Passer montanus</i>	9	10:03	0	on the ground
706	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Columba livia</i>	2	10:20	30	flight
707	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Milvus migrans</i>	1	10:31	100	soaring
708	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Corvus frugilegus</i>	1	10:42	20	flight
709	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Corvus frugilegus</i>	5	10:54	30	flight
710	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Pica pica</i>	2	11:02	50	flight
711	14.10.2024	VP07	42.465120°	76.126961°	09:15-11:15	Rain	<i>Acridotheres tristis</i>	3	11:12	10	flight
712	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Corvus frugilegus</i>	2	11:36	40	flight
713	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Acridotheres tristis</i>	8	11:43	50	flight
714	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Pica pica</i>	2	11:54	10	flight
715	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Galerida cristata</i>	3	12:01	0	on the ground
716	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Falco tinnunculus</i>	1	12:02	100	soaring
717	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Pica pica</i>	2	12:18	50	flight
718	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Columba livia</i>	15	12:37	30	flight
719	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Buteo buteo</i>	1	12:40	150	soaring
720	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Pica pica</i>	2	12:51	30	flight
721	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Passer montanus</i>	8	13:02	0	on the ground
722	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Corvus frugilegus</i>	4	13:03	30	flight
723	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Pica pica</i>	1	13:19	20	flight
724	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Pica pica</i>	1	13:27	50	flight
725	14.10.2024	VP06	42.469005°	76.015956°	11:35-13:35	Rain	<i>Corvus frugilegus</i>	1	13:29	20	flight
726	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Buteo buteo</i>	1	14:44	100	soaring
727	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Pica pica</i>	2	14:45	20	flight
728	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Corvus frugilegus</i>	12	14:50	30	flight
729	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Columba livia</i>	26	15:03	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
730	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Phylloscopus trochiloides</i>	1	15:17	1	on the bush
731	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Parus major</i>	2	15:28	1	on the bush
732	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Corvus frugilegus</i>	4	15:42	20	flight
733	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Cyanistes cyanus</i>	2	15:43	0	on the ground
734	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Pica pica</i>	1	15:56	20	flight
735	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Acridotheres tristis</i>	3	16:03	0	on the ground
736	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Milvus migrans</i>	1	16:12	100	soaring
737	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Pica pica</i>	2	16:25	20	flight
738	14.10.2024	VP05	42.496796°	75.843678°	14:40-16:40	Rain	<i>Corvus frugilegus</i>	2	16:33	50	flight
739	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Corvus frugilegus</i>	1	06:55	20	flight
740	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Pica pica</i>	2	07:02	50	flight
741	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Troglodytes troglodytes</i>	1	07:12	0	on the ground
742	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Parus major</i>	1	07:25	1	on the tree
743	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Cyanistes cyanus</i>	1	07:37	1	on the tree
744	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Corvus frugilegus</i>	4	07:38	50	flight
745	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Columba livia</i>	19	07:46	50	flight
746	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Pica pica</i>	3	07:54	20	flight
747	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Acridotheres tristis</i>	7	08:03	0	on the ground
748	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Passer montanus</i>	18	08:15	0	on the ground
749	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Corvus frugilegus</i>	2	08:26	20	flight
750	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Corvus frugilegus</i>	7	08:30	30	flight
751	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Pica pica</i>	3	08:44	100	flight
752	15.10.2024	VP04	42.577462°	75.802566°	06:55-08:55	Rain	<i>Parus major</i>	1	08:55	1	on the tree
753	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Pica pica</i>	1	09:10	20	flight
754	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Corvus frugilegus</i>	2	09:16	50	flight
755	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Cyanistes cyanus</i>	2	09:17	10	on the slope
756	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Corvus frugilegus</i>	1	09:29	30	flight
757	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Milvus migrans</i>	2	09:34	100	soaring
758	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Columba livia</i>	25	09:40	100	flight
759	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Gypaetus barbatus</i>	1	09:56	200	soaring
760	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Pica pica</i>	2	10:12	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
761	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Corvus frugilegus</i>	3	10:19	50	flight
762	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Passer montanus</i>	19	10:28	0	on the ground
763	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Phoenicurus erythronotus</i>	1	10:38	1	on the tree
764	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Pica pica</i>	2	10:50	20	flight
765	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Buteo rufinus</i>	1	11:04	100	soaring
766	15.10.2024	VP03	42.623138°	75.828866°	09:10-10:10	Rain	<i>Pica pica</i>	4	11:10	50	flight
767	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	1	11:16	30	flight
768	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Turdus merula</i>	2	11:28	1	on the bush
769	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	3	11:39	20	flight
770	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	2	11:46	30	flight
771	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Columba livia</i>	17	12:03	50	flight
772	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Gyps himalayensis</i>	2	12:19	300	soaring
773	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Gyps himalayensis</i>	1	12:38	200	flight
774	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	4	12:44	30	flight
775	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Aegypius monachus</i>	1	12:46	300	soaring
776	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Pica pica</i>	2	12:56	20	flight
777	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Corvus frugilegus</i>	4	13:12	50	flight
778	15.10.2024	VP02	42.690571°	75.884568°	11:15-13:15	Cloudy	<i>Turdus merula</i>	1	13:14	0	on the ground
779	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Pica pica</i>	1	14:36	30	flight
780	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Milvus migrans</i>	2	14:37	100	soaring
781	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Pica pica</i>	2	14:44	20	flight
782	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Corvus frugilegus</i>	3	14:52	30	flight
783	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Cyanistes cyanus</i>	1	15:03	0	on the ground
784	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Columba livia</i>	4	15:20	40	flight
785	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Columba livia</i>	18	15:34	30	flight
786	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Pica pica</i>	3	15:42	50	flight
787	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Corvus frugilegus</i>	4	15:54	20	flight
788	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Passer montanus</i>	9	16:08	0	on the ground
789	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Acridotheres tristis</i>	2	16:20	0	on the ground
790	15.10.2024	VP01	42.713709°	75.843865°	14:30-16:30	Cloudy	<i>Corvus frugilegus</i>	28	16:26	50	flight
791	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:09	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
792	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	07:14	30	flight
793	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	07:19	20	flight
794	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Passer montanus</i>	8	07:23	0	on the ground
795	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea alba</i>	1	07:24	10	flight
796	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea cinerea</i>	1	07:40	10	flight
797	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:47	50	flight
798	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	5	08:02	1	on the tree
799	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Parus major</i>	2	08:04	2	on the tree
800	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Phalacrocorax carbo</i>	1	08:14	30	flight
801	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Columba livia</i>	9	08:15	50	flight
802	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	18	08:28	100	flight
803	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Aquila chrysaetos</i>	1	08:44	200	flight
804	16.10.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	08:55	20	flight
805	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Passer montanus</i>	12	09:23	15	on the slope
806	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Pica pica</i>	3	09:33	30	flight
807	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Corvus frugilegus</i>	5	09:40	50	flight
808	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Corvus frugilegus</i>	2	09:45	20	flight
809	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Corvus frugilegus</i>	1	09:54	30	flight
810	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Acridotheres tristis</i>	2	09:55	20	flight
811	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Cyanistes cyanus</i>	1	10:09	5	on the slope
812	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Parus major</i>	1	10:20	0	on the ground
813	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Galerida cristata</i>	4	10:33	0	on the ground
814	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Columba livia</i>	2	10:45	30	on the slope
815	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Streptopelia decaocto</i>	3	10:56	20	on the slope
816	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Pica pica</i>	3	11:02	30	flight
817	16.10.2024	VP03	42.623138°	75.828866°	09:20-12:20	Cloudy	<i>Gyps himalayensis</i>	1	11:14	200	flight
818	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Gyps himalayensis</i>	1	11:45	200	soaring
819	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Gyps himalayensis</i>	2	11:54	300	soaring
820	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	7	12:03	30	flight
821	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Pica pica</i>	2	12:23	50	flight
822	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Turdus merula</i>	1	12:34	20	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
823	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Aquila nipalensis</i>	1	12:40	200	flight
824	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Pica pica</i>	2	12:54	20	on the slope
825	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Pica pica</i>	1	13:01	20	flight
826	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Galerida cristata</i>	4	13:09	0	on the ground
827	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Pica pica</i>	2	13:13	100	flight
828	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Columba livia</i>	12	13:25	100	flight
829	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	1	13:30	20	flight
830	16.10.2024	VP02	42.690571°	75.884568°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	5	13:33	50	flight
831	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Columba livia</i>	3	14:00	20	flight
832	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Pica pica</i>	1	14:19	30	flight
833	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Galerida cristata</i>	5	14:28	0	on the ground
834	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Corvus frugilegus</i>	12	14:40	50	flight
835	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Corvus frugilegus</i>	2	14:56	30	flight
836	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Cyanistes cyanus</i>	1	15:02	0	on the ground
837	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Parus major</i>	1	15:16	0	on the ground
838	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Milvus migrans</i>	1	15:27	100	soaring
839	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Pica pica</i>	1	15:33	50	flight
840	16.10.2024	VP01	42.713709°	75.843865°	14:00-16:00	Cloudy	<i>Acridotheres tristis</i>	2	15:48	50	flight
841	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Pica pica</i>	1	07:06	30	flight
842	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Pica pica</i>	1	07:19	20	flight
843	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Acridotheres tristis</i>	3	07:29	0	on the ground
844	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Passer montanus</i>	20	07:39	10	flight
845	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Corvus frugilegus</i>	2	07:44	30	flight
846	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Columba livia</i>	3	07:57	50	flight
847	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Columba livia</i>	17	08:10	100	flight
848	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Corvus frugilegus</i>	2	08:19	40	flight
849	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Pica pica</i>	2	08:26	30	flight
850	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Milvus migrans</i>	2	08:35	20	flight
851	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Corvus frugilegus</i>	1	08:50	0	on the ground
852	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Milvus migrans</i>	1	09:03	100	soaring
853	17.10.2024	VP01	42.713709°	75.843865°	07:00-09:30	Rain	<i>Corvus frugilegus</i>	2	09:22	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
854	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Pica pica</i>	2	10:03	20	flight
855	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Corvus frugilegus</i>	2	10:15	20	flight
856	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Columba livia</i>	1	10:32	30	flight
857	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Aquila nipalensis</i>	2	10:47	200	sitting on the rock
858	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Pica pica</i>	3	10:56	30	flight
859	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Corvus frugilegus</i>	3	11:08	20	flight
860	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Turdus merula</i>	2	11:12	1	on the bush
861	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Columba livia</i>	3	11:20	50	flight
862	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Milvus migrans</i>	2	11:29	100	flight
863	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Pica pica</i>	2	11:40	30	flight
864	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Corvus frugilegus</i>	2	11:47	50	flight
865	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Passer montanus</i>	8	11:52	0	on the ground
866	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Acridotheres tristis</i>	2	12:10	10	flight
867	17.10.2024	VP02	42.690571°	75.884568°	10:00-12:30	Rain	<i>Corvus frugilegus</i>	18	12:21	50	flight
868	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Columba livia</i>	3	12:44	30	flight
869	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Columba livia</i>	2	12:55	20	flight
870	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Pica pica</i>	1	13:09	10	on the slope
871	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	1	13:21	30	flight
872	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Milvus migrans</i>	2	13:32	150	soaring
873	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	1	13:40	40	flight
874	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Gyps himalayensis</i>	1	13:50	300	soaring
875	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Gyps himalayensis</i>	2	13:54	250	flight
876	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Pica pica</i>	2	14:01	30	flight
877	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	5	14:13	20	flight
878	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Cyanistes cyanus</i>	1	14:25	0	on the ground
879	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Columba livia</i>	8	14:30	20	flight
880	17.10.2024	VP03	42.623138°	75.828866°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	3	14:38	0	on the ground
881	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:02	20	flight
882	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Fringilla coelebs</i>	12	07:16	0	on the ground
883	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	15	07:20	50	flight
884	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Columba livia</i>	6	07:29	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
885	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Columba livia</i>	3	07:37	100	flight
886	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:50	30	flight
887	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	1	07:56	20	flight
888	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	9	08:03	50	flight
889	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Passer montanus</i>	1	08:12	0	on the ground
890	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	08:28	30	flight
891	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	08:29	50	flight
892	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Milvus migrans</i>	1	08:30	100	soaring
893	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	08:44	20	flight
894	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Cyanistes cyanus</i>	1	08:45	1	on the bush
895	01.11.2024	VP01	42.713709°	75.843865°	07:00-09:00	Cloudy	<i>Parus major</i>	2	08:54	0	on the ground
896	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Pica pica</i>	2	09:20	30	flight
897	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	09:31	50	flight
898	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Passer montanus</i>	3	09:38	0	on the ground
899	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Galerida cristata</i>	5	09:44	0	on the ground
900	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Pica pica</i>	1	09:50	50	flight
901	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Corvus frugilegus</i>	1	09:54	100	flight
902	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Columba livia</i>	7	10:06	50	flight
903	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Turdus merula</i>	1	10:17	0	on the ground
904	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Turdus merula</i>	1	10:23	0	on the ground
905	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Pica pica</i>	1	10:33	0	on the ground
906	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	10:40	30	flight
907	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Buteo japonicus</i>	1	10:44	150	flight
908	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Pica pica</i>	2	10:47	40	flight
909	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Pica pica</i>	1	10:55	20	flight
910	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Corvus frugilegus</i>	1	11:02	10	flight
911	01.11.2024	VP02	42.690571°	75.884568°	9:20-11:20	Cloudy	<i>Columba livia</i>	2	11:10	0	on the ground
912	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Columba livia</i>	2	11:45	30	flight
913	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Cyanistes cyanus</i>	1	11:52	0	on the ground
914	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Parus major</i>	1	12:06	0	on the ground
915	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	3	12:20	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
916	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Columba livia</i>	7	12:35	50	flight
917	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Columba livia</i>	19	12:40	50	flight
918	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Gyps himalayensis</i>	1	12:50	200	soaring
919	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Streptopelia decaocto</i>	2	13:01	20	flight
920	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Pica pica</i>	1	13:14	40	flight
921	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	1	13:19	30	flight
922	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Gyps himalayensis</i>	1	13:23	200	flight
923	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Corvus frugilegus</i>	1	13:28	40	flight
924	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Buteo japonicus</i>	1	13:30	100	flight
925	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Pica pica</i>	2	13:32	20	flight
926	01.11.2024	VP03	42.623138°	75.828866°	11:40-13:40	Cloudy	<i>Columba livia</i>	1	13:34	0	on the ground
927	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	14:01	1	on the tree
928	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Parus major</i>	1	14:12	2	on the tree
929	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	3	14:17	1	on the tree
930	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	1	14:22	20	flight
931	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	14:27	30	flight
932	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	14:34	50	flight
933	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Passer montanus</i>	18	14:45	1	on the tree
934	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Phalacrocorax carbo</i>	1	14:50	30	flight
935	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea cinerea</i>	2	15:12	30	flight
936	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea cinerea</i>	1	15:25	20	flight
937	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	1	15:37	30	flight
938	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	15:38	20	flight
939	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Cyanistes cyanus</i>	1	15:41	1	on the tree
940	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Parus major</i>	2	15:52	2	on the tree
941	01.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	16:00	40	flight
942	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Pica pica</i>	1	07:10	40	flight
943	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Corvus frugilegus</i>	2	07:29	30	flight
944	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Columba livia</i>	3	07:40	20	flight
945	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Corvus frugilegus</i>	2	07:56	30	flight
946	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Pica pica</i>	1	08:10	50	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
947	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Columba livia</i>	4	08:12	50	flight
948	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Milvus migrans</i>	1	08:28	100	flight
949	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Corvus frugilegus</i>	2	08:39	20	flight
950	02.11.2024	VP05	42.496796°	75.843678°	07:10-09:10	Rain	<i>Pica pica</i>	2	08:59	15	flight
951	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Buteo japonicus</i>	1	09:30	150	soaring
952	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Pica pica</i>	2	09:45	30	flight
953	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Corvus frugilegus</i>	5	09:54	30	flight
954	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Columba livia</i>	8	10:08	50	flight
955	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Aquila chrysaetos</i>	1	10:19	200	flight
956	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Pica pica</i>	2	10:26	30	flight
957	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Pica pica</i>	3	10:40	20	flight
958	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Corvus frugilegus</i>	2	10:55	30	flight
959	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Columba livia</i>	8	11:12	50	flight
960	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Corvus frugilegus</i>	1	11:22	50	flight
961	02.11.2024	VP06	42.469005°	76.015956°	09:30-11:30	Rain	<i>Corvus frugilegus</i>	1	11:30	50	flight
962	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Galerida cristata</i>	4	11:54	0	on the ground
963	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Pica pica</i>	2	12:07	20	flight
964	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Corvus frugilegus</i>	1	12:19	30	flight
965	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Passer montanus</i>	6	12:30	0	on the ground
966	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Acridotheres tristis</i>	4	12:49	0	on the ground
967	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Pica pica</i>	2	13:01	20	flight
968	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Pica pica</i>	2	13:12	0	on the ground
969	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Parus major</i>	1	13:20	0	on the ground
970	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Cyanistes cyanus</i>	1	13:21	10	on the slope
971	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Pica pica</i>	2	13:29	20	flight
972	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Columba livia</i>	2	13:34	30	flight
973	02.11.2024	VP07	42.465120°	76.126961°	11:50-13:50	Rain	<i>Corvus frugilegus</i>	1	13:50	50	flight
974	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Fulica atra</i>	16	14:20	0	on the water
975	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Podiceps cristatus</i>	3	14:36	0	on the water
976	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Anas platyrhynchos</i>	4	14:44	0	on the water
977	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Tachybaptus ruficollis</i>	2	14:52	0	on the water

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
978	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Larus ridibundus</i>	6	15:03	0	on the water
979	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Cygnus cygnus</i>	16	15:09	0	on the water
980	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Pica pica</i>	2	15:19	0	on the shore
981	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Columba livia</i>	4	15:29	20	flight
982	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Cygnus olor</i>	7	15:40	0	on the water
983	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Parus major</i>	1	15:49	0	on the shore
984	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Cyanistes cyanus</i>	2	16:02	1	on the tree
985	02.11.2024	VP08	42.449183°	76.183739°	14:20-16:20	Cloudy	<i>Mareca penelope</i>	9	16:09	0	on the water
986	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	1	07:02	20	flight
987	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	8	07:09	40	flight
988	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	12	07:19	30	flight
989	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	07:30	50	flight
990	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	3	07:45	10	flight
991	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Columba livia</i>	9	07:50	20	flight
992	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	3	08:15	30	flight
993	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Passer montanus</i>	14	08:26	0	on the ground
994	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Pica pica</i>	2	08:44	20	flight
995	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	08:51	10	flight
996	03.11.2024	VP05	42.496796°	75.843678°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	1	09:00	50	flight
997	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	09:20	20	flight
998	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Buteo japonicus</i>	1	09:29	100	soaring
999	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Alectoris chukar</i>	2	09:36	0	on the ground
1000	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Columba livia</i>	1	09:44	50	flight
1001	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Streptopelia decaocto</i>	2	09:52	20	flight
1002	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Galerida cristata</i>	8	10:10	0	on the ground
1003	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Pica pica</i>	1	10:12	20	flight
1004	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	12	10:25	30	flight
1005	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	10:30	50	flight
1006	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Columba livia</i>	17	10:34	30	flight
1007	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Pica pica</i>	2	10:45	20	flight
1008	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	11:00	100	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1009	03.11.2024	VP06	42.469005°	76.015956°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	1	11:13	50	flight
1010	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Pica pica</i>	1	12:41	100	flight
1011	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Buteo japonicus</i>	1	12:35	150	soaring
1012	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	3	12:41	10	on the slope
1013	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Cyanistes cyanus</i>	1	12:47	0	on the ground
1014	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Parus cinereus</i>	1	12:54	1	on the tree
1015	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Parus major</i>	2	12:56	2	on the tree
1016	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	3	13:00	20	flight
1017	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Columba livia</i>	10	13:16	50	flight
1018	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Streptopelia decaocto</i>	2	13:30	20	flight
1019	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Pica pica</i>	3	13:32	100	flight
1020	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	3	13:44	20	flight
1021	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	10	13:52	50	flight
1022	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Pica pica</i>	2	14:02	30	flight
1023	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Passer montanus</i>	12	14:10	0	on the ground
1024	03.11.2024	VP07	42.465120°	76.126961°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	5	14:16	50	flight
1025	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Mareca penelope</i>	5	15:00	0	on the water
1026	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Tadorna ferruginea</i>	12	15:01	0	on the water
1027	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Fulica atra</i>	17	15:01	0	on the water
1028	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Cygnus cygnus</i>	8	15:01	0	on the water
1029	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Cygnus olor</i>	5	15:02	0	on the water
1030	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Podiceps cristatus</i>	5	15:02	0	on the water
1031	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Tachybaptus ruficollis</i>	1	15:16	0	on the water
1032	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Podiceps nigricollis</i>	5	15:41	0	on the water
1033	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Larus ridibundus</i>	8	15:45	0	on the water
1034	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Larus ridibundus</i>	2	15:50	0	on the water
1035	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Pica pica</i>	1	16:08	0	on the shore
1036	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Corvus frugilegus</i>	8	16:21	20	flight
1037	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Columba livia</i>	9	16:30	30	flight
1038	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Sturnus vulgaris</i>	20	16:43	50	soaring
1039	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Passer domesticus</i>	3	16:44	0	on the shore

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1040	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Pica pica</i>	1	16:50	20	flight
1041	03.11.2024	VP08	42.449183°	76.183739°	15:00-17:00	Cloudy	<i>Columba livia</i>	26	16:55	100	flight
1042	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Cygnus olor</i>	7	07:00	0	on the water
1043	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Cygnus cygnus</i>	4	07:10	0	on the water
1044	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Fulica atra</i>	15	07:16	0	on the water
1045	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Podiceps cristatus</i>	2	07:20	0	on the water
1046	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Tadorna ferruginea</i>	3	07:26	0	on the water
1047	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Anas platyrhynchos</i>	4	07:33	0	on the water
1048	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Tringa totanus</i>	1	07:45	0	on the shore
1049	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Tachybaptus ruficollis</i>	2	07:51	0	on the water
1050	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Podiceps nigricollis</i>	9	08:01	0	on the water
1051	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Pica pica</i>	2	08:07	20	flight
1052	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Accipiter nisus</i>	1	08:14	50	flight
1053	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Pica pica</i>	1	08:17	20	flight
1054	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	8	08:21	50	flight
1055	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Columba livia</i>	7	08:22	30	flight
1056	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Pica pica</i>	2	08:36	20	flight
1057	10.11.2024	VP08	42.449183°	76.183739°	07:00-09:00	Sunny	<i>Corvus frugilegus</i>	2	08:57	0	on the shore
1058	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Corvus frugilegus</i>	1	09:21	20	flight
1059	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Pica pica</i>	3	09:37	50	flight
1060	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Cyanistes cyanus</i>	1	09:50	5	flight
1061	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Buteo japonicus</i>	1	10:01	150	soaring
1062	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Pica pica</i>	2	10:15	1	on the tree
1063	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Fringilla coelebs</i>	12	10:25	2	on the tree
1064	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Fringilla montifringilla</i>	8	10:33	1	on the tree
1065	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Corvus frugilegus</i>	2	10:36	20	flight
1066	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Columba livia</i>	4	10:44	40	flight
1067	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Pica pica</i>	1	10:50	30	flight
1068	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Corvus frugilegus</i>	1	10:52	50	flight
1069	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Cyanistes cyanus</i>	1	11:02	1	on the tree
1070	10.11.2024	VP07	42.465120°	76.126961°	09:20-11:20	Sunny	<i>Corvus frugilegus</i>	9	11:17	30	flight

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1071	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Columba livia</i>	12	12:41	20	flight
1072	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Columba livia</i>	3	12:52	30	flight
1073	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Corvus frugilegus</i>	5	13:02	50	flight
1074	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Pica pica</i>	1	13:20	10	flight
1075	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Aquila chrysaetos</i>	1	13:38	300	flight
1076	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Columba livia</i>	3	13:47	20	flight
1077	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Pica pica</i>	2	14:01	10	flight
1078	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Galerida cristata</i>	6	14:16	0	on the ground
1079	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Pica pica</i>	1	14:27	20	flight
1080	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Corvus frugilegus</i>	2	14:35	0	on the ground
1081	10.11.2024	VP06	42.469005°	76.015956°	12:40-14:40	Sunny	<i>Corvus frugilegus</i>	8	14:40	20	flight
1082	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Corvus frugilegus</i>	1	15:01	10	flight
1083	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Corvus frugilegus</i>	5	15:20	20	flight
1084	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Columba livia</i>	9	15:38	20	flight
1085	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Pica pica</i>	2	15:50	50	flight
1086	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Pica pica</i>	1	16:01	20	flight
1087	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Columba livia</i>	3	16:11	100	flight
1088	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Passer montanus</i>	10	16:20	0	on the ground
1089	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Pica pica</i>	2	16:34	20	flight
1090	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Galerida cristata</i>	4	16:40	0	on the ground
1091	10.11.2024	VP05	42.496796°	75.843678°	15:00-17:00	Sunny	<i>Corvus frugilegus</i>	3	16:54	50	flight
1092	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	07:01	20	flight
1093	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	3	07:15	10	flight
1094	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Passer montanus</i>	12	07:24	0	on the ground
1095	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	7	07:35	50	flight
1096	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Columba livia</i>	15	07:46	100	flight
1097	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	07:56	20	flight
1098	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Acridotheres tristis</i>	1	08:15	1	on the tree
1099	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	2	08:25	20	flight
1100	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Parus major</i>	2	08:37	2	on the tree
1101	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Cyanistes cyanus</i>	1	08:38	1	on the tree

N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1102	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Parus cinereus</i>	1	08:41	50	flight
1103	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Pica pica</i>	1	08:50	50	flight
1104	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea alba</i>	1	08:54	30	flight
1105	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Ardea cinerea</i>	1	08:56	20	flight
1106	11.11.2024	VP04	42.577462°	75.802566°	07:00-09:00	Cloudy	<i>Corvus frugilegus</i>	5	09:00	50	flight
1107	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Pica pica</i>	1	09:23	20	flight
1108	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	8	09:27	30	flight
1109	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	09:40	30	flight
1110	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Columba livia</i>	14	09:55	30	flight
1111	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Pica pica</i>	1	10:04	40	flight
1112	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Gypaetus barbatus</i>	1	10:05	50	flight
1113	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	5	10:17	50	flight
1114	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	2	10:28	100	flight
1115	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Turdus merula</i>	1	10:37	20	flight
1116	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Passer montanus</i>	5	10:50	0	on the ground
1117	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Gyps himalayensis</i>	1	10:53	200	soaring
1118	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Corvus frugilegus</i>	3	11:07	20	flight
1119	11.11.2024	VP03	42.623138°	75.828866°	09:20-11:20	Cloudy	<i>Pica pica</i>	1	11:17	30	flight
1120	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	2	12:42	20	flight
1121	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Columba livia</i>	7	12:55	30	flight
1122	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	1	13:01	30	flight
1123	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Passer montanus</i>	4	13:12	10	flight
1124	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Milvus migrans</i>	1	13:13	100	soaring
1125	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	4	13:20	20	flight
1126	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Turdus merula</i>	2	13:34	0	on the ground
1127	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Columba livia</i>	17	13:51	100	flight
1128	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	3	14:02	10	flight
1129	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Pica pica</i>	1	14:12	20	flight
1130	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Milvus migrans</i>	1	14:21	150	flight
1131	11.11.2024	VP02	42.690571°	75.884568°	12:40-14:40	Cloudy	<i>Corvus frugilegus</i>	1	14:30	30	flight

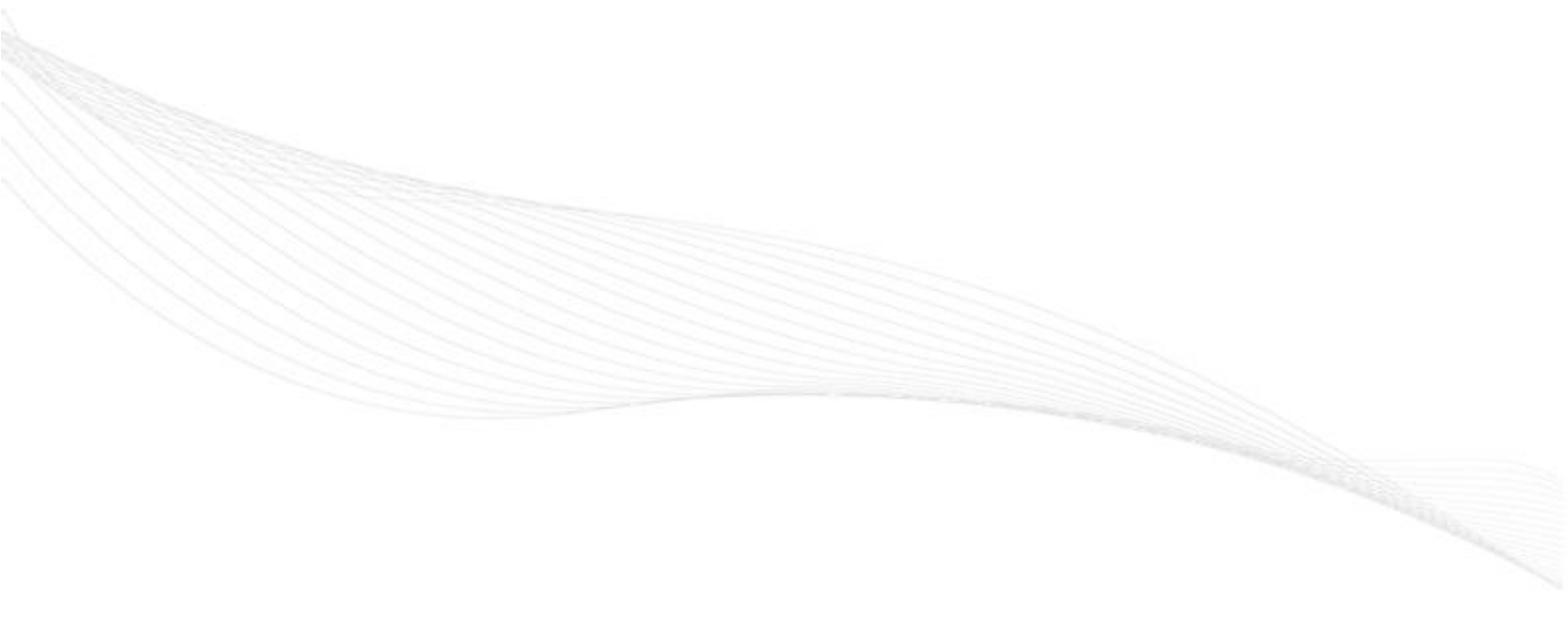
N	Date	VP	N	E	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1132	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Corvus frugilegus</i>	1	15:00	30	flight
1133	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Pica pica</i>	2	15:08	20	flight
1134	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Galerida cristata</i>	5	15:20	0	on the ground
1135	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Pica pica</i>	1	15:31	40	flight
1136	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Acridotheres tristis</i>	6	15:40	0	on the ground
1137	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Columba livia</i>	15	15:54	50	flight
1138	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Pica pica</i>	3	16:02	100	flight
1139	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Sturnus vulgaris</i>	19	16:16	30	flight
1140	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Columba livia</i>	1	16:21	20	flight
1141	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Pica pica</i>	1	16:30	40	flight
1142	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Buteo japonicus</i>	1	16:32	200	flight
1143	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Pica pica</i>	2	16:43	20	flight
1144	11.11.2024	VP01	42.713709°	75.843865°	15:00-17:00	Cloudy	<i>Milvus migrans</i>	1	16:54	150	soaring

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Technical appendix 13:

VP Bird Monitoring report (Spring 2024)



VP Bird Monitoring Report

Spring 2024

**48 km Kemin — Balykchy
Interconnection (500 kV)
Project**

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Table of Content

1.	4	
2.	8	
3.	9	
4.	16	
5.	18	
6.	19	
Annex 1. Photo materials on species	17	
Annex 2. Results of the observation	18	

Table of Figures

Figure 1. Project features	5
Figure 2. 48 km Kemin-Balykchi Interconnection (500kV)	5
Figure 3. Elevation profile of the current layout of the OHTL	6
Figure 4. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site	7
Figure 5. IBA “Western Issyk Kul Lake”	7
Figure 6. Vantage points	8
Figure 7. Threatened species observed during the survey.	12
Figure 8. Frequency of meetings with threatened bird species per vantage point	13
Figure 9. <i>Aquila chrysaetos</i>	17
Figure 10. <i>Ciconia nigra</i>	17
Figure 11. <i>Gypaetus barbatus</i>	17
Figure 12. <i>Gyps himalayensis</i>	17

Table of Tables

Table 1. Schedule of the survey and effort level (hours)	8
Table 2. Vantage points coordinates	9
Table 3. Species observed on the project site	9
Table 4. Species included in the Kyrgyzstan Red Data Book IUCN X and above and distribution by points	12
Table 5. Summary of meetings with species included in the Kyrgyz RDB and IUCN as VU and above.	13
Table 6. Primary data	18

1. Introduction

Overhead transmission lines (OHTL) can cause fatal collisions for birds, especially for bustards, cranes, and large bodied waterbirds. These structures are also associated with bird electrocutions, primarily affecting raptors, vultures, and other large birds that tend to perch and/or nest on towers. The risk of electrocution is particularly high when pylons are constructed with hazardous designs and situated in high-risk areas. For high voltage OHTL, risks of bird collisions are considered to be high, but bird electrocution risk is generally considered to be low, as industry-standard designs generally have wide spacing of electrified parts, and conductors suspended below, rather than above support structures.,

The proposed (500kV) Kemin — Balykchi Interconnection (or the “Project”) is a 48 km stretch of OHTL that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built in Balykchy (Figure 1- 2). This line is located close to Issyk-Kul Lake, which is designated Ramsar site (Figure 3) and the eastern part of Issyk-Kul Lake was designated as IBA “Eastern Issyk-Kul Lake” in 2006 (Figure 4).

This report presents the results of ornithological monitoring conducted for the primary purpose of characterizing the species composition of bird species that are potentially susceptible to OHTL collision and/or electrocution impacts within the project's area of influence.

These surveys assessed the abundance and spatial distribution of bird species, the nature of the stay, daily activity of birds during spring migration and the beginning of nesting, additionally to identify bird species of conservation concern, as listed in the IUCN Red List and the Kyrgyzstan Red Book.

This report presents the primary materials from bird Vantage Point (VP) surveys conducted in the territory during March, April, and May 2024.

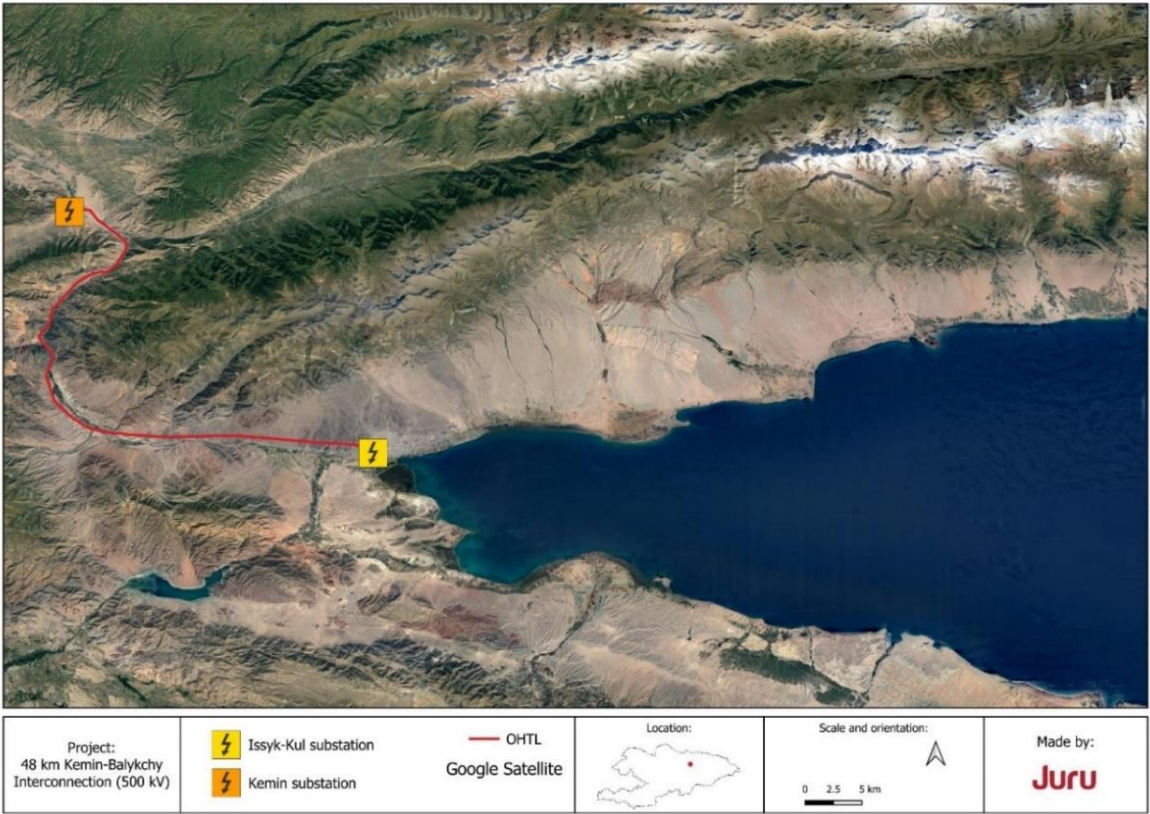


Figure 1. Project features

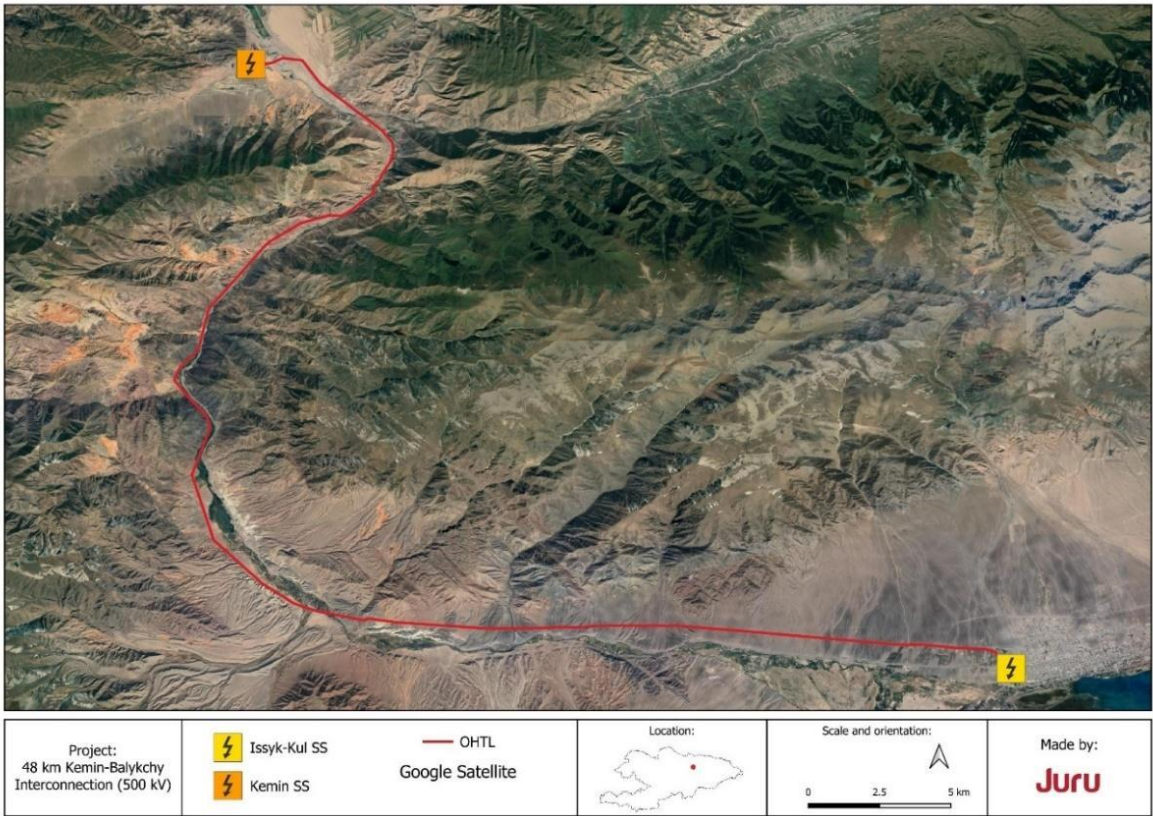


Figure 2. 48 km Kemin-Balykchi Interconnection (500kV)

The initial 48 kilometre route shown is only a preliminary and not a final version of the OHTL route, as is the currently stated length of the proposed OHTL - 57 km with an elevation difference of 759 metres. The proposed OHTL runs across several habitats: semi-desert, rocky desert, gorges, floodplain, foothills (adyrs) and gardens. It passes through the Boom Gorge, crosses the Chu River several times, and runs near the existing OHTL.

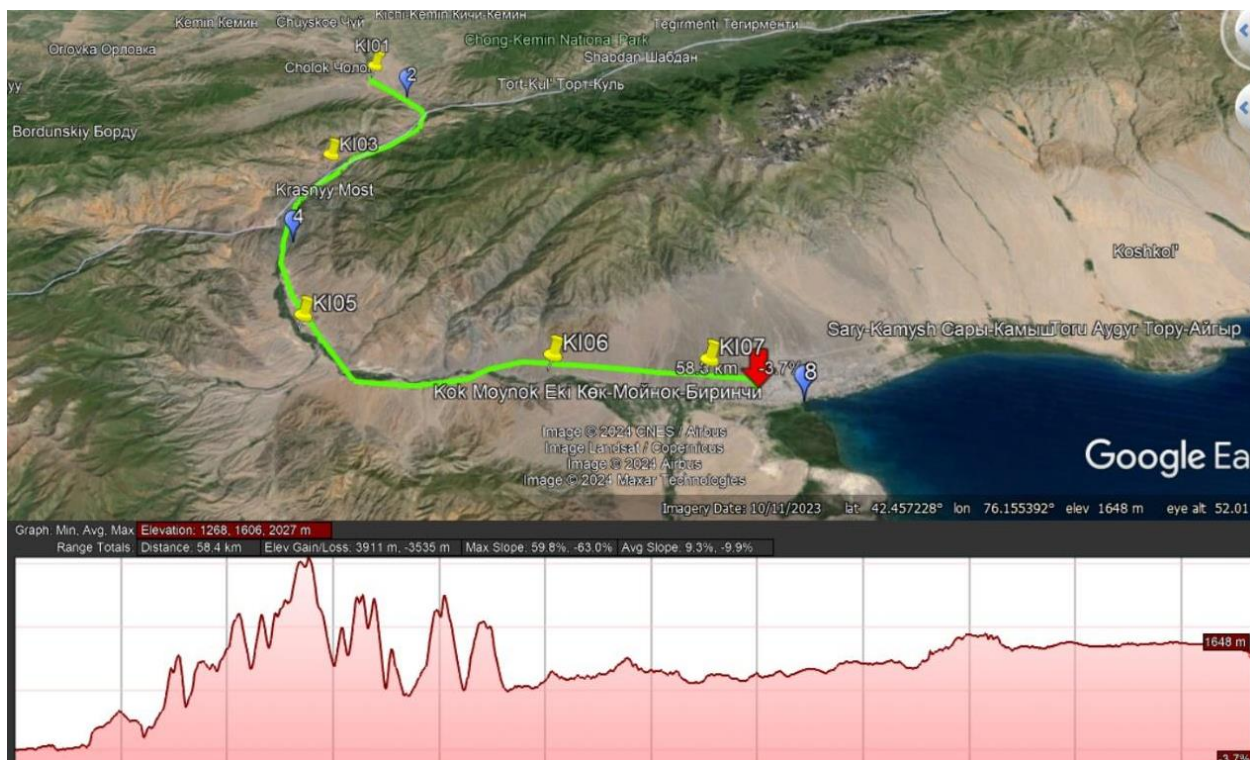


Figure 3. Elevation profile of the current layout of the OHTL

The line is located less than 2 km from Issyk-Kul Lake (Figure 4), which is designated as a Ramsar site¹. Additionally western part of Issyk Kul Lake was designated as Important bird area (hereinafter IBA) "Western Issyk Kul Lake" in 2006 (Figure 5). This IBA hosts 267 bird species and is important as breeding territory of Pallas's sandgrouse (*Syrhaptes paradoxus*), Saker falcon (*Falco cherrug*), and wintering waterbird species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*), as well as wintering waterbird aggregation site². According to historical data every year from 25 to 80 thousand individuals of 30 bird species winter in this area. Foothill zone of the surrounding mountains hosts Saker falcon, Golden eagle, Egyptian vulture and other vultures.

¹ Ramsar Sites Information Service 2024 <https://rsis.ramsar.org/rs/1231>

² BirdLife International (2024) Important Bird Area factsheet: Western Issyk Kul Lake. Downloaded from <https://datazone.birdlife.org/site/factsheet/western-issyk-kul-lake-iba-kyrgyzstan> on 23/07/2024.

2. Materials and methods

Throughout the spring survey period, which extended from March 27 to May 10, 2024, eight 2.5-hour VP surveys were conducted at eight VPs in representative habitats (Figure 6). The points were located to cover the OHTL as completely as possible (Table 2).

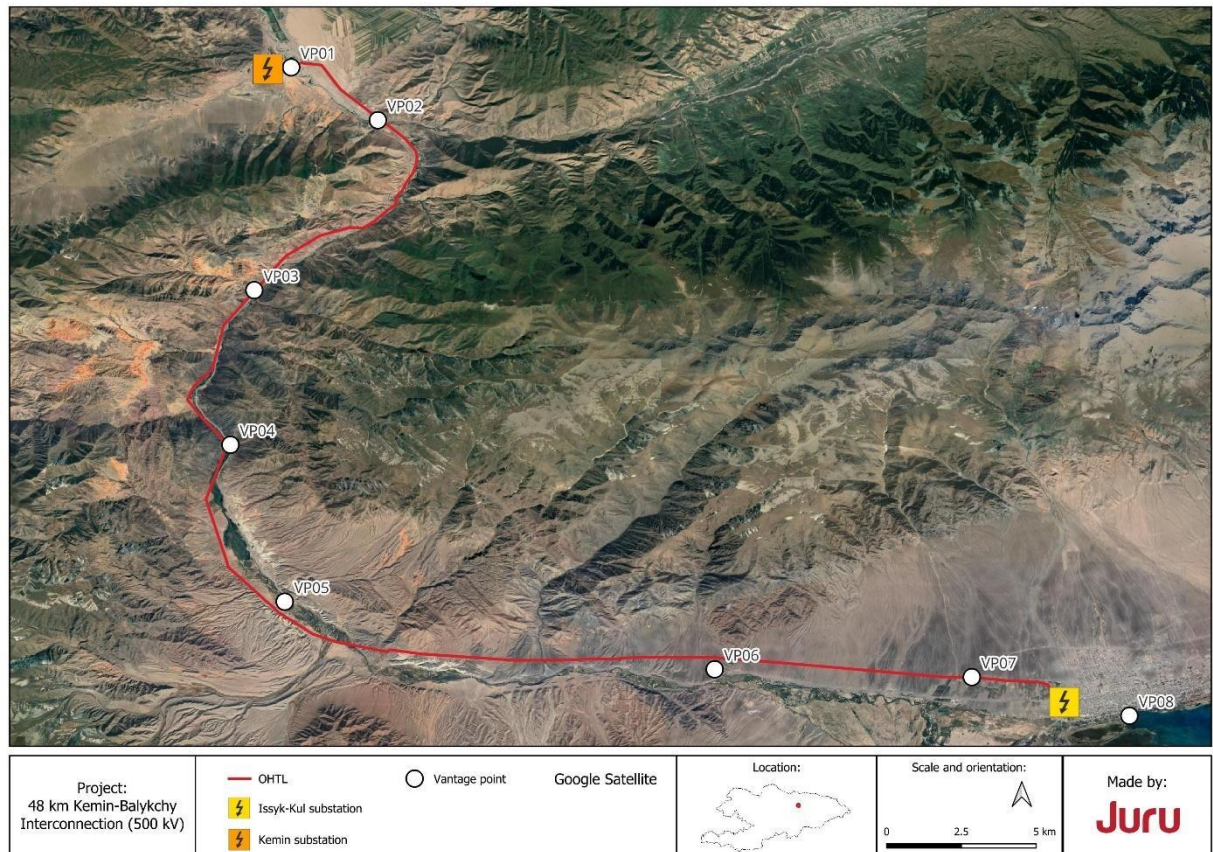


Figure 6. Vantage points

On an average day, one to four VP surveys were completed, resulting in a total of 20 survey hours per VP location, or 160 total hours of VP survey over the course of the season (Table 1).

The VP survey methods followed the guidelines outlined by Scottish Natural Heritage (SNH) in 2017³ for bird assessment. While industry-standard collision risk modelling methods using VP survey data as inputs have only been developed for modelling collisions of birds with wind turbines, VP surveys are, nonetheless, the standard, and most suitable survey methodology for characterising the use of airspace by key bird groups that can be impacted by powerlines, including raptors, vultures, migrating waterbirds, and others. These surveys aimed to monitor sensitive bird species within the survey area, gathering valuable data on their presence, behaviour, and abundance.

³ Scottish Natural Heritage (SNH) 2017, Recommended bird survey methods to inform impact assessment of onshore wind farms. March 2017 version 2, Scotland, UK.

Table 1: Schedule of the survey and effort level (hours)

Date/ VP	March		April												May				Total hours
	27	31	01	02	05	06	09	12	13	14	26	27	28	29	07	08	09	10	
VP01	2.5		2.5		2.5		2.5	2.5		2.5		2.5					2.5		20
VP02	2.5		2.5		2.5			2.5		2.5		2.5				2.5	2.5		20
VP03	2.5		2.5		2.5			2.5		2.5		2.5				2.5	2.5		20
VP04		2.5	2.5		2.5			2.5		2.5			2.5			2.5	2.5		20
VP05	2.5			2.5		2.5			2.5				2.5		2.5	2.5		2.5	20
VP06		2.5		2.5		2.5			2.5				2.5	2.5	2.5			2.5	20
VP07		2.5		2.5		2.5			2.5		2.5			2.5	2.5			2.5	20
VP08		2.5		2.5		2.5			2.5		2.5			2.5	2.5			2.5	20
Total																			160

Table 2: Vantage points coordinates

Survey Points	Coordinates (dd)		Biotope
	N	E	
VP01	42.713709°	75.843865°	Fallow land near the Chu River, less than 2 km away - agricultural fields
VP02	42.692218°	75.879070°	The beginning of the canyon with trees and shrubs along the banks of the Chu River
VP03	42.623138°	75.828866°	Scree slope with eastern exposure, devoid of vegetation
VP04	42.560278°	75.819167°	Mountain gorge and Chu River with signs of excavations
VP05	42.496796°	75.843678°	Left bank of the Chu River with sandy alluvial soils and shrub vegetation
VP06	42.469005°	76.015956°	Alluvial cone on the southern exposure of the ridge
VP07	42.465120°	76.126961°	The slope of the southern exposure of the ridge with fallow lands and young bushes
VP08	42.450126°	76.184493°	Gently sandy shore of Lake Issyk-Kul with grassy vegetation

During the observations, photographing of birds was carried out, which is used to confirm the correct determination of species and obtain additional data on the number of individuals.

The following equipment was used

- two binoculars (BUSHNELL TROPHY 8x42)
- camera (Canon EOS 5D Mark 4 with lens Canon EF 500mm f4.5 and Canon EF 600mm f4)
- spotting scope (Levenhuk Blaze BASE 60)

3. Findings and Results

As a result of the survey, 93 bird species were observed on the Vantage points (Table 3). Six of them, specifically the Black stork, Bearded vulture, Himalayan vulture, Cinereous vulture, Golden eagle, Black-bellied sandgrouse are listed in the Red Data Book of Kyrgyz Republic. The IUCN Red List includes 4 Near Threatened (NT) species and 1 Moderately Depleted (MD) species among these observations.

Table 3: Species observed on the project site

	Latin name	Common name	IUCN status	Kyrgyz RDB Status	Total number observations
1	<i>Tadorna ferruginea</i>	Ruddy shelduck	LC		20
2	<i>Spatula querquedula</i>	Garganey	LC		2
3	<i>Mareca penelope</i>	Eurasian wigeon	LC		5
4	<i>Anas platyrhynchos</i>	Mallard	LC		26
5	<i>Anas acuta</i>	Northern pintail	LC		3
6	<i>Phasianus colchicus mongolicus</i>	Ring-necked Pheasant	LC		25
7	<i>Alectoris chukar</i>	Chukar	LC		51
8	<i>Tachybaptus ruficollis</i>	Little grebe	LC		7
9	<i>Podiceps cristatus</i>	Great crested grebe	LC		6
10	<i>Podiceps nigricollis</i>	Black-necked grebe	LC		1
11	<i>Columba livia</i>	Rock dove	LC		311
12	<i>Columba rupestris</i>	Hill pigeon	LC		19
13	<i>Columba oenas</i>	Stock dove	LC		17
14	<i>Streptopelia decaocto</i>	Eurasian collared dove	LC		16
15	<i>Spilopelia senegalensis</i>	Laughing dove	LC		12
16	<i>Pterocles orientalis</i>	Black-bellied sandgrouse	LC	NT	22
17	<i>Cuculus canorus</i>	Common cuckoo	LC		3
18	<i>Fulica atra</i>	Eurasian coot	LC		47
19	<i>Himantopus himantopus</i>	Black-winged stilt	LC		20
20	<i>Charadrius dubius</i>	Little Ringed Plover	LC		9
21	<i>Vanellus vanellus</i>	Northern lapwing	NT		4
22	<i>Actitis hypoleucos</i>	Common sandpiper	LC		1
23	<i>Tringa ochropus</i>	Green sandpiper	LC		2
24	<i>Tringa erythropus</i>	Spotted redshank	LC		2
25	<i>Tringa nebularia</i>	Common greenshank	LC		4
26	<i>Arenaria interpres</i>	Ruddy turnstone	LC		3
27	<i>Calidris temminckii</i>	Temminck's stint	LC		6
28	<i>Larus ridibundus</i>	Black-headed gull	LC		43

	Latin name	Common name	IUCN status	Kyrgyz RDB Status	Total number observations
29	<i>Larus cachinnans</i>	Caspian gull	LC		10
30	<i>Chlidonias hybrida</i>	Whiskered tern	LC		2
31	<i>Sterna hirundo</i>	Common tern	LC		27
32	<i>Ciconia nigra</i>	Black stork	LC, MD	NT	3
33	<i>Phalacrocorax carbo</i>	Great cormorant	LC		29
34	<i>Ardea cinerea</i>	Grey heron	LC		14
35	<i>Gypaetus barbatus</i>	Bearded vulture	NT	NT	15
36	<i>Aegypius monachus</i>	Cinereous vulture	NT	NT	14
37	<i>Gyps himalayensis</i>	Himalayan vulture	NT	LC	51
38	<i>Aquila chrysaetos</i>	Golden eagle	LC	NT	11
39	<i>Circus aeruginosus</i>	Western marsh harrier	LC		5
40	<i>Accipiter nisus</i>	Eurasian sparrowhawk	LC		5
41	<i>Milvus migrans</i>	Black kite	LC		72
42	<i>Buteo buteo</i>	Common buzzard	LC		16
43	<i>Buteo rufinus</i>	Long-legged buzzard	LC		43
44	<i>Upupa epops</i>	Eurasian hoopoe	LC		20
45	<i>Coracias garrulus</i>	European roller	LC		12
46	<i>Falco tinnunculus</i>	Eurasian Kestrel	LC		40
47	<i>Falco subbuteo</i>	Eurasian hobby	LC		2
48	<i>Lanius collurio</i>	Red-backed shrike	LC		3
49	<i>Lanius isabellinus</i>	Isabelline shrike	LC		1
50	<i>Pica pica</i>	Eurasian magpie	LC		230
51	<i>Pyrrhocorax pyrrhocorax</i>	Red-billed chough	LC		6
52	<i>Corvus monedula</i>	Eurasian Jackdaw	LC		4
53	<i>Corvus frugilegus</i>	Rook	LC		320
54	<i>Corvus corax</i>	Common raven	LC		4

	Latin name	Common name	IUCN status	Kyrgyz RDB Status	Total number observations
55	<i>Cyanistes cyanus</i>	Azure Tit	LC		
56	<i>Parus major</i>	Great tit	LC		30
57	<i>Parus cinereus</i>	Cinereous tit	LC		2
58	<i>Periparus ater</i>	Coal tit	LC		3
59	<i>Melanocorypha calandra</i>	Calandra lark	LC		16
60	<i>Alauda arvensis</i>	Eurasian skylark	LC		1
61	<i>Galerida cristata</i>	Crested lark	LC		15
62	<i>Acrocephalus agricola</i>	Paddyfield warbler	LC		3
63	<i>Acrocephalus palustris</i>	Marsh warbler	LC		4
64	<i>Locustella certhiola</i>	Pallas's grasshopper warbler	LC		1
65	<i>Phylloscopus collybita</i>	Common chiffchaff	LC		10
66	<i>Phylloscopus trochiloides</i>	Greenish warbler	LC		5
67	<i>Cettia cetti</i>	Cetti's warbler	LC		6
68	<i>Curruca communis</i>	Common whitethroat	LC		5
69	<i>Tichodroma muraria</i>	Wallcreeper	LC		3
70	<i>Sturnus vulgaris</i>	Common starling	LC		27
71	<i>Acridotheres tristis</i>	Common Myna	LC		140
72	<i>Turdus viscivorus</i>	Mistle thrush	LC		11
73	<i>Turdus merula</i>	Eurasian Blackbird	LC		36
74	<i>Turdus atrogularis</i>	Black-throated thrush	LC		22
75	<i>Phoenicurus erythronotus</i>	Rufous-backed Redstart	LC		24
76	<i>Phoenicurus phoenicurus</i>	Common redstart	LC		1
77	<i>Monticola saxatilis</i>	Common rock thrush	LC		9
78	<i>Oenanthe isabellina</i>	Isabelline wheatear	LC		22
79	<i>Oenanthe pleschanka</i>	Pied wheatear	LC		23
80	<i>Passer domesticus</i>	House sparrow	LC		25

	Latin name	Common name	IUCN status	Kyrgyz RDB Status	Total number observations
81	<i>Passer montanus</i>	Eurasian tree sparrow	LC		187
82	<i>Petronia petronia</i>	Rock sparrow	LC		2
83	<i>Motacilla cinerea</i>	Gray Wagtail	LC		8
84	<i>Motacilla citreola</i>	Citrine wagtail	LC		1
85	<i>Motacilla personata</i>	White wagtail	LC		64
86	<i>Anthus richardi</i>	Richard's Pipit	LC		1
87	<i>Anthus spinoletta</i>	Water pipit	LC		13
88	<i>Fringilla coelebs</i>	Common Chaffinch	LC		6
89	<i>Acanthis cannabina</i>	Eurasian Linnet	LC		41
90	<i>Carduelis caniceps</i>	Eastern Goldfinch	LC		24
91	<i>Serinus pusillus</i>	Red-fronted serin	LC		9
92	<i>Emberiza calandra</i>	Corn bunting	LC		1
93	<i>Emberiza schoeniclus</i>	Reed Bunting	LC		6

The threatened species occurred on VP02, VP03, VP05, VP06, and VP07. The most meeting with the threatened species were on VP02 and VP03 (Figure 7).

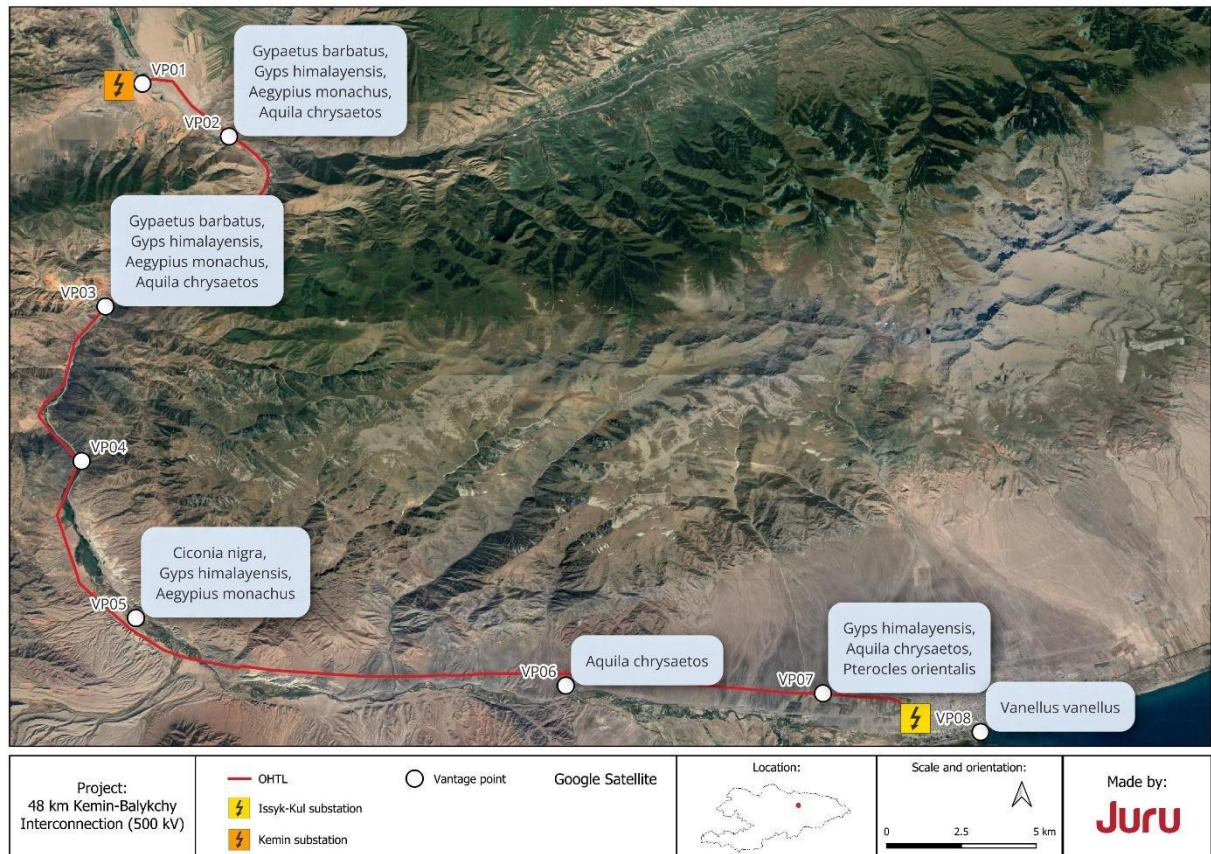


Figure 7. Threatened species observed during the survey.

Table 4: Species included in the Kyrgyzstan Red Data Book IUCN X and above and distribution by points

	Latin name	Common name	IUCN	Kyrgyz Republic Red Data Book	VP
1	<i>Ciconia nigra</i>	Black stork	LC	NT	5
2	<i>Gypaetus barbatus</i>	Bearded vulture	NT	NT	2, 3
3	<i>Gyps himalayensis</i>	Himalayan vulture	NT	LC	2, 3, 5, 7
4	<i>Aegypius monachus</i>	Cinereous vulture	NT	NT	2, 3, 5
5	<i>Aquila chrysaetos</i>	Golden eagle	LC	NT	2, 3, 6
6	<i>Pterocles orientalis</i>	Black-bellied sandgrouse	LC	NT	7
7	<i>Vanellus vanellus</i>	Northern lapwing	NT	LC	8

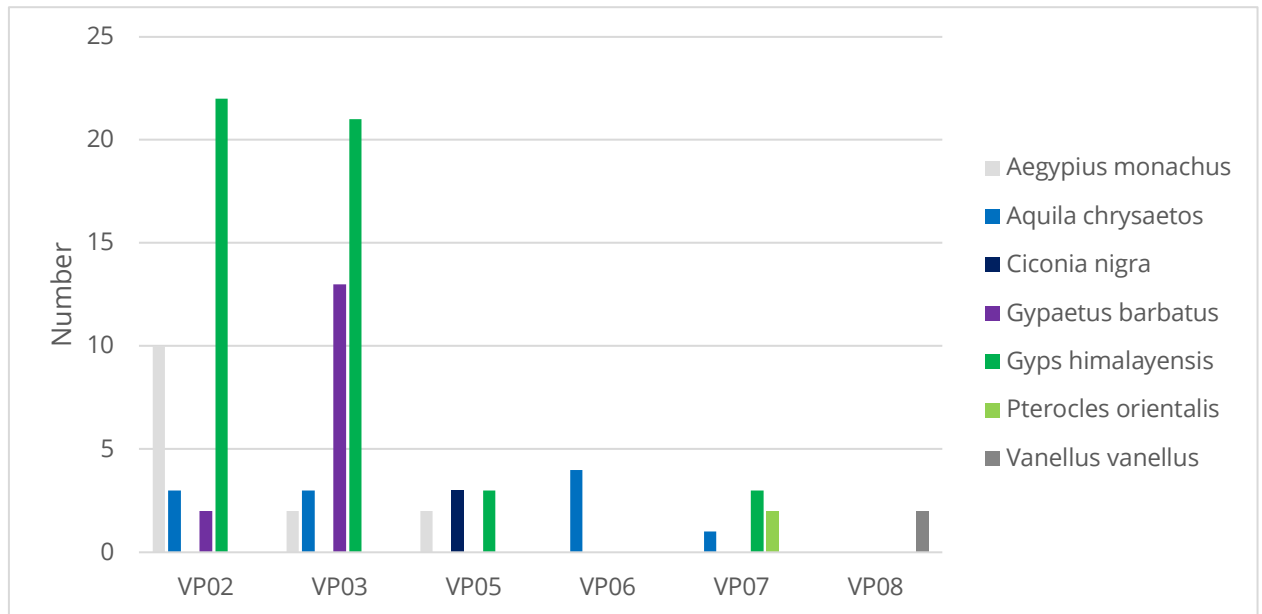


Figure 8. Frequency of meetings with threatened bird species per vantage point

Table 5: Summary of meetings with species included in the Kyrgyz RDB and IUCN as VU and above.

Date	VP	Species	Number	Time	Altitude	Activity
05/04/2024	VP 02	<i>Gyps himalayensis</i>	2	11:49	200	Soaring
05/04/2024	VP 02	<i>Gyps himalayensis</i>	3	11:50	250	Soaring
05/04/2024	VP 02	<i>Aegypius monachus</i>	2	11:50	250	Soaring
12/04/2024	VP 02	<i>Gyps himalayensis</i>	2	10:53	200	Soaring
12/04/2024	VP 02	<i>Aegypius monachus</i>	1	10:57	200	Soaring
12/04/2024	VP 02	<i>Aegypius monachus</i>	2	11:00	200	Soaring
27/04/2024	VP 02	<i>Gyps himalayensis</i>	3	10:44	200	Soaring
27/04/2024	VP 02	<i>Gyps himalayensis</i>	2	11:27	200	Soaring
08/05/2024	VP 02	<i>Aegypius monachus</i>	3	12:59	300	Soaring
08/05/2024	VP 02	<i>Gypaetus barbatus</i>	2	13:13	100	Flight
08/05/2024	VP 02	<i>Gyps himalayensis</i>	5	14:33	300	Soaring
09/05/2024	VP 02	<i>Aquila chrysaetos</i>	2	11:26	150	Soaring
09/05/2024	VP 02	<i>Gyps himalayensis</i>	4	11:26	100	Flight
05/04/2024	VP 03	<i>Aquila chrysaetos</i>	1	12:49	250	Flight
05/04/2024	VP 03	<i>Gyps himalayensis</i>	1	13:01	300	Soaring
05/04/2024	VP 03	<i>Gypaetus barbatus</i>	2	13:06	200	Flight
05/04/2024	VP 03	<i>Gypaetus barbatus</i>	1	14:44	150	Flight
12/04/2024	VP 03	<i>Gyps himalayensis</i>	2	13:25	250	Soaring
12/04/2024	VP 03	<i>Gyps himalayensis</i>	3	13:34	250	Soaring
12/04/2024	VP 03	<i>Gypaetus barbatus</i>	2	13:36	70	Flight
12/04/2024	VP 03	<i>Gyps himalayensis</i>	2	15:40	100	Soaring
14/04/2024	VP 03	<i>Aquila chrysaetos</i>	1	10:40	200	Soaring
14/04/2024	VP 03	<i>Gyps himalayensis</i>	3	12:01	300	Soaring

27/04/2024	VP 03	<i>Aquila chrysaetos</i>	1	15:44	300	Soaring
27/04/2024	VP 03	<i>Aegypius monachus</i>	2	17:02	200	Flight
27/04/2024	VP 03	<i>Gyps himalayensis</i>	1	17:10	200	Flight
08/05/2024	VP 03	<i>Gyps himalayensis</i>	3	13:36	150	Flight
08/05/2024	VP 03	<i>Gypaetus barbatus</i>	2	13:39	200	Flight
09/05/2024	VP 03	<i>Gypaetus barbatus</i>	2	12:15	200	Soaring
09/05/2024	VP 03	<i>Gyps himalayensis</i>	2	14:41	100	Soaring
28/04/2024	VP 05	<i>Ciconia nigra</i>	1	09:33	70	Soaring
10/05/2024	VP 05	<i>Ciconia nigra</i>	2	09:35	60	Soaring
10/05/2024	VP 05	<i>Gyps himalayensis</i>	3	10:12	200	Soaring
10/05/2024	VP 05	<i>Aegypius monachus</i>	2	10:23	200	Soaring
13/04/2024	VP 06	<i>Aquila chrysaetos</i>	1	13:29	200	Soaring
29/04/2024	VP 06	<i>Aquila chrysaetos</i>	1	09:03	300	Soaring
10/05/2024	VP 06	<i>Aquila chrysaetos</i>	1	14:12	200	Soaring
06/04/2024	VP 07	<i>Aquila chrysaetos</i>	1	13:44	250	Soaring
06/04/2024	VP 07	<i>Pterocles orientalis</i>	2	14:30	15	Flight
07/05/2024	VP 07	<i>Gyps himalayensis</i>	3	11:12	300	Soaring

4. Key species descriptions

Black stork (*Ciconia nigra*) - VI category; IUCN: (LC)

Status: least concern, this species is naturally threatened and migratory.

Distribution: Nesting sites of the black stork are known in the basins of the rivers Sary-Dzhaz, At-Bashi, Naryn, Ak-Sai, Karakol, Karasay, Toragai, Tyup, Toruaygyr, Kochkor, Susamyr, Jumgal, Chatkal, and in a number of other places in the Tian Shan and Altay Mountain systems within Kyrgyzstan (Yanushavich et al., 1959, Kydyraliev, 1972, 1990; Red Book, 2007), as well as in the upper reaches of the Chu River (Romanovskaya, 2015).

Habitats: During the nesting period, the Black stork inhabits mountain valleys (river basins), after the nesting period and during migration, it can be found near lowland reservoirs and rivers.

Before 2019, a pair of black storks nested in close proximity to the road. However, after the male was killed by local residents, the nest was abandoned. Each year, one or two pairs of storks are observed in the area, and in 2021, fledglings were encountered.

Bearded vulture (*Gypaetus barbatus*) - VI category; IUCN: (NT)

Status: Classified as a near threatened, naturally threatened, sedentary, locally widespread species.

Distribution: In the Kyrgyz Republic, it can be found on all major ridges of the Western, Northern, Central, and Inner Tien Shan, as well as the Pamir-Alai (Arlettaz R. and others, 1992)

Habitats: The species primarily inhabits the middle and upper mountain belt at altitudes of 1,000-4,300 meters above sea level. It nests on rocky cliffs. Periodically, during the non-breeding season, certain individuals exhibit migration to flat regions.

During the survey, two adult and a juvenile bird were observed at VP03. A pair was detected at VP02 once only.

Himalayan Griffon (*Gyps himalayensis*) – VII category; IUCN: (NT)

Status: Classified as a near threatened, sedentary, the only species within the genus in the fauna of the Kyrgyz Republic. Monotypic species.

Distribution: Himalayas, Hindu Kush, Tibet, Kunlun, Altyn-Tag, Nan Shan. In the Tian Shan it inhabits the Alai, Turkestan, Fergana, and Kyrgyz ranges; Teskey Ala-Too, Central and Inner Tian Shan ranges. (Red Book of Kyrgyz SSR, 1985; Stepanyan, 1990)

Habitats: Inhabits the subalpine and alpine zones of the Tian Shan, in areas with wild hoofed animals and herds of domestic animals. It prefers to nest in places with rocky exposures.

Active nest of *Gyps himalayensis* (696 meters from the OHTL) was discovered during the Raptor nest search. 1-3 adult birds were observed at VP02, VP03, VP05, and VP07 during the survey.

Cinereous vulture (*Aegypius monachus*) - VI category; IUCN: (NT)

Status: Classified as near threatened, sedentary, and a mosaic widespread species.

Distribution: The species is common throughout the territory of Kyrgyzstan on the nesting. (Birds of Kyrgyzstan, 1959; Dandliker and others, 1992)

Habitats: It primarily occupies the lower and middle mountain belt and feeds on carrion from ungulates.

During this survey, *Aegypius monachus* was observed at VP02, VP03, and VP05, primarily during the early part of the day.

Golden eagle (*Aquila chrysaetos*) – VI category, IUCN: (LC)

Status: Least Concern, sedentary, with locally widespread distribution, in the Kyrgyz Republic, subspecies *Aquila chrysaetos daphanea* inhabits. (Severtsov, 1873)

Distribution: Occurs throughout Kyrgyzstan mountains. (Shukurov, 1981)

Habitats: Golden eagles inhabit remnant mountains of deserts, loess cliffs of foothills, and rock formations in the middle and upper mountain zones. They build nests on rocks, cliffs, trees, and structures like power transmission line supports.

1-2 adult birds were observed at VP02, VP03, VP06, and VP07 during the survey. Active nest of *Aquila chrysaetos* (1460 meters from the OHTL) was found during the Raptor nest search.

Black-bellied Sandgrouse (*Pterocles orientalis*) - VI category, IUCN: (LC)

Status: Least Concern, low-numbered, little-studied species.

Distribution: Inhabits the northeastern part of the Republic. During nesting, it is found on the western coast of Lake Issyk-Kul in the valleys of the At-Bashi and Naryn rivers, it is also found in the Kochkor Basin.

Habitats: It nests on clayey foothill plateaus at an altitude of 1500 to 2000 meters above sea level, with thickets of caragana, anabasis, and saltworts, and in some cases - without shrubby vegetation.

During the survey, two individuals of *Pterocles orientalis* were observed only once at VP07.

Northern Lapwing (*Vanellus vanellus*) - IUCN: (NT)

Status: Near Threatened, decreasing species.

A migratory bird, arriving in Kyrgyzstan in late winter to early spring.

Habitats: They inhabit damp meadows in river valleys, near lakes, in marshes and plains, and in mountains up to 1800-3000 meters.

During the survey, a pair of *Vanellus vanellus* was observed at VP08 near the Lake Issyk-Kul.

5. Conclusion

The bird VP survey was conducted in Spring 2024, recorded a diversity of bird species, despite the cold spring that resulted in reduced bird activity. In total, 93 bird species were observed, six of which are listed as a threatened species in the National Red Book.

Among the species observed, some are potentially vulnerable to the construction and operation of power lines. Most notably, *Ciconia nigra*, which was sighted twice at VP05 and may be nesting nearby. *Ciconia nigra* can perch on power line supports, making them susceptible to collisions as well as electrocution due to fecal stream conductivity.

While *Aegypius monachus*, *Gypaetus barbatus*, *Gyps himalayensis*, and *Aquila chrysaetos* have a lower risk of colliding with power lines, they may still be at risk of electrocution due to similar factors.

6. Annex

Annex 1. Photo materials on species



Figure 9. *Aquila chrysaetos*

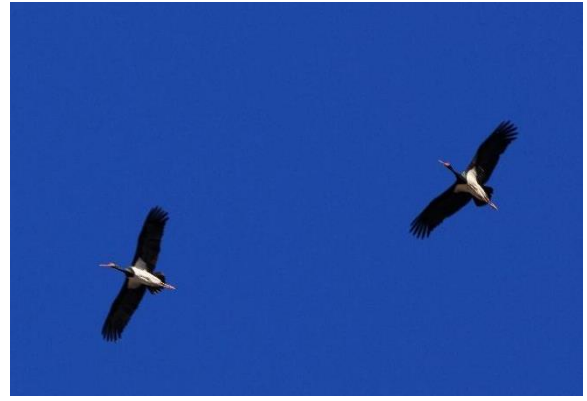


Figure 10. *Ciconia nigra*



Figure 11. *Gypaetus barbatus*



Figure 12. *Gyps himalayensis*

Annex 2. Results of the observation

Table 6: Primary data

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1	27/03/2024	VP01	06:45-08:45	Sunny	<i>Columba livia</i>	7	06:45	15	Flight
2	27/03/2024	VP01	06:45-08:45	Sunny	<i>Pica pica</i>	2	06:50	0	On the ground
3	27/03/2024	VP01	06:45-08:45	Sunny	<i>Corvus frugilegus</i>	3	06:55	0	On the ground
4	27/03/2024	VP01	06:45-08:45	Sunny	<i>Corvus monedula</i>	4	07:14	20	Flight
5	27/03/2024	VP01	06:45-08:45	Sunny	<i>Upupa epops</i>	1	07:19	10	Flight
6	27/03/2024	VP01	06:45-08:45	Sunny	<i>Streptopelia decaocto</i>	3	07:26	30	Flight
7	27/03/2024	VP01	06:45-08:45	Sunny	<i>Milvus migrans</i>	1	07:35	70	Soaring
8	27/03/2024	VP01	06:45-08:45	Sunny	<i>Buteo buteo</i>	1	07:45	200	Soaring
9	27/03/2024	VP01	06:45-08:45	Sunny	<i>Melanocorypha calandra</i>	9	07:49	20	Displaying
10	27/03/2024	VP01	06:45-08:45	Sunny	<i>Phoenicurus phoenicurus</i>	1	07:54	10	Flight
11	27/03/2024	VP01	06:45-08:45	Sunny	<i>Acridotheres tristis</i>	4	08:01		On the ground
12	27/03/2024	VP01	06:45-08:45	Sunny	<i>Milvus migrans</i>	1	08:15	100	Soaring
13	27/03/2024	VP01	06:45-08:45	Sunny	<i>Phylloscopus collybita</i>	1	08:25	5	Flight
14	27/03/2024	VP01	06:45-08:45	Sunny	<i>Passer domesticus</i>	12	08:30	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
15	27/03/2024	VP01	06:45-08:45	Sunny	<i>Pica pica</i>	3	08:35	10	Flight
16	27/03/2024	VP01	06:45-08:45	Sunny	<i>Phasianus colchicus mongolicus</i>	5	08:40	0	On the ground
17	27/03/2024	VP01	06:45-08:45	Sunny	<i>Turdus merula</i>	1	08:41	1	On the shrub
18	27/03/2024	VP01	06:45-08:45	Sunny	<i>Turdus viscivorus</i>	1	08:44	1	On the shrub
19	27/03/2024	VP01	06:45-08:45	Sunny	<i>Spilopelia senegalensis</i>	2	08:45	10	Flight
20	27/03/2024	VP02	09:45-11:45	Sunny	<i>Oenanthe sp.</i>	1	09:45	0	On the ground
21	27/03/2024	VP02	09:45-11:45	Sunny	<i>Sturnus vulgaris</i>	12	09:50	1	On the shrub
22	27/03/2024	VP02	09:45-11:45	Sunny	<i>Turdus viscivorus</i>	1	09:55	1	On the shrub
23	27/03/2024	VP02	09:45-11:45	Sunny	<i>Turdus atrogularis</i>	13	10:05	2	Flight
24	27/03/2024	VP02	09:45-11:45	Sunny	<i>Lanius isabellinus</i>	1	10:10	2	на склоне горы
25	27/03/2024	VP02	09:45-11:45	Sunny	<i>Alauda sp.</i>	4	10:12	0	On the ground
26	27/03/2024	VP02	09:45-11:45	Sunny	<i>Carduelis caniceps</i>	20	10:25	0	On the ground
27	27/03/2024	VP02	09:45-11:45	Sunny	<i>Milvus migrans</i>	3	10:34	50	Flight
28	27/03/2024	VP02	09:45-11:45	Sunny	<i>Buteo rufinus</i>	1	10:40	100	Soaring
29	27/03/2024	VP02	09:45-11:45	Sunny	<i>Pica pica</i>	2	10:44	10	Flight
30	27/03/2024	VP02	09:45-11:45	Sunny	<i>Corvus frugilegus</i>	7	10:51	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
31	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Corvus frugilegus</i>	3	10:55	0	On the ground
32	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Passer montanus</i>	15	11:05	0	On the ground
33	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Acanthis cannabina</i>	20	11:10	0	On the ground
34	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Milvus migrans</i>	2	11:14	60	Flight
35	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Pyrrhocorax pyrrhocorax</i>	6	11:19	100	Flight
36	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Petronia petronia</i>	2	11:21	0	On the ground
37	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Aquila chrysaetos</i>	1	11:29	400	Soaring
38	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Falco tinnunculus</i>	1	11:30	150	Flight
39	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Motacilla sp</i>	2	11:35	0	On the ground
40	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Fringilla coelebs</i>	6	11:39	0	On the ground
41	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Corvus corax</i>	3	11:42	20	Flight
42	27/03/2024	VP0 2	09:45-11:45	Sunny	<i>Upupa epops</i>	1	11:45	0	On the ground
43	27/03/2024	VP0 3	12:45-14:45	Mainly cloudy	<i>Buteo buteo</i>	2	12:45	200	Flight
44	27/03/2024	VP0 3	12:45-14:45	Mainly cloudy	<i>Falco tinnunculus</i>	3	12:49	150	Soaring
45	27/03/2024	VP0 3	12:45-14:45	Mainly cloudy	<i>Buteo rufinus</i>	1	12:51	200	Soaring
46	27/03/2024	VP0 3	12:45-14:45	Mainly cloudy	<i>Pica pica</i>	2	12:59	15	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
47	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Pica pica</i>	3	13:01	0	On the ground
48	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Corvus frugilegus</i>	5	13:10	0	On the ground
49	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Phoenicurus erythronotus</i>	2	13:12	5	On the ground
50	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Falco tinnunculus</i>	1	13:20	200	Soaring
51	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Columba livia</i>	7	13:25	30	Flight
52	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Pica pica</i>	2	13:33	15	Flight
53	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Oenanthe sp.</i>	3	13:38	0	On the ground
54	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Alectoris chukar</i>	4	13:45	0	On the ground
55	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Buteo rufinus</i>	1	13:50	250	Soaring
56	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Phasianus colchicus</i>	1	13:54	0	On the ground
57	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Parus flavipectus</i>	2	13:56	0	On the ground
58	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Phasianus colchicus</i>	1	13:59	0	On the ground
59	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Phasianus colchicus</i>	2	14:08	0	On the ground
60	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Turdus viscivorus</i>	1	14:15	10	Flight
61	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Turdus atrogularis</i>	5	14:25	5	Flight
62	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Buteo rufinus</i>	1	14:32	200	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
63	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Buteo rufinus</i>	1	14:34	200	Flight
64	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Corvus frugilegus</i>	1	14:36	50	Flight
65	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Pica pica</i>	1	14:40	15	Flight
66	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Gyps himalayensis</i>	2	14:42	300	Soaring
67	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Buteo rufinus</i>	1	14:44	250	Soaring
68	27/03/2024	VP03	12:45-14:45	Mainly cloudy	<i>Columba livia</i>	5	14:45	15	Flight
69	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Buteo buteo</i>	1	15:30	200	Soaring
70	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Milvus migrans</i>	1	15:37	150	Flight
71	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Milvus migrans</i>	1	15:40	150	Flight
72	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Pica pica</i>	1	15:44	10	Flight
73	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Pica pica</i>	1	15:51	5	Flight
74	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Pica pica</i>	3	16:10	5	Flight
75	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Corvus frugilegus</i>	4	16:25	0	On the ground
76	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Pica pica</i>	2	16:31	10	Flight
77	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Falco tinnunculus</i>	3	16:45	150	Soaring
78	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Lanius collurio</i>	1	16:54	1	On the shrub

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
79	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Milvus migrans</i>	8	17:02	150	Soaring
80	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Turdus viscivorus</i>	1	17:09	10	Flight
81	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Oenanthe sp.</i>	2	17:14	0	On the ground
82	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Acanthis cannabina</i>	9	17:19	0	On the ground
83	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Anthus spinoletta</i>	3	17:26	0	On the ground
84	27/03/2024	VP05	15:30-17:30	Mainly cloudy	<i>Alauda sp.</i>	8	17:30	0	On the ground
85	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Tringa nebularia</i>	1	06:50	0	On the ground
86	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Tringa ochropus</i>	2	06:59	0	On the ground
87	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Fulica atra</i>	3	07:07	on the water	On the water
88	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Larus ridibundus</i>	3	07:12	5	Flight
89	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Sterna hirundo</i>	2	07:24	5	Flight
90	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Larus ridibundus</i>	4	07:31	3	Flight
91	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Larus cachinnans</i>	1	07:44	20	Flight
92	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Serinus pusillus</i>	9	08:04	10	Flight
93	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Parus flavipectus</i>	1	08:15	0	On the ground
94	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Parus major</i>	2	08:19	2	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
95	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Motacilla personata</i>	3	08:34	0	On the ground
96	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Columba livia</i>	7	08:39	0	Flight
97	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Fulica atra</i>	5	08:43	on the water	On the water
98	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Motacilla personata</i>	2	08:51	near the water	On the ground
99	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Corvus frugilegus</i>	3	08:54	0	On the ground
100	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Pica pica</i>	2	09:03	0	On the ground
101	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Tachybaptus ruficollis</i>	1	09:07	on the water	On the water
102	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Anas platyrhynchos</i>	2	09:17	30	Flight
103	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Larus ridibundus</i>	2	09:19	20	On the water
104	31/03/2024	VP08	06:50-09:20	Cloudy	<i>Accipiter nisus</i>	1	09:20	30	Flight, on the tree
105	31/03/2024	VP07	09:35-12:05	Rain	<i>Phylloscopus collybita</i>	1	09:37	1	On the shrub
106	31/03/2024	VP07	09:35-12:05	Rain	<i>Parus major</i>	1	09:46	1	On the tree
107	31/03/2024	VP07	09:35-12:05	Rain	<i>Turdus atrogularis</i>	2	10:00	1	On the tree
108	31/03/2024	VP07	09:35-12:05	Rain	<i>Oenanthe sp.</i>	1	10:16	0	On the ground
109	31/03/2024	VP07	09:35-12:05	Rain	<i>Oenanthe sp.</i>	2	10:29	0	On the ground
110	31/03/2024	VP07	09:35-12:05	Rain	<i>Buteo rufinus</i>	1	10:41	0.5	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
111	31/03/2024	VP07	09:35-12:05	Rain	<i>Curruca communis</i>	1	10:49	1	Displaying
112	31/03/2024	VP07	09:35-12:05	Rain	<i>Parus major</i>	2	11:12	1	On the tree
113	31/03/2024	VP07	09:35-12:05	Rain	<i>Larus cachinnans</i>	1	11:14	30	Flight
114	31/03/2024	VP07	09:35-12:05	Rain	<i>Corvus frugilegus</i>	2	11:29	10	Flight
115	31/03/2024	VP07	09:35-12:05	Rain	<i>Pica pica</i>	2	11:42	20	Flight
116	31/03/2024	VP07	09:35-12:05	Rain	<i>Milvus migrans</i>	1	11:49	50	Flight
117	31/03/2024	VP07	09:35-12:05	Rain	<i>Corvus frugilegus</i>	1	12:00	20	Flight
118	31/03/2024	VP06	12:15-14:45	Rain	<i>Alectoris chukar</i>	3	12:15	0	On the ground
119	31/03/2024	VP06	12:15-14:45	Rain	<i>Phasianus colchicus</i>	1	12:35	0	On the ground
120	31/03/2024	VP06	12:15-14:45	Rain	<i>Alectoris chukar</i>	2	13:00	0	On the ground
121	31/03/2024	VP06	12:15-14:45	Rain	<i>Curruca communis</i>	1	13:10	1	On the shrub
122	31/03/2024	VP06	12:15-14:45	Rain	<i>Anthus spinoletta</i>	1	13:24	0	On the ground
123	31/03/2024	VP06	12:15-14:45	Rain	<i>Oenanthe sp.</i>	1	13:29	0	On the ground
124	31/03/2024	VP06	12:15-14:45	Rain	<i>Pica pica</i>	2	13:41	15	Flight
125	31/03/2024	VP06	12:15-14:45	Rain	<i>Corvus frugilegus</i>	3	14:00	0	On the ground
126	31/03/2024	VP06	12:15-14:45	Rain	<i>Passer montanus</i>	3	14:12	10	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
127	31/03/2024	VP06	12:15-14:45	Rain	<i>Motacilla personata</i>	1	14:30	0	On the ground
128	31/03/2024	VP06	12:15-14:45	Rain	<i>Galerida cristata</i>	2	14:45	0	On the ground
129	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Anas platyrhynchos</i>	2	15:00	20	Flight
130	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Tadorna ferruginea</i>	2	15:03	20	Flight
131	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Corvus frugilegus</i>	3	15:19	30	Flight
132	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Phalacrocorax carbo</i>	1	15:24	50	Flight
133	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Pica pica</i>	3	15:29	1	Local movements
134	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Phoenicurus erythronotus</i>	1	15:35	1	Local movements
135	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Corvus frugilegus</i>	1	15:49	5	Local movements
136	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Pica pica</i>	2	16:01	20	Flight
137	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Pica pica</i>	1	16:15	15	Flight
138	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Falco tinnunculus</i>	1	16:24	100	Soaring
139	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Milvus migrans</i>	1	16:40	150	Soaring
140	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Buteo rufinus</i>	1	17:01	100	Flight
141	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Columba livia</i>	8	17:12	10	Flight
142	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Passer montanus</i>	12	17:19	0	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
143	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Pica pica</i>	1	17:24	5	Local movements
144	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Corvus frugilegus</i>	3	17:28	5	Local movements
145	31/03/2024	VP04	15:00-17:30	Mainly cloudy	<i>Tadorna ferruginea</i>	2	17:30	30	Flight
146	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Corvus frugilegus</i>	2	07:01	0	On the ground
147	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Columba livia</i>	5	07:07	10	On the power line
148	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Oenanthe sp.</i>	2	07:20	0	On the ground
149	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Parus flavipectus</i>	1	07:29	10	Flight
150	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Motacilla personata</i>	1	07:36	0	On the ground
151	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Passer montanus</i>	15	07:44	10	Flight
152	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Motacilla personata</i>	2	07:51	2	Local movements
153	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Corvus frugilegus</i>	2	08:02	10	Flight
154	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Milvus migrans</i>	1	08:14	50	Flight
155	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Turdus merula</i>	2	08:17	15	Flight
156	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Upupa epops</i>	1	08:21	15	On the power line
157	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Spilopelia senegalensis</i>	2	08:24	0	On the ground
158	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Pica pica</i>	1	08:26	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
159	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Corvus frugilegus</i>	2	08:33	0	On the ground
160	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Passer montanus</i>	5	08:35	0	On the ground
161	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Streptopelia decaocto</i>	3	08:44	15	Flight
162	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Cuculus canorus</i>	1	08:46	20	Displaying on the power line
163	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Pica pica</i>	1	08:49	5	Local movements
164	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Corvus frugilegus</i>	2	08:51	5	Local movements
165	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Upupa epops</i>	1	09:12	10	Flight
166	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Milvus migrans</i>	1	09:17	50	Flight
167	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Columba livia</i>	3	09:21	10	Flight
168	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Spilopelia senegalensis</i>	2	09:23	15	Flight
169	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Passer montanus</i>	4	09:26	10	On the ground
170	01/04/2024	VP01	07:00-08:30	Cloudy	<i>Oenanthe sp.</i>	1	09:30	0	On the ground
171	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Motacilla personata</i>	1	09:41	0	On the ground
172	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Turdus merula</i>	1	09:44	2	On the shrub
173	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Pica pica</i>	2	09:51	0	On the ground
174	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Corvus frugilegus</i>	1	09:54	5	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
175	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Phoenicurus</i>	1	10:01	2	On the shrub
176	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Falco tinnunculus</i>	2	10:07	50	Soaring
177	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Corvus frugilegus</i>	2	10:12	10	Flight
178	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Oenanthe pleschanka</i>	2	10:17	0	On the ground
179	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Turdus merula</i>	1	10:34	1	On the ground
180	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Pica pica</i>	1	10:40	20	Flight
181	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Gyps himalayensis</i>	2	10:55	200	Soaring
182	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Corvus corax</i>	1	11:04	100	Flight
183	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Buteo rufinus</i>	1	11:14	50	Soaring
184	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Corvus frugilegus</i>	2	11:26	5	Flight
185	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Aegypius monachus</i>	2	11:38	200	Soaring
186	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Gyps himalayensis</i>	1	11:55	200	Soaring
187	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Falco tinnunculus</i>	1	12:00	100	Flight
188	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Columba livia</i>	5	12:06	10	Flight
189	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Pica pica</i>	2	12:14	0	On the ground
190	01/04/2024	VP0 2	09:40-12:10	Cloudy	<i>Oenanthe sp.</i>	2	12:24	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
191	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Galerida cristata</i>	1	12:28	0	On the ground
192	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Motacilla personata</i>	1	12:31	0	On the ground
193	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Columba livia</i>	4	12:33	20	Flight
194	01/04/2024	VP02	09:40-12:10	Cloudy	<i>Corvus frugilegus</i>	2	12:34	20	Flight
195	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Columba oenas</i>	7	12:31	20	Flight
196	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Motacilla personata</i>	2	12:44	0	On the ground
197	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Parus flavipectus</i>	1	12:49	0	On the ground
198	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Phylloscopus sp.</i>	1	12:57	0	On the ground
199	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Columba livia</i>	2	13:09	0	On the ground
200	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Columba rupestris</i>	3	13:25	25	Flight
201	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Gypaetus barbatus</i>	3	13:29	150	Soaring, two adult birds and a young one
202	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Buteo rufinus</i>	1	13:44	100	Soaring
203	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Milvus migrans</i>	2	13:55	50	Flight
204	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Gyps himalayensis</i>	2	14:09	150	Soaring
205	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Milvus migrans</i>	1	14:25	100	Soaring
206	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Motacilla personata</i>	1	14:32	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
207	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Coracias garrulus</i>	2	14:42	10	On the wires
208	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Milvus migrans</i>	1	14:50	50	Flight
209	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Buteo rufinus</i>	1	14:54	100	Flight
210	01/04/2024	VP03	12:30-15:00	Mainly cloudy	<i>Gypaetus barbatus</i>	1	15:00	200	Flight
211	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Cettia cetti</i>	1	15:30	1	On the tree
212	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Phylloscopus trochiloides</i>	1	15:36	1	On the tree
213	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Phalacrocorax carbo</i>	3	15:44	60	Flight
214	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Tadorna ferruginea</i>	2	15:58	60	Flight
215	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Anas platyrhynchos</i>	2	16:04	40	Flight
216	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Mareca penelope</i>	3	16:07	50	Flight
217	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Milvus migrans</i>	2	16:14	70	Flight
218	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Corvus frugilegus</i>	3	16:24	15	On the tree
219	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Pica pica</i>	2	16:37	15	Flight
220	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Phoenicurus sp.</i>	1	16:50	1	On the tree
221	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Parus flavipectus</i>	2	17:00	1	On the tree
222	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Parus major</i>	1	17:06	1	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
223	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Parus major</i>	2	17:15	2	Local Movements
224	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Corvus frugilegus</i>	1	17:24	20	Local Movements
225	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Acridotheres tristis</i>	5	17:30	0	On the ground
226	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Pica pica</i>	2	17:32	0	On the ground
227	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Columba livia</i>	5	17:41	20	Flight
228	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Pica pica</i>	1	17:49	5	Local movements
229	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Phylloscopus collybita</i>	1	17:52	1	On the tree
230	01/04/2024	VP04	15:30-18:00	Mainly cloudy	<i>Milvus migrans</i>	2	17:54	50	Soaring
231	02/04/2024	VP05	07:15-09:45	Rain	<i>Corvus frugilegus</i>	1	07:20	20	Flight
232	02/04/2024	VP05	07:15-09:45	Rain	<i>Pica pica</i>	2	07:25	20	Flight
233	02/04/2024	VP05	07:15-09:45	Rain	<i>Corvus frugilegus</i>	2	07:32	0	On the ground
234	02/04/2024	VP05	07:15-09:45	Rain	<i>Passer domesticus</i>	3	07:44	0	On the ground
235	02/04/2024	VP05	07:15-09:45	Rain	<i>Acridotheres tristis</i>	9	07:46		On the ground
236	02/04/2024	VP05	07:15-09:45	Rain	<i>Phoenicurus erythronotus</i>	1	07:49	1	On the tree
237	02/04/2024	VP05	07:15-09:45	Rain	<i>Phylloscopus collybita</i>	1	07:58	1	On the tree
238	02/04/2024	VP05	07:15-09:45	Rain	<i>Columba livia</i>	5	08:00	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
239	02/04/2024	VP05	07:15-09:45	Rain	<i>Falco tinnunculus</i>	2	08:15	50	Soaring
240	02/04/2024	VP05	07:15-09:45	Rain	<i>Ardea cinerea</i>	1	08:32	30	Flight
241	02/04/2024	VP05	07:15-09:45	Rain	<i>Circus aeruginosus</i>	1	08:54	10	On the ground
242	02/04/2024	VP05	07:15-09:45	Rain	<i>Corvus frugilegus</i>	1	09:00	30	Flight
243	02/04/2024	VP05	07:15-09:45	Rain	<i>Pica pica</i>	2	09:15	20	Flight
244	02/04/2024	VP05	07:15-09:45	Rain	<i>Motacilla cinerea</i>	1	09:29	0	On the ground
245	02/04/2024	VP05	07:15-09:45	Rain	<i>Motacilla personata</i>	2	09:35	0	On the ground
246	02/04/2024	VP06	10:00-12:30	Rain	<i>Phasianus colchicus</i>	3	10:12	0	On the ground
247	02/04/2024	VP06	10:00-12:30	Rain	<i>Alectoris chukar</i>	3	10:20	0	On the ground
248	02/04/2024	VP06	10:00-12:30	Rain	<i>Phylloscopus sp.</i>	1	10:34	0	On the ground
249	02/04/2024	VP06	10:00-12:30	Rain	<i>Oenanthe pleschanka</i>	2	10:48	0	On the ground
250	02/04/2024	VP06	10:00-12:30	Rain	<i>Oenanthe sp.</i>	2	11:03	0	On the ground
251	02/04/2024	VP06	10:00-12:30	Rain	<i>Acridotheres tristis</i>	5	11:14	0	On the ground
252	02/04/2024	VP06	10:00-12:30	Rain	<i>Aquila chrysaetos</i>	1	11:24	300	Soaring
253	02/04/2024	VP06	10:00-12:30	Rain	<i>Galerida cristata</i>	2	11:35	0	On the ground
254	02/04/2024	VP06	10:00-12:30	Rain	<i>Alectoris chukar</i>	2	12:01	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
255	02/04/2024	VP06	10:00-12:30	Rain	<i>Corvus frugilegus</i>	1	12:19		On the ground
256	02/04/2024	VP06	10:00-12:30	Rain	<i>Pica pica</i>	2	12:22	20	Flight
257	02/04/2024	VP06	10:00-12:30	Rain	<i>Buteo buteo</i>	1	12:28	150	Flight
258	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Parus major</i>	2	12:41	1	On the tree
259	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Passer montanus</i>	20	12:51	0	On the ground
260	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Oenanthe isabellina</i>	2	13:03	0	On the ground
261	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Milvus migrans</i>	1	13:14	100	Soaring
262	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Buteo rufinus</i>	1	13:22	150	Flight
263	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Oenanthe isabellina</i>	2	13:30	0	On the ground
264	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Corvus frugilegus</i>	3	13:42	20	Flight
265	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Pica pica</i>	2	13:50	15	Flight
266	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Columba livia</i>	4	14:00	5	Local movements
267	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Streptopelia decaocto</i>	2	14:22	1	On the tree
268	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Phylloscopus sp.</i>	1	14:34	1	On the tree
269	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Milvus migrans</i>	1	14:36	50	Flight
270	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Pica pica</i>	2	14:49	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
271	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Columba livia</i>	3	15:04	15	Flight
272	02/04/2024	VP07	12:40-15:15	Mainly cloudy	<i>Acridotheres tristis</i>	2	15:10	0	On the ground
273	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Tringa nebularia</i>	1	15:36	на песке	On the ground
274	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Larus ridibundus</i>	2	15:41	на песке	On the ground
275	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Sterna hirundo</i>	3	15:49	2	On the water
276	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Columba livia</i>	7	15:55	0	On the water
277	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Pica pica</i>	2	16:04	10	Flight
278	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Pica pica</i>	2	16:19	10	Flight
279	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Corvus frugilegus</i>	3	16:28	15	Flight
280	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Motacilla personata</i>	2	16:34	0	On the ground
281	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Parus major</i>	2	16:49	5	On the tree
282	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Parus flavipectus</i>	1	17:01	5	On the tree
283	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Accipiter nisus</i>	1	17:19	60	Flight
284	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Fulica atra</i>	3	17:22	0	On the water
285	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Tachybaptus ruficollis</i>	2	17:31	0	On the water
286	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Podiceps nigricollis</i>	1	17:39	0	On the water

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
287	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Larus cachinnans</i>	1	17:44	10	Flight
288	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Fulica atra</i>	5	17:46	0	On the water
289	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Sturnus vulgaris</i>	15	17:54	5	On the tree
290	02/04/2024	VP08	15:30-18:00	Mainly cloudy	<i>Periparus ater</i>	1	17:58	2	On the tree
291	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Oenanthe sp.</i>	2	07:15	0	On the ground
292	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Parus flavipectus</i>	1	07:29	0	On the ground
293	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Upupa epops</i>	1	07:31	0	On the tree
294	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Spilopelia senegalensis</i>	2	07:45	20	Flight
295	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Columba livia</i>	3	07:49	0	On the ground
296	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Oenanthe sp.</i>	1	08:01	0	On the ground
297	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Pica pica</i>	3	08:14	20	Flight
298	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Corvus frugilegus</i>	2	08:20	20	Flight
299	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Acridotheres tristis</i>	5	08:22	0	On the ground
300	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Motacilla personata</i>	1	08:40	0	On the ground
301	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Corvus frugilegus</i>	1	08:46	5	Local movements
302	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Passer montanus</i>	12	08:49	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
303	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Cuculus canorus</i>	1	08:54	1	On the tree
304	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Upupa epops</i>	1	09:05	10	Flight
305	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Motacilla personata</i>	2	09:12	0	On the ground
306	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Motacilla cinerea</i>	1	09:14	0	On the ground
307	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Milvus migrans</i>	1	09:15	100	Soaring
308	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Corvus frugilegus</i>	1	09:16	20	Flight
309	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Acridotheres tristis</i>	4	09:17	10	Flight
310	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Parus flavipectus</i>	1	09:21	1	Flight
311	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Streptopelia decaocto</i>	2	09:23	10	On the power line
312	05/04/2024	VP01	07:05-09:35	Cloudy	<i>Pica pica</i>	2	09:26	0	On the ground
313	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Coracias garrulus</i>	1	09:51	5	On the ground
314	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Turdus viscivorus</i>	1	10:02	2	On the ground
315	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Carduelis caniceps</i>	4	10:15	0	On the ground
316	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Falco tinnunculus</i>	1	10:20	100	Soaring
317	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Corvus frugilegus</i>	2	10:29	20	Flight
318	05/04/2024	VP02	09:45-12:15	Cloudy	<i>Turdus merula</i>	1	10:44	1	On the shrub

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
319	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Oenanthe sp.</i>	1	10:55	0	On the ground
320	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Oenanthe sp.</i>	2	11:12	0	On the ground
321	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Alectoris chukar</i>	4	11:24	0	On the ground
322	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Pica pica</i>	1	11:29	20	Flight
323	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Motacilla personata</i>	1	11:42	10	On the wires
324	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Gyps himalayensis</i>	2	11:49	200	Soaring
325	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Gyps himalayensis</i>	3	11:50	250	Soaring
326	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Aegypius monachus</i>	2	11:50	250	Soaring
327	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Phoenicurus erythronotus</i>	1	11:56	1	On the ground
328	05/04/2024	VP0 2	09:45-12:15	Cloudy	<i>Corvus frugilegus</i>	3	12:01	5	Local movements
329	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Columba livia</i>	2	12:34	0	On the ground
330	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Pica pica</i>	1	12:36	0	On the ground
331	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Alectoris chukar</i>	2	12:41	0	On the ground
332	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Aquila chrysaetos</i>	1	12:49	250	Flight
333	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Gyps himalayensis</i>	1	13:01	300	Soaring
334	05/04/2024	VP0 3	12:30-15:00	Sunny	<i>Gypaetus barbatus</i>	2	13:06	200	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
335	05/04/2024	VP03	12:30-15:00	Sunny	<i>Buteo rufinus</i>	2	13:15	150	Flight
336	05/04/2024	VP03	12:30-15:00	Sunny	<i>Monticola saxatilis</i>	2	13:16	10	On the ground
337	05/04/2024	VP03	12:30-15:00	Sunny	<i>Parus flavipectus</i>	1	13:24	0	On the ground
338	05/04/2024	VP03	12:30-15:00	Sunny	<i>Phoenicurus erythronotus</i>	3	13:35	5	Flight
339	05/04/2024	VP03	12:30-15:00	Sunny	<i>Pica pica</i>	2	13:49	0	On the ground
340	05/04/2024	VP03	12:30-15:00	Sunny	<i>Corvus frugilegus</i>	3	13:53	70	Flight
341	05/04/2024	VP03	12:30-15:00	Sunny	<i>Columba oenas</i>	2	14:00	30	Flight
342	05/04/2024	VP03	12:30-15:00	Sunny	<i>Motacilla cinerea</i>	1	14:03	0	On the ground
343	05/04/2024	VP03	12:30-15:00	Sunny	<i>Oenanthe pleschanka</i>	2	14:06	0	Displaying
344	05/04/2024	VP03	12:30-15:00	Sunny	<i>Turdus viscivorus</i>	2	14:07	20	On the ground
345	05/04/2024	VP03	12:30-15:00	Sunny	<i>Corvus frugilegus</i>	3	14:23	20	Flight
346	05/04/2024	VP03	12:30-15:00	Sunny	<i>Falco tinnunculus</i>	1	14:29	50	Flight
347	05/04/2024	VP03	12:30-15:00	Sunny	<i>Buteo rufinus</i>	2	14:30	200	Soaring
348	05/04/2024	VP03	12:30-15:00	Sunny	<i>Gypaetus barbatus</i>	1	14:44	150	Flight
349	05/04/2024	VP03	12:30-15:00	Sunny	<i>Oenanthe pleschanka</i>	1	14:53	0	On the ground
350	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Phylloscopus sp.</i>	3	15:24	1	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
351	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Parus flavipectus</i>	1	15:25	1	On the tree
352	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Parus major</i>	1	15:29	1	On the tree
353	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Phalacrocorax carbo</i>	2	15:34	1	On the ground
354	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Anas platyrhynchos</i>	2	15:40	20	Flight
355	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Tadorna ferruginea</i>	2	15:48	20	Flight
356	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Corvus frugilegus</i>	1	16:00	30	Flight
357	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Pica pica</i>	3	16:12	15	Flight
358	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Larus ridibundus</i>	1	16:18	20	Flight
359	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Larus cachinnans</i>	1	16:22	30	Flight
360	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Phalacrocorax carbo</i>	3	16:29	40	Flight
361	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Parus major</i>	1	16:44	1	On the tree
362	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Acrocephalus palustris</i>	2	16:49	1	In the reeds
363	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Acrocephalus agricola</i>	1	16:53	1	In the reeds
364	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Circus aeruginosus</i>	2	17:01	20	Flight
365	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Milvus migrans</i>	3	17:02	100	Flight
366	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Pica pica</i>	2	17:03	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
367	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Motacilla personata</i>	1	17:05	0	On the ground
368	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Corvus frugilegus</i>	2	17:09	10	Flight
369	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Corvus frugilegus</i>	1	17:15	20	Flight
370	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Cettia cetti</i>	1	17:19	1	On the shrub
371	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Columba livia</i>	9	17:29		Local movements
372	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Larus ridibundus</i>	2	17:34	30	Flight
373	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Pica pica</i>	2	17:39	20	Flight
374	05/04/2024	VP04	15:15-17:45	Partly cloudy	<i>Phalacrocorax carbo</i>	1	17:43	30	Flight
375	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Pica pica</i>	2	07:18	0	On the ground
376	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Corvus frugilegus</i>	3	07:21	20	Flight
377	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Pica pica</i>	1	07:24	30	Flight
378	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Parus flavipectus</i>	1	07:29	1	On the tree
379	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Larus ridibundus</i>	2	07:33	20	Flight
380	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Phoenicurus erythronotus</i>	2	07:27	1	On the shrub
381	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Motacilla personata</i>	2	07:34	2	On the ground
382	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Charadrius dubius</i>	1	07:40	2	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
383	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Corvus frugilegus</i>	2	07:51	20	Flight
384	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Pica pica</i>	3	07:57	30	Local movements
385	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Buteo rufinus</i>	1	08:09	150	Soaring
386	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Corvus frugilegus</i>	2	08:15	20	Flight
387	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Parus major</i>	1	08:23	1	On the shrub
388	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Turdus viscivorus</i>	1	08:27	1	On the tree
389	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Turdus merula</i>	1	08:34	1	On the tree
390	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Turdus merula</i>	2	08:38	1	Flight
391	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Phylloscopus collybita</i>	1	08:42	1	On the shrub
392	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Tadorna ferruginea</i>	2	08:44	30	Flight
393	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Phalacrocorax carbo</i>	1	09:02	30	Flight
394	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Ardea cinerea</i>	3	09:07	0	On the ground
395	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Actitis hypoleucos</i>	1	09:16	0	On the ground
396	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Corvus frugilegus</i>	1	09:23	0	On the ground
397	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Pica pica</i>	2	09:32		Local movements
398	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Corvus frugilegus</i>	1	09:33		Local movements

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
399	06/04/2024	VP05	07:15-09:45	Mainly cloudy	<i>Milvus migrans</i>	2	09:38	30	Flight
400	06/04/2024	VP06	10:00-12:30	Rain	<i>Oenanthe pleschanka</i>	1	10:03	0	On the ground
401	06/04/2024	VP06	10:00-12:30	Rain	<i>Anthus spinoletta</i>	1	10:15	0	On the ground
402	06/04/2024	VP06	10:00-12:30	Rain	<i>Motacilla citreola</i>	1	10:33	0	On the ground
403	06/04/2024	VP06	10:00-12:30	Rain	<i>Alectoris chukar</i>	2	10:45	0	On the ground
404	06/04/2024	VP06	10:00-12:30	Rain	<i>Oenanthe sp.</i>	2	10:49	0	On the ground
405	06/04/2024	VP06	10:00-12:30	Rain	<i>Alectoris chukar</i>	1	10:54	0	On the ground
406	06/04/2024	VP06	10:00-12:30	Rain	<i>Corvus frugilegus</i>	2	11:10	20	Flight
407	06/04/2024	VP06	10:00-12:30	Rain	<i>Pica pica</i>	3	11:15	15	Flight
408	06/04/2024	VP06	10:00-12:30	Rain	<i>Falco tinnunculus</i>	1	11:30	100	Flight
409	06/04/2024	VP06	10:00-12:30	Rain	<i>Buteo buteo</i>	1	11:50	150	Flight
410	06/04/2024	VP06	10:00-12:30	Rain	<i>Corvus frugilegus</i>	7	12:09	0	On the ground
411	06/04/2024	VP06	10:00-12:30	Rain	<i>Curruca communis</i>	1	12:15	1	On the ground
412	06/04/2024	VP06	10:00-12:30	Rain	<i>Pica pica</i>	1	12:23	0	Local movements
413	06/04/2024	VP07	12:40-15:20	Rain	<i>Galerida cristata</i>	4	12:44	0	On the ground
414	06/04/2024	VP07	12:40-15:20	Rain	<i>Oenanthe isabellina</i>	2	12:49	1	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
415	06/04/2024	VP07	12:40-15:20	Rain	<i>Corvus frugilegus</i>	2	13:09	0	On the ground
416	06/04/2024	VP07	12:40-15:20	Rain	<i>Phylloscopus collybita</i>	1	13:12	1	On the tree
417	06/04/2024	VP07	12:40-15:20	Rain	<i>Parus major</i>	2	13:27	1	On the tree
418	06/04/2024	VP07	12:40-15:20	Rain	<i>Buteo rufinus</i>	1	13:29	100	Flight
419	06/04/2024	VP07	12:40-15:20	Rain	<i>Aquila chrysaetos</i>	1	13:44	250	Soaring
420	06/04/2024	VP07	12:40-15:20	Rain	<i>Pica pica</i>	2	14:01	20	Flight
421	06/04/2024	VP07	12:40-15:20	Rain	<i>Corvus frugilegus</i>	3	14:13	20	Flight
422	06/04/2024	VP07	12:40-15:20	Rain	<i>Streptopelia decaocto</i>	3	14:21	1	Local movements
423	06/04/2024	VP07	12:40-15:20	Rain	<i>Pterocles orientalis</i>	2	14:30	15	Flight
424	06/04/2024	VP07	12:40-15:20	Rain	<i>Parus flavipectus</i>	1	14:38	1	On the tree
425	06/04/2024	VP07	12:40-15:20	Rain	<i>Parus major</i>	1	14:47	1	On the tree
426	06/04/2024	VP07	12:40-15:20	Rain	<i>Corvus frugilegus</i>	5	14:58	20	Flight
427	06/04/2024	VP07	12:40-15:20	Rain	<i>Acridotheres tristis</i>	4	15:03	0	On the ground
428	06/04/2024	VP07	12:40-15:20	Rain	<i>Columba livia</i>	12	15:10	30	Flight
429	06/04/2024	VP08	15:30-17:00	Sunny	<i>Charadrius dubius</i>	2	15:30	0	On the ground
430	06/04/2024	VP08	15:30-17:00	Sunny	<i>Motacilla sp</i>	2	15:35	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
431	06/04/2024	VP08	15:30-17:00	Sunny	<i>Columba livia</i>	2	15:44	5	near the water
432	06/04/2024	VP08	15:30-17:00	Sunny	<i>Turdus merula</i>	1	15:46	5	On the tree
433	06/04/2024	VP08	15:30-17:00	Sunny	<i>Podiceps cristatus</i>	3	15:49	0	On the water
434	06/04/2024	VP08	15:30-17:00	Sunny	<i>Fulica atra</i>	6	15:54	0	On the water
435	06/04/2024	VP08	15:30-17:00	Sunny	<i>Tringa nebularia</i>	1	16:10	2	near the water
436	06/04/2024	VP08	15:30-17:00	Sunny	<i>Tachybaptus ruficollis</i>	2	16:14	0	On the water
437	06/04/2024	VP08	15:30-17:00	Sunny	<i>Milvus migrans</i>	2	16:19	50	Flight
438	06/04/2024	VP08	15:30-17:00	Sunny	<i>Corvus frugilegus</i>	3	16:24	20	Flight
439	06/04/2024	VP08	15:30-17:00	Sunny	<i>Pica pica</i>	1	16:27	15	Flight
440	06/04/2024	VP08	15:30-17:00	Sunny	<i>Sterna hirundo</i>	3	16:34	5	Flight
441	06/04/2024	VP08	15:30-17:00	Sunny	<i>Himantopus himantopus</i>	1	16:39	10	Flight
442	06/04/2024	VP08	15:30-17:00	Sunny	<i>Himantopus himantopus</i>	2	16:46	10	Flight
443	06/04/2024	VP08	15:30-17:00	Sunny	<i>Acridotheres tristis</i>	4	16:54	0	On the ground
444	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Motacilla sp</i>	2	06:40	0	On the ground
445	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Oenanthe sp.</i>	1	06:54	0	On the ground
446	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Corvus frugilegus</i>	2	07:05	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
447	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Pica pica</i>	1	07:14	20	Flight
448	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Columba livia</i>	1	07:19	25	Flight
449	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Turdus merula</i>	2	07:25	10	On the power line
450	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Upupa epops</i>	1	07:34	10	On the tree
451	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Oenanthe sp.</i>	1	07:49	0	On the ground
452	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Passer montanus</i>	5	08:03	0	On the ground
453	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Columba livia</i>	12	08:15	20	Flight
454	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Streptopelia decaocto</i>	2	08:24	0	On the ground
455	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Corvus frugilegus</i>	1	08:32	10	Flight
456	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Pica pica</i>	2	08:47	2	Local movements
457	09/04/2024	VP01	06:30-09:00	Cloudy, windy	<i>Motacilla sp.</i>	1	08:52	0	On the ground
458	12/04/2024	VP01	08:00-10:30	Sunny	<i>Columba livia</i>	4	08:00	50	Flight
459	12/04/2024	VP01	08:00-10:30	Sunny	<i>Accipiter nisus</i>	1	08:03	150	Flight
460	12/04/2024	VP01	08:00-10:30	Sunny	<i>Oenanthe sp.</i>	1	08:19	0	On the ground
461	12/04/2024	VP01	08:00-10:30	Sunny	<i>Oenanthe sp.</i>	2	08:23	0	On the ground
462	12/04/2024	VP01	08:00-10:30	Sunny	<i>Corvus frugilegus</i>	1	08:24	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
463	12/04/2024	VP01	08:00-10:30	Sunny	<i>Pica pica</i>	2	08:26	20	Flight
464	12/04/2024	VP01	08:00-10:30	Sunny	<i>Alauda arvensis</i>	1	08:33	0	On the ground
465	12/04/2024	VP01	08:00-10:30	Sunny	<i>Motacilla personata</i>	2	08:41	0	On the ground
466	12/04/2024	VP01	08:00-10:30	Sunny	<i>Motacilla cinerea</i>	1	08:47	0	On the ground
467	12/04/2024	VP01	08:00-10:30	Sunny	<i>Parus flavipectus</i>	1	09:03	5	On the tree
468	12/04/2024	VP01	08:00-10:30	Sunny	<i>Upupa epops</i>	1	09:13	15	On the power line
469	12/04/2024	VP01	08:00-10:30	Sunny	<i>Cuculus canorus</i>	1	09:19	on the power line	On the power line
470	12/04/2024	VP01	08:00-10:30	Sunny	<i>Corvus frugilegus</i>	3	09:24	30	Flight
471	12/04/2024	VP01	08:00-10:30	Sunny	<i>Columba livia</i>	1	09:37	30	Flight
472	12/04/2024	VP01	08:00-10:30	Sunny	<i>Buteo rufinus</i>	1	09:44	100	Flight
473	12/04/2024	VP01	08:00-10:30	Sunny	<i>Corvus frugilegus</i>	4	09:50	25	Flight
474	12/04/2024	VP01	08:00-10:30	Sunny	<i>Turdus merula</i>	1	10:04	0	On the ground
475	12/04/2024	VP01	08:00-10:30	Sunny	<i>Oenanthe isabellina</i>	2	10:19	0	On the ground
476	12/04/2024	VP01	08:00-10:30	Sunny	<i>Buteo rufinus</i>	1	10:24	100	Flight
477	12/04/2024	VP01	08:00-10:30	Sunny	<i>Pica pica</i>	1	10:33	10	Local movements
478	12/04/2024	VP02	10:40-13:10	Sunny	<i>Corvus frugilegus</i>	1	10:43	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
479	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Pica pica</i>	2	10:46	30	Flight
480	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Gyps himalayensis</i>	2	10:53	200	Soaring
481	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Aegypius monachus</i>	1	10:57	200	Soaring
482	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Aegypius monachus</i>	2	11:00	200	Soaring
483	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Pica pica</i>	1	11:03	50	Flight
484	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Motacilla personata</i>	1	11:08	0	On the ground
485	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Emberiza calandra</i>	1	11:17	1	On the shrub
486	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Phoenicurus erythronotus</i>	1	11:29	1	On the shrub
487	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Falco tinnunculus</i>	1	11:36	50	Flight
488	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Turdus merula</i>	1	11:49	1	On the shrub
489	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Oenanthe isabellina</i>	2	12:05	0	On the ground
490	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Oenanthe pleschanka</i>	2	12:19	1	On the shrub
491	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Corvus frugilegus</i>	1	12:33	20	Flight
492	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Corvus frugilegus</i>	3	12:39	20	Flight
493	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Pica pica</i>	1	12:42	30	Flight
494	12/04/2024	VP0 2	10:40-13:10	Sunny	<i>Falco tinnunculus</i>	1	12:44	100	Soaring

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
495	12/04/2024	VP02	10:40-13:10	Sunny	<i>Pica pica</i>	3	12:58	0	On the ground
496	12/04/2024	VP02	10:40-13:10	Sunny	<i>Pica pica</i>	1	13:09	1	On the shrub
497	12/04/2024	VP02	10:40-13:10	Sunny	<i>Pica pica</i>	2	13:12	0	On the ground
498	12/04/2024	VP03	13:25-15:55	Sunny	<i>Gyps himalayensis</i>	2	13:25	250	Soaring
499	12/04/2024	VP03	13:25-15:55	Sunny	<i>Gyps himalayensis</i>	3	13:34	250	Soaring
500	12/04/2024	VP03	13:25-15:55	Sunny	<i>Gypaetus barbatus</i>	2	13:36	70	Flight
501	12/04/2024	VP03	13:25-15:55	Sunny	<i>Corvus frugilegus</i>	1	13:40	30	Flight
502	12/04/2024	VP03	13:25-15:55	Sunny	<i>Columba rupestris</i>	7	14:03	60	On the ground
503	12/04/2024	VP03	13:25-15:55	Sunny	<i>Columba rupestris</i>	2	14:06	60	On the ground
504	12/04/2024	VP03	13:25-15:55	Sunny	<i>Columba livia</i>	4	14:23	50	Flight
505	12/04/2024	VP03	13:25-15:55	Sunny	<i>Monticola saxatilis</i>	2	14:37	30	On the ground
506	12/04/2024	VP03	13:25-15:55	Sunny	<i>Motacilla personata</i>	2	14:40	0	On the ground
507	12/04/2024	VP03	13:25-15:55	Sunny	<i>Motacilla cinerea</i>	1	15:08	0	On the ground
508	12/04/2024	VP03	13:25-15:55	Sunny	<i>Parus flavipectus</i>	1	15:14	5	Flight
509	12/04/2024	VP03	13:25-15:55	Sunny	<i>Turdus merula</i>	2	15:23	0	On the ground
510	12/04/2024	VP03	13:25-15:55	Sunny	<i>Oenanthe sp.</i>	2	15:26	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
511	12/04/2024	VP03	13:25-15:55	Sunny	<i>Anthus spinoletta</i>	1	15:34	0	On the ground
512	12/04/2024	VP03	13:25-15:55	Sunny	<i>Gyps himalayensis</i>	2	15:40	100	Soaring
513	12/04/2024	VP03	13:25-15:55	Sunny	<i>Buteo rufinus</i>	1	15:44	100	Soaring
514	12/04/2024	VP03	13:25-15:55	Sunny	<i>Buteo rufinus</i>	2	15:45	150	Flight
515	12/04/2024	VP04	16:15-18:45	Sunny	<i>Tadorna ferruginea</i>	2	16:15	40	Flight
516	12/04/2024	VP04	16:15-18:45	Sunny	<i>Anas platyrhynchos</i>	2	16:24	30	Flight
517	12/04/2024	VP04	16:15-18:45	Sunny	<i>Pica pica</i>	1	16:33	50	Flight
518	12/04/2024	VP04	16:15-18:45	Sunny	<i>Corvus frugilegus</i>	5	16:36	50	Flight
519	12/04/2024	VP04	16:15-18:45	Sunny	<i>Phalacrocorax carbo</i>	1	16:45	20	Flight
520	12/04/2024	VP04	16:15-18:45	Sunny	<i>Larus cachinnans</i>	1	16:51	30	Flight
521	12/04/2024	VP04	16:15-18:45	Sunny	<i>Ardea cinerea</i>	1	17:09	30	Flight
522	12/04/2024	VP04	16:15-18:45	Sunny	<i>Buteo rufinus</i>	3	17:12	100	Soaring
523	12/04/2024	VP04	16:15-18:45	Sunny	<i>Corvus frugilegus</i>	1	17:20	20	Flight
524	12/04/2024	VP04	16:15-18:45	Sunny	<i>Acridotheres tristis</i>	3	17:36	10	Flight
525	12/04/2024	VP04	16:15-18:45	Sunny	<i>Columba livia</i>	10	17:39	15	Flight
526	12/04/2024	VP04	16:15-18:45	Sunny	<i>Columba livia</i>	2	17:50	15	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
527	12/04/2024	VP04	16:15-18:45	Sunny	<i>Buteo buteo</i>	1	18:15	100	Flight
528	12/04/2024	VP04	16:15-18:45	Sunny	<i>Pica pica</i>	2	18:24	2	Flight
529	13/04/2024	VP08	06:50-09:20	Sunny	<i>Motacilla personata</i>	1	06:50	0	On the ground
530	13/04/2024	VP08	06:50-09:20	Sunny	<i>Turdus merula</i>	1	06:55	0	On the ground
531	13/04/2024	VP08	06:50-09:20	Sunny	<i>Turdus atrogularis</i>	2	06:59	0	On the ground
532	13/04/2024	VP08	06:50-09:20	Sunny	<i>Parus flavipectus</i>	2	07:05	1	On the tree
533	13/04/2024	VP08	06:50-09:20	Sunny	<i>Periparus ater</i>	1	07:13	1	On the tree
534	13/04/2024	VP08	06:50-09:20	Sunny	<i>Parus major</i>	2	07:19	1	On the tree
535	13/04/2024	VP08	06:50-09:20	Sunny	<i>Fulica atra</i>	8	07:23	0	on the water
536	13/04/2024	VP08	06:50-09:20	Sunny	<i>Tachybaptus ruficollis</i>	2	07:35	0	on the water
537	13/04/2024	VP08	06:50-09:20	Sunny	<i>Podiceps cristatus</i>	2	07:39	0	on the water
538	13/04/2024	VP08	06:50-09:20	Sunny	<i>Fulica atra</i>	5	07:44	0	on the water
539	13/04/2024	VP08	06:50-09:20	Sunny	<i>Sterna hirundo</i>	2	08:03	5	Flight
540	13/04/2024	VP08	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	2	08:12	0	On the ground
541	13/04/2024	VP08	06:50-09:20	Sunny	<i>Himantopus himantopus</i>	1	08:14	5	Flight
542	13/04/2024	VP08	06:50-09:20	Sunny	<i>Columba livia</i>	3	08:20	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
543	13/04/2024	VP08	06:50-09:20	Sunny	<i>Pica pica</i>	2	08:22	0	On the ground
544	13/04/2024	VP08	06:50-09:20	Sunny	<i>Larus ridibundus</i>	1	08:34	5	Flight
545	13/04/2024	VP08	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	2	08:46	0	On the ground
546	13/04/2024	VP08	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	1	09:01	20	Flight
547	13/04/2024	VP08	06:50-09:20	Sunny	<i>Fulica atra</i>	2	09:10	0	on the water
548	13/04/2024	VP08	06:50-09:20	Sunny	<i>Sterna hirundo</i>	2	09:12	5	Flight
549	13/04/2024	VP08	06:50-09:20	Sunny	<i>Chlidonias hybrida</i>	2	09:17	5	Flight
550	13/04/2024	VP08	06:50-09:20	Sunny	<i>Charadrius dubius</i>	2	09:18	0	On the ground
551	13/04/2024	VP07	09:35-12:05	Sunny	<i>Buteo buteo</i>	1	09:35	100	Flight
552	13/04/2024	VP07	09:35-12:05	Sunny	<i>Phylloscopus sp.</i>	1	09:40	1	On the tree
553	13/04/2024	VP07	09:35-12:05	Sunny	<i>Parus cinereus</i>	2	10:03	1	On the tree
554	13/04/2024	VP07	09:35-12:05	Sunny	<i>Parus major</i>	1	10:12	1	On the tree
555	13/04/2024	VP07	09:35-12:05	Sunny	<i>Upupa epops</i>	1	10:24	0	On the ground
556	13/04/2024	VP07	09:35-12:05	Sunny	<i>Falco tinnunculus</i>	1	10:35	100	Soaring
557	13/04/2024	VP07	09:35-12:05	Sunny	<i>Alectoris chukar</i>	2	11:03	0	On the ground
558	13/04/2024	VP07	09:35-12:05	Sunny	<i>Motacilla personata</i>	1	11:12	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
559	13/04/2024	VP07	09:35-12:05	Sunny	<i>Oenanthe sp.</i>	2	11:27	0	On the ground
560	13/04/2024	VP07	09:35-12:05	Sunny	<i>Oenanthe isabellina</i>	1	11:36	0	On the ground
561	13/04/2024	VP07	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	1	11:42	20	Flight
562	13/04/2024	VP07	09:35-12:05	Sunny	<i>Columba livia</i>	2	11:49	0	On the ground
563	13/04/2024	VP07	09:35-12:05	Sunny	<i>Phalacrocorax carbo</i>	1	12:00	50	Flight
564	13/04/2024	VP06	12:15-14:45	Sunny	<i>Oenanthe sp.</i>	1	13:03	0	On the ground
565	13/04/2024	VP06	12:15-14:45	Sunny	<i>Anthus spinoletta</i>	2	13:12	0	On the ground
566	13/04/2024	VP06	12:15-14:45	Sunny	<i>Melanocorypha calandra</i>	1	13:20	0	On the ground
567	13/04/2024	VP06	12:15-14:45	Sunny	<i>Aquila chrysaetos</i>	1	13:29	200	Soaring
568	13/04/2024	VP06	12:15-14:45	Sunny	<i>Buteo buteo</i>	1	13:37	20	Flight
569	13/04/2024	VP06	12:15-14:45	Sunny	<i>Pica pica</i>	2	13:38	0	On the ground
570	13/04/2024	VP06	12:15-14:45	Sunny	<i>Columba livia</i>	2	13:42	20	Flight
571	13/04/2024	VP06	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	13:44	30	Flight
572	13/04/2024	VP06	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	9	13:50	20	Flight
573	13/04/2024	VP06	12:15-14:45	Sunny	<i>Phylloscopus sp.</i>	1	13:52	1	Local movements
574	13/04/2024	VP06	12:15-14:45	Sunny	<i>Phoenicurus</i>	2	14:07	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
575	13/04/2024	VP06	12:15-14:45	Sunny	<i>Alectoris chukar</i>	3	14:12	0	On the ground
576	13/04/2024	VP06	12:15-14:45	Sunny	<i>Alectoris chukar</i>	2	14:29	0	On the ground
577	13/04/2024	VP05	15:00-17:30	Sunny	<i>Ardea cinerea</i>	1	15:15	30	Flight
578	13/04/2024	VP05	15:00-17:30	Sunny	<i>Anas platyrhynchos</i>	2	15:34	20	Flight
579	13/04/2024	VP05	15:00-17:30	Sunny	<i>Larus ridibundus</i>	2	15:36	20	Flight
580	13/04/2024	VP05	15:00-17:30	Sunny	<i>Corvus frugilegus</i>	2	15:40	30	Flight
581	13/04/2024	VP05	15:00-17:30	Sunny	<i>Pica pica</i>	1	16:01	15	Flight
582	13/04/2024	VP05	15:00-17:30	Sunny	<i>Acridotheres tristis</i>	2	16:12	50	Flight
583	13/04/2024	VP05	15:00-17:30	Sunny	<i>Columba livia</i>	2	16:37	30	Flight
584	13/04/2024	VP05	15:00-17:30	Sunny	<i>Columba livia</i>	3	16:40	30	Flight
585	13/04/2024	VP05	15:00-17:30	Sunny	<i>Falco tinnunculus</i>	1	17:01	100	Soaring
586	13/04/2024	VP05	15:00-17:30	Sunny	<i>Cettia cetti</i>	1	17:09	1	On the shrub
587	13/04/2024	VP05	15:00-17:30	Sunny	<i>Circus aeruginosus</i>	1	17:12	10	Flight
588	13/04/2024	VP05	15:00-17:30	Sunny	<i>Corvus frugilegus</i>	2	17:20	10	Flight
589	13/04/2024	VP05	15:00-17:30	Sunny	<i>Pica pica</i>	2	17:26	20	Flight
590	13/04/2024	VP05	15:00-17:30	Sunny	<i>Corvus frugilegus</i>	1	17:28	50	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
591	14/04/2024	VP01	08:00-10:30	Rain	<i>Corvus frugilegus</i>	2	08:02	10	Flight
592	14/04/2024	VP01	08:00-10:30	Rain	<i>Pica pica</i>	1	08:12	20	Flight
593	14/04/2024	VP01	08:00-10:30	Rain	<i>Upupa epops</i>	2	08:17	0	On the ground
594	14/04/2024	VP01	08:00-10:30	Rain	<i>Oenanthe sp.</i>	2	08:24	0	On the ground
595	14/04/2024	VP01	08:00-10:30	Rain	<i>Oenanthe sp.</i>	2	08:36	0	On the ground
596	14/04/2024	VP01	08:00-10:30	Rain	<i>Pica pica</i>	1	09:15	0	On the ground
597	14/04/2024	VP01	08:00-10:30	Rain	<i>Motacilla personata</i>	3	09:24	0	On the ground
598	14/04/2024	VP01	08:00-10:30	Rain	<i>Motacilla personata</i>	1	09:36	0	On the ground
599	14/04/2024	VP01	08:00-10:30	Rain	<i>Pica pica</i>	2	10:06	20	Flight
600	14/04/2024	VP01	08:00-10:30	Rain	<i>Columba livia</i>	10	10:16	30	Flight
601	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Motacilla personata</i>	2	10:14	0	On the ground
602	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Milvus migrans</i>	3	10:23	50	Soaring
603	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Turdus merula</i>	1	10:47	1	On the shrub
604	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Corvus frugilegus</i>	2	11:09	20	Flight
605	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Columba livia</i>	4	11:34	30	Flight
606	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Corvus frugilegus</i>	1	11:49	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
607	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Phoenicurus erythronotus</i>	2	12:03	1	On the shrub
608	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Corvus frugilegus</i>	1	12:20	20	Flight
609	14/04/2024	VP02	10:15-12:45	Heavy rain	<i>Pica pica</i>	2	12:31	20	Flight
610	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Corvus frugilegus</i>	1	10:19	20	Flight
611	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Alectoris chukar</i>	2	10:23	0	On the ground
612	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Columba oenas</i>	5	10:29	20	Flight
613	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Pica pica</i>	2	10:34	30	Flight
614	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Aquila chrysaetos</i>	1	10:40	200	Soaring
615	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Motacilla personata</i>	1	10:57	0	On the ground
616	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Motacilla cinerea</i>	1	11:23	0	On the ground
617	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Phylloscopus sp.</i>	1	11:29	1	On the shrub
618	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Corvus frugilegus</i>	3	11:36	2	Local movements
619	14/04/2024	VP03	10:15-12:45	Heavy rain	<i>Columba livia</i>	6	11:47	50	Flight
620	14/04/2024	VP03	10:15-12:45	Rain	<i>Gyps himalayensis</i>	3	12:01	300	Soaring
621	14/04/2024	VP03	10:15-12:45	Rain	<i>Motacilla sp</i>	2	12:26	0	On the ground
622	14/04/2024	VP03	10:15-12:45	Rain	<i>Tichodroma muraria</i>	1	12:39	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
623	14/04/2024	VP04	15:45-18:45	Rain	<i>Larus ridibundus</i>	3	15:49	20	Flight
624	14/04/2024	VP04	15:45-18:45	Rain	<i>Mareca penelope</i>	2	15:51	30	Flight
625	14/04/2024	VP04	15:45-18:45	Rain	<i>Anas platyrhynchos</i>	2	15:59	30	Flight
626	14/04/2024	VP04	15:45-18:45	Rain	<i>Falco tinnunculus</i>	1	16:12	100	Soaring
627	14/04/2024	VP04	15:45-18:45	Rain	<i>Corvus frugilegus</i>	2	16:23	20	Flight
628	14/04/2024	VP04	15:45-18:45	Rain	<i>Himantopus himantopus</i>	3	16:39	20	Flight
629	14/04/2024	VP04	15:45-18:45	Rain	<i>Phalacrocorax carbo</i>	1	17:07	30	Flight
630	14/04/2024	VP04	15:45-18:45	Rain	<i>Pica pica</i>	1	17:15	50	Flight
631	14/04/2024	VP04	15:45-18:45	Rain	<i>Phalacrocorax carbo</i>	1	17:29	30	Flight
632	14/04/2024	VP04	15:45-18:45	Rain	<i>Ardea cinerea</i>	2	17:45	10	Flight
633	14/04/2024	VP04	15:45-18:45	Rain	<i>Phoenicurus</i>	3	18:00	1	Flight
634	14/04/2024	VP04	15:45-18:45	Rain	<i>Pica pica</i>	1	18:26	10	Flight
635	26/04/2024	VP08	14:00-16:30	Rain	<i>Arenaria interpres</i>	3	14:00	0	On the ground
636	26/04/2024	VP08	14:00-16:30	Rain	<i>Larus ridibundus</i>	2	14:06	0	On the ground
637	26/04/2024	VP08	14:00-16:30	Rain	<i>Corvus frugilegus</i>	1	14:23	0	On the ground
638	26/04/2024	VP08	14:00-16:30	Rain	<i>Motacilla personata</i>	2	14:36	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
639	26/04/2024	VP08	14:00-16:30	Rain	<i>Fulica atra</i>	5	14:37	0	on the water
640	26/04/2024	VP08	14:00-16:30	Rain	<i>Podiceps cristatus</i>	1	14:44	0	on the water
641	26/04/2024	VP08	14:00-16:30	Rain	<i>Corvus frugilegus</i>	5	15:01	50	Flight
642	26/04/2024	VP08	14:00-16:30	Rain	<i>Himantopus himantopus</i>	4	15:15	5	Flight
643	26/04/2024	VP08	14:00-16:30	Rain	<i>Charadrius dubius</i>	1	15:35	0	On the ground
644	26/04/2024	VP08	14:00-16:30	Rain	<i>Calidris temminckii</i>	6	15:50	0	On the ground
645	26/04/2024	VP08	14:00-16:30	Rain	<i>Columba livia</i>	2	16:01	0	On the ground
646	26/04/2024	VP08	14:00-16:30	Rain	<i>Pica pica</i>	1	16:10	20	Flight
647	26/04/2024	VP08	14:00-16:30	Rain	<i>Columba livia</i>	2	16:16	0	On the ground
648	26/04/2024	VP08	14:00-16:30	Rain	<i>Turdus merula</i>	1	16:27	1	On the tree
649	26/04/2024	VP08	14:00-16:30	Rain	<i>Larus cachinnans</i>	1	16:29	20	Flight
650	26/04/2024	VP07	16:40-19:10	Rain	<i>Milvus migrans</i>	2	16:40	100	Soaring
651	26/04/2024	VP07	16:40-19:10	Rain	<i>Corvus frugilegus</i>	1	16:46	20	Flight
652	26/04/2024	VP07	16:40-19:10	Rain	<i>Pica pica</i>	2	16:50	30	Flight
653	26/04/2024	VP07	16:40-19:10	Rain	<i>Motacilla sp</i>	1	17:03	0	On the ground
654	26/04/2024	VP07	16:40-19:10	Rain	<i>Oenanthe isabellina</i>	2	17:10	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
655	26/04/2024	VP07	16:40-19:10	Rain	<i>Corvus frugilegus</i>	1	17:15	20	Flight
656	26/04/2024	VP07	16:40-19:10	Rain	<i>Buteo rufinus</i>	1	17:27	150	Soaring
657	26/04/2024	VP07	16:40-19:10	Rain	<i>Corvus frugilegus</i>	1	17:33	20	Flight
658	26/04/2024	VP07	16:40-19:10	Rain	<i>Turdus merula</i>	2	17:49	1	On the tree
659	26/04/2024	VP07	16:40-19:10	Rain	<i>Corvus frugilegus</i>	1	18:03	1	On the tree
660	26/04/2024	VP07	16:40-19:10	Rain	<i>Milvus migrans</i>	2	18:20	50	Flight
661	26/04/2024	VP07	16:40-19:10	Rain	<i>Pica pica</i>	1	18:37	1	On the tree
662	26/04/2024	VP07	16:40-19:10	Rain	<i>Columba livia</i>	1	18:46	2	Local movements
663	26/04/2024	VP07	16:40-19:10	Rain	<i>Acridotheres tristis</i>	10	19:00	0	On the ground
664	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Oenanthe sp.</i>	2	07:40	0	On the ground
665	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	1	07:46	20	Local movements
666	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Columba livia</i>	2	07:49	10	On the wires
667	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Falco subbuteo</i>	1	08:12	100	Flight
668	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Upupa epops</i>	2	08:16	10	Flight
669	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Pica pica</i>	1	08:27	30	Flight
670	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	1	08:33	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
671	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Milvus migrans</i>	2	08:49	15	On the power line
672	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Upupa epops</i>	1	09:12	0	On the ground
673	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Oenanthe sp.</i>	2	09:27	0	On the ground
674	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Parus flavipectus</i>	1	09:33	0	On the tree
675	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Motacilla personata</i>	2	09:39	0	On the ground
676	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Pica pica</i>	1	09:44	20	Flight
677	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Columba livia</i>	2	09:55	0	On the ground
678	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Spilopelia senegalensis</i>	2	09:59	20	Flight
679	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	1	10:06	0	On the ground
680	27/04/2024	VP01	07:40-10:10	Cloudy	<i>Oenanthe sp.</i>	2	10:09	0	On the ground
681	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Milvus migrans</i>	3	10:22	150	Soaring
682	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Pica pica</i>	2	10:36	0	On the ground
683	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Falco tinnunculus</i>	2	10:39	100	Soaring
684	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Gyps himalayensis</i>	3	10:44	200	Soaring
685	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Pica pica</i>	1	10:50	20	Flight
686	27/04/2024	VP02	10:20-12:55	Cloudy	<i>Corvus frugilegus</i>	1	11:10	30	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
687	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Coracias garrulus</i>	2	11:12	20	Flight
688	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Motacilla personata</i>	1	11:23	0	On the ground
689	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Gyps himalayensis</i>	2	11:27	200	Soaring
690	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Phoenicurus erythronotus</i>	1	11:33	2	On the ground
691	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Pica pica</i>	1	11:39	50	Flight
692	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Corvus frugilegus</i>	2	11:40	0	On the ground
693	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Corvus frugilegus</i>	1	11:44	0	On the ground
694	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Oenanthe pleschanka</i>	2	11:50	0	On the ground
695	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Turdus merula</i>	1	11:52	1	On the shrub
696	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Falco tinnunculus</i>	1	12:01	100	Flight
697	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Corvus frugilegus</i>	1	12:12	5	Local movements
698	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Pica pica</i>	2	12:36	10	Local movements
699	27/04/2024	VP0 2	10:20-12:55	Cloudy	<i>Columba livia</i>	10	12:45	5	Local movements
700	27/04/2024	VP0 3	15:10-17:45	Cloudy	<i>Coracias garrulus</i>	2	15:12	20	Flight
701	27/04/2024	VP0 3	15:10-17:45	Cloudy	<i>Corvus frugilegus</i>	10	15:27	30	Flight
702	27/04/2024	VP0 3	15:10-17:45	Cloudy	<i>Columba livia</i>	9	15:36	50	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
703	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Aquila chrysaetos</i>	1	15:44	300	Soaring
704	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Motacilla personata</i>	2	15:50	0	On the ground
705	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Parus flavipectus</i>	2	16:00	1	On the shrub
706	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Monticola saxatilis</i>	2	16:02	20	On the ground
707	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Tichodroma muraria</i>	2	16:29	30	On the ground
708	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Corvus frugilegus</i>	1	16:34	50	Flight
709	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Pica pica</i>	1	16:50	20	Flight
710	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Aegypius monachus</i>	2	17:02	200	Flight
711	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Gyps himalayensis</i>	1	17:10	200	Flight
712	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Pica pica</i>	3	17:12	30	Flight
713	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Streptopelia decaocto</i>	1	17:30	0	On the ground
714	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Corvus frugilegus</i>	1	17:31	0	On the ground
715	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Phoenicurus sp.</i>	2	17:33	0	On the ground
716	27/04/2024	VP03	15:10-17:45	Cloudy	<i>Pica pica</i>	1	17:44	0	On the ground
717	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Pica pica</i>	2	07:41	20	Flight
718	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	1	07:44	30	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
719	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	2	07:46	20	Flight
720	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Acridotheres tristis</i>	4	07:49	20	Flight
721	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Phalacrocorax carbo</i>	2	07:51	15	Flight
722	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Ardea cinerea</i>	1	07:56	10	Flight
723	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Pica pica</i>	1	08:10	20	Flight
724	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Circus aeruginosus</i>	1	08:15	10	Flight
725	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Motacilla personata</i>	2	08:24	0	On the ground
726	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Acrocephalus palustris</i>	1	08:36	0	In the reeds
727	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	2	08:44	20	Flight
728	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Acrocephalus agricola</i>	2	08:56	1	In the reeds
729	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Locustella certhiola</i>	1	09:03	1	In the reeds
730	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Acridotheres tristis</i>	1	09:12	5	Flight
731	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Pica pica</i>	3	09:26	50	Flight
732	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Corvus frugilegus</i>	1	09:37	10	Flight
733	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Ardea cinerea</i>	3	09:44	20	Flight
734	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Phalacrocorax carbo</i>	2	09:55	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
735	28/04/2024	VP04	07:40-10:10	Cloudy	<i>Falco tinnunculus</i>	1	10:06	50	Soaring
736	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Ciconia nigra</i>	1	09:33	70	Soaring
737	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Pica pica</i>	1	09:40	30	Flight
738	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Acridotheres tristis</i>	2	09:45	0	On the ground
739	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Corvus frugilegus</i>	1	09:55	20	Flight
740	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Columba livia</i>	8	09:58	30	Flight
741	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Acridotheres tristis</i>	4	10:12	0	On the ground
742	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Pica pica</i>	2	10:19	20	Flight
743	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Columba livia</i>	10	10:20	50	Flight
744	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Anas platyrhynchos</i>	2	10:23	10	Flight
745	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Phoenicurus</i>	2	10:27	1	On the shrub
746	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Cettia cetti</i>	1	10:35	1	On the shrub
747	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Parus flavipectus</i>	1	10:45	1	On the shrub
748	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Phylloscopus collybita</i>	1	10:50	1	On the shrub
749	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Corvus frugilegus</i>	1	11:03	30	Flight
750	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Larus cachinnans</i>	2	11:15	50	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
751	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Pica pica</i>	1	11:30	0	On the ground
752	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Larus ridibundus</i>	4	11:34	10	Flight
753	28/04/2024	VP05	09:30-11:50	Cloudy	<i>Corvus frugilegus</i>	6	11:45	20	Flight
754	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Oenanthe pleschanka</i>	2	14:33	0	On the ground
755	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Melanocorypha calandra</i>	3	14:40	0	On the ground
756	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Buteo buteo</i>	1	14:50	0	On the ground
757	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Pica pica</i>	2	15:12	20	Flight
758	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Corvus frugilegus</i>	1	15:37	20	Flight
759	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Columba livia</i>	5	15:49	30	Flight
760	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Oenanthe pleschanka</i>	1	16:02	0	On the ground
761	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Buteo buteo</i>	3	16:14	150	Soaring
762	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Oenanthe isabellina</i>	2	16:30	0	On the ground
763	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Anthus richardi</i>	1	16:44	0	On the ground
764	28/04/2024	VP06	14:30-17:00	Cloudy	<i>Corvus frugilegus</i>	4	16:46	20	Flight
765	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Corvus frugilegus</i>	2	08:00	30	Flight
766	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Pica pica</i>	1	08:12	50	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
767	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Alectoris chukar</i>	2	08:23	0	On the ground
768	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Acridotheres tristis</i>	3	08:37	0	On the ground
769	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Columba livia</i>	2	08:50	50	Flight
770	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Aquila chrysaetos</i>	1	09:03	300	Soaring
771	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Pica pica</i>	3	09:13	50	Flight
772	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Alectoris chukar</i>	2	09:20	0	On the ground
773	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Corvus frugilegus</i>	1	09:27	20	Flight
774	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Oenanthe pleschanka</i>	2	09:30	0	On the ground
775	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Phasianus colchicus</i>	2	09:40	0	On the ground
776	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Pica pica</i>	1	10:09	20	Flight
777	29/04/2024	VP06	08:00-10:30	Cloudy	<i>Buteo buteo</i>	1	10:22	150	Soaring
778	29/04/2024	VP07	10:45-13:15	Rain	<i>Parus flavipectus</i>	1	10:46	1	On the shrub
779	29/04/2024	VP07	10:45-13:15	Rain	<i>Parus major</i>	2	10:49	1	On the shrub
780	29/04/2024	VP07	10:45-13:15	Rain	<i>Phylloscopus trochiloides</i>	2	11:12	1	On the shrub
781	29/04/2024	VP07	10:45-13:15	Rain	<i>Phylloscopus collybita</i>	1	11:13	1	On the shrub
782	29/04/2024	VP07	10:45-13:15	Rain	<i>Corvus frugilegus</i>	1	11:29	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
783	29/04/2024	VP07	10:45-13:15	Rain	<i>Milvus migrans</i>	2	11:39	100	Soaring
784	29/04/2024	VP07	10:45-13:15	Rain	<i>Pica pica</i>	1	11:50	20	Flight
785	29/04/2024	VP07	10:45-13:15	Rain	<i>Acridotheres tristis</i>	4	12:12	0	On the ground
786	29/04/2024	VP07	10:45-13:15	Rain	<i>Buteo rufinus</i>	2	12:30	100	Flight
787	29/04/2024	VP07	10:45-13:15	Rain	<i>Columba livia</i>	1	12:44	50	Flight
788	29/04/2024	VP07	10:45-13:15	Rain	<i>Pterocles orientalis</i>	20	12:46	20	Flight
789	29/04/2024	VP07	10:45-13:15	Rain	<i>Galerida cristata</i>	2	12:50	0	On the ground
790	29/04/2024	VP07	10:45-13:15	Rain	<i>Larus cachinnans</i>	1	12:55	30	Flight
791	29/04/2024	VP07	10:45-13:15	Rain	<i>Tadorna ferruginea</i>	2	13:09	20	Flight
792	29/04/2024	VP07	10:45-13:15	Rain	<i>Acridotheres tristis</i>	7	13:15	5	Local movements
794	29/04/2024	VP08	15:00-17:30	Rain	<i>Turdus merula</i>	2	15:01	2	On the tree
795	29/04/2024	VP08	15:00-17:30	Rain	<i>Pica pica</i>	1	15:03	0	On the ground
796	29/04/2024	VP08	15:00-17:30	Rain	<i>Parus flavipectus</i>	2	15:12	1	On the tree
797	29/04/2024	VP08	15:00-17:30	Rain	<i>Fulica atra</i>	5	15:36	0	On the water
798	29/04/2024	VP08	15:00-17:30	Rain	<i>Acridotheres tristis</i>	2	15:40	0	On the ground
799	29/04/2024	VP08	15:00-17:30	Rain	<i>Motacilla personata</i>	3	15:50	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
800	29/04/2024	VP08	15:00-17:30	Rain	<i>Accipiter nisus</i>	1	16:03	70	Flight
801	29/04/2024	VP08	15:00-17:30	Rain	<i>Himantopus himantopus</i>	2	16:12	5	Flight
802	29/04/2024	VP08	15:00-17:30	Rain	<i>Charadrius dubius</i>	2	16:25	0	On the ground
803	29/04/2024	VP08	15:00-17:30	Rain	<i>Larus ridibundus</i>	2	16:38	5	Flight
804	29/04/2024	VP08	15:00-17:30	Rain	<i>Larus ridibundus</i>	3	16:40	0	On the ground
805	29/04/2024	VP08	15:00-17:30	Rain	<i>Charadrius dubius</i>	1	16:50	0	On the ground
806	29/04/2024	VP08	15:00-17:30	Rain	<i>Sterna hirundo</i>	2	17:00	0	Flight
807	29/04/2024	VP08	15:00-17:30	Rain	<i>Tringa nebularia</i>	1	17:02	0	On the ground
808	29/04/2024	VP08	15:00-17:30	Rain	<i>Vanellus vanellus</i>	2	17:05	0	On the ground
809	29/04/2024	VP08	15:00-17:30	Rain	<i>Tringa erythropus</i>	2	17:12	0	On the ground
810	29/04/2024	VP08	15:00-17:30	Rain	<i>Acridotheres tristis</i>	6	17:13	0	On the ground
811	29/04/2024	VP08	15:00-17:30	Rain	<i>Columba livia</i>	2	17:18	0	On the ground
812	29/04/2024	VP08	15:00-17:30	Rain	<i>Larus ridibundus</i>	1	17:23	0	Flight
813	07/05/2024	VP08	07:30-10:00	Sunny	<i>Larus ridibundus</i>	2	07:30	5	Flight
814	07/05/2024	VP08	07:30-10:00	Sunny	<i>Phalacrocorax carbo</i>	1	07:40	50	Flight
815	07/05/2024	VP08	07:30-10:00	Sunny	<i>Spatula querquedula</i>	2	07:45	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
816	07/05/2024	VP08	07:30-10:00	Sunny	<i>Larus ridibundus</i>	2	07:57	0	On the ground
817	07/05/2024	VP08	07:30-10:00	Sunny	<i>Acridotheres tristis</i>	4	08:03	0	On the ground
818	07/05/2024	VP08	07:30-10:00	Sunny	<i>Tadorna ferruginea</i>	2	08:12	50	Flight
819	07/05/2024	VP08	07:30-10:00	Sunny	<i>Pica pica</i>	1	08:20	1	On the tree
820	07/05/2024	VP08	07:30-10:00	Sunny	<i>Parus flavipectus</i>	1	08:26	1	On the tree
821	07/05/2024	VP08	07:30-10:00	Sunny	<i>Periparus ater</i>	1	08:37	1	On the tree
822	07/05/2024	VP08	07:30-10:00	Sunny	<i>Accipiter nisus</i>	1	09:01	100	Soaring
823	07/05/2024	VP08	07:30-10:00	Sunny	<i>Columba livia</i>	4	09:03	0	On the ground
824	07/05/2024	VP08	07:30-10:00	Sunny	<i>Spilopelia senegalensis</i>	2	09:15	0	On the ground
825	07/05/2024	VP08	07:30-10:00	Sunny	<i>Himantopus himantopus</i>	4	09:27	5	Flight
826	07/05/2024	VP08	07:30-10:00	Sunny	<i>Phoenicurus erythronotus</i>	1	09:33	1	On the tree
827	07/05/2024	VP08	07:30-10:00	Sunny	<i>Sterna hirundo</i>	4	09:48	5	Flight
828	07/05/2024	VP08	07:30-10:00	Sunny	<i>Pica pica</i>	1	09:51	20	Flight
829	07/05/2024	VP08	07:30-10:00	Sunny	<i>Corvus frugilegus</i>	2	09:59	20	Local movements
830	07/05/2024	VP07	10:10-12:40	Sunny	<i>Buteo rufinus</i>	2	10:06	0	On the ground
831	07/05/2024	VP07	10:10-12:40	Sunny	<i>Oenanthe pleschanka</i>	2	10:12	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
832	07/05/2024	VP07	10:10-12:40	Sunny	<i>Alectoris chukar</i>	2	10:19	0	On the ground
833	07/05/2024	VP07	10:10-12:40	Sunny	<i>Oenanthe isabellina</i>	1	10:30	0	On the ground
834	07/05/2024	VP07	10:10-12:40	Sunny	<i>Phylloscopus trochiloides</i>	1	10:44	1	On the tree
835	07/05/2024	VP07	10:10-12:40	Sunny	<i>Milvus migrans</i>	1	10:49	150	Soaring
836	07/05/2024	VP07	10:10-12:40	Sunny	<i>Gyps himalayensis</i>	3	11:12	300	Soaring
837	07/05/2024	VP07	10:10-12:40	Sunny	<i>Phoenicurus erythronotus</i>	1	11:25	1	On the tree
838	07/05/2024	VP07	10:10-12:40	Sunny	<i>Columba livia</i>	2	11:30	0	On the ground
839	07/05/2024	VP07	10:10-12:40	Sunny	<i>Pica pica</i>	1	11:34	30	Flight
840	07/05/2024	VP07	10:10-12:40	Sunny	<i>Oenanthe isabellina</i>	1	11:50	0	On the ground
841	07/05/2024	VP07	10:10-12:40	Sunny	<i>Corvus frugilegus</i>	2	12:02	20	Flight
842	07/05/2024	VP07	10:10-12:40	Sunny	<i>Pica pica</i>	1	12:12	1	On the tree
843	07/05/2024	VP07	10:10-12:40	Sunny	<i>Parus flavipectus</i>	2	12:20	1	On the tree
844	07/05/2024	VP06	13:00-15:30	Sunny	<i>Galerida cristata</i>	2	13:20	0	On the ground
845	07/05/2024	VP06	13:00-15:30	Sunny	<i>Oenanthe isabellina</i>	2	13:40	0	On the ground
846	07/05/2024	VP06	13:00-15:30	Sunny	<i>Alectoris chukar</i>	2	13:59	0	On the ground
847	07/05/2024	VP06	13:00-15:30	Sunny	<i>Phylloscopus sp.</i>	1	14:03	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
848	07/05/2024	VP06	13:00-15:30	Sunny	<i>Pica pica</i>	2	14:17	20	Flight
849	07/05/2024	VP06	13:00-15:30	Sunny	<i>Columba livia</i>	8	14:21	30	Flight
850	07/05/2024	VP06	13:00-15:30	Sunny	<i>Pica pica</i>	1	14:33	0	On the ground
851	07/05/2024	VP06	13:00-15:30	Sunny	<i>Falco tinnunculus</i>	2	14:36	30	Flight
852	07/05/2024	VP06	13:00-15:30	Sunny	<i>Passer montanus</i>	10	14:46	0	On the ground
853	07/05/2024	VP06	13:00-15:30	Sunny	<i>Anthus spinoletta</i>	2	14:53	0	On the ground
854	07/05/2024	VP06	13:00-15:30	Sunny	<i>Phasianus colchicus</i>	2	15:07	0	On the ground
855	07/05/2024	VP06	13:00-15:30	Sunny	<i>Pica pica</i>	1	15:09	20	Flight
856	07/05/2024	VP06	13:00-15:30	Sunny	<i>Corvus frugilegus</i>	1	15:28	30	Flight
857	07/05/2024	VP05	15:45-18:15	Sunny	<i>Anas acuta</i>	3	15:44	20	Flight
858	07/05/2024	VP05	15:45-18:15	Sunny	<i>Corvus frugilegus</i>	4	15:53	30	Flight
859	07/05/2024	VP05	15:45-18:15	Sunny	<i>Larus ridibundus</i>	3	16:12	10	Flight
860	07/05/2024	VP05	15:45-18:15	Sunny	<i>Buteo buteo</i>	2	16:22	100	Flight
861	07/05/2024	VP05	15:45-18:15	Sunny	<i>Pica pica</i>	3	16:37	1	On the tree
862	07/05/2024	VP05	15:45-18:15	Sunny	<i>Emberiza schoeniclus</i>	5	17:03	1	On the shrub
863	07/05/2024	VP05	15:45-18:15	Sunny	<i>Parus flavipectus</i>	1	17:25	1	On the shrub

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
864	07/05/2024	VP05	15:45-18:15	Sunny	<i>Parus major</i>	1	17:38	1	On the shrub
865	07/05/2024	VP05	15:45-18:15	Sunny	<i>Anas platyrhynchos</i>	2	17:41	20	Flight
866	07/05/2024	VP05	15:45-18:15	Sunny	<i>Tadorna ferruginea</i>	2	17:50	20	Flight
867	07/05/2024	VP05	15:45-18:15	Sunny	<i>Phalacrocorax carbo</i>	1	17:55	20	Flight
868	07/05/2024	VP05	15:45-18:15	Sunny	<i>Pica pica</i>	1	18:09	30	Flight
869	07/05/2024	VP05	15:45-18:15	Sunny	<i>Corvus frugilegus</i>	1	18:12	30	Flight
870	08/05/2024	VP05	06:50-09:20	Sunny	<i>Pica pica</i>	1	06:50	20	Flight
871	08/05/2024	VP05	06:50-09:20	Sunny	<i>Passer montanus</i>	10	06:53	0	On the ground
872	08/05/2024	VP05	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	2	06:55	0	On the ground
873	08/05/2024	VP05	06:50-09:20	Sunny	<i>Pica pica</i>	1	06:59	20	Flight
874	08/05/2024	VP05	06:50-09:20	Sunny	<i>Columba livia</i>	2	07:13	30	Flight
875	08/05/2024	VP05	06:50-09:20	Sunny	<i>Milvus migrans</i>	1	07:21	100	Soaring
876	08/05/2024	VP05	06:50-09:20	Sunny	<i>Pica pica</i>	1	07:19	50	Flight
877	08/05/2024	VP05	06:50-09:20	Sunny	<i>Parus flavipectus</i>	1	07:23	1	In the reeds
878	08/05/2024	VP05	06:50-09:20	Sunny	<i>Cettia cetti</i>	1	07:24	1	On the shrub
879	08/05/2024	VP05	06:50-09:20	Sunny	<i>Phalacrocorax carbo</i>	2	07:33	10	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
880	08/05/2024	VP05	06:50-09:20	Sunny	<i>Larus ridibundus</i>	2	07:48	10	Flight
881	08/05/2024	VP05	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	1	08:03	10	Flight
882	08/05/2024	VP05	06:50-09:20	Sunny	<i>Anas platyrhynchos</i>	1	08:12	10	Flight
883	08/05/2024	VP05	06:50-09:20	Sunny	<i>Himantopus himantopus</i>	3	08:14	10	Flight
884	08/05/2024	VP05	06:50-09:20	Sunny	<i>Falco tinnunculus</i>	2	08:25	100	Soaring
885	08/05/2024	VP05	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	1	08:26	20	Flight
886	08/05/2024	VP05	06:50-09:20	Sunny	<i>Pica pica</i>	1	08:30	50	Flight
887	08/05/2024	VP05	06:50-09:20	Sunny	<i>Columba livia</i>	2	08:37	20	Flight
888	08/05/2024	VP05	06:50-09:20	Sunny	<i>Acrocephalus palustris</i>	1	09:02	1	In the reeds
889	08/05/2024	VP05	06:50-09:20	Sunny	<i>Corvus frugilegus</i>	2	09:12	1	On the tree
890	08/05/2024	VP05	06:50-09:20	Sunny	<i>Pica pica</i>	3	09:16	1	On the tree
891	08/05/2024	VP04	09:35-12:05	Sunny	<i>Pica pica</i>	2	09:31	30	Flight
892	08/05/2024	VP04	09:35-12:05	Sunny	<i>Passer montanus</i>	20	09:40	1	On the tree
893	08/05/2024	VP04	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	2	09:55	20	Flight
894	08/05/2024	VP04	09:35-12:05	Sunny	<i>Parus major</i>	1	09:59	1	On the tree
895	08/05/2024	VP04	09:35-12:05	Sunny	<i>Phalacrocorax carbo</i>	1	10:00	10	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
896	08/05/2024	VP04	09:35-12:05	Sunny	<i>Anas platyrhynchos</i>	2	10:02	20	Flight
897	08/05/2024	VP04	09:35-12:05	Sunny	<i>Falco tinnunculus</i>	2	10:14	50	Flight
898	08/05/2024	VP04	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	1	10:23	20	Flight
899	08/05/2024	VP04	09:35-12:05	Sunny	<i>Milvus migrans</i>	1	10:35	100	Soaring
900	08/05/2024	VP04	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	10	10:41	50	Flight
901	08/05/2024	VP04	09:35-12:05	Sunny	<i>Buteo rufinus</i>	1	11:02	100	Soaring
902	08/05/2024	VP04	09:35-12:05	Sunny	<i>Parus flavipectus</i>	1	11:17	1	On the shrub
903	08/05/2024	VP04	09:35-12:05	Sunny	<i>Phoenicurus</i>	1	11:29	1	On the shrub
904	08/05/2024	VP04	09:35-12:05	Sunny	<i>Emberiza schoeniclus</i>	1	11:31	1	On the shrub
905	08/05/2024	VP04	09:35-12:05	Sunny	<i>Tadorna ferruginea</i>	2	11:36	10	Flight
906	08/05/2024	VP04	09:35-12:05	Sunny	<i>Pica pica</i>	2	11:44	10	Flight
907	08/05/2024	VP04	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	4	11:45	20	Flight
908	08/05/2024	VP04	09:35-12:05	Sunny	<i>Milvus migrans</i>	2	11:46	100	Soaring
909	08/05/2024	VP03	12:15-14:45	Sunny	<i>Parus flavipectus</i>	2	12:15	0	On the ground
910	08/05/2024	VP03	12:15-14:45	Sunny	<i>Motacilla cinerea</i>	1	12:28	0	On the ground
911	08/05/2024	VP03	12:15-14:45	Sunny	<i>Motacilla personata</i>	1	12:40	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
912	08/05/2024	VP03	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	13:03	50	Flight
913	08/05/2024	VP03	12:15-14:45	Sunny	<i>Pica pica</i>	2	13:14	2	Local movements
914	08/05/2024	VP03	12:15-14:45	Sunny	<i>Columba livia</i>	4	13:27	4	Local movements
915	08/05/2024	VP03	12:15-14:45	Sunny	<i>Gyps himalayensis</i>	3	13:36	150	Flight
916	08/05/2024	VP03	12:15-14:45	Sunny	<i>Gypaetus barbatus</i>	2	13:39	200	Flight
917	08/05/2024	VP03	12:15-14:45	Sunny	<i>Pica pica</i>	1	13:50	20	Flight
918	08/05/2024	VP03	12:15-14:45	Sunny	<i>Monticola saxatilis</i>	2	14:06	30	On the ground
919	08/05/2024	VP03	12:15-14:45	Sunny	<i>Alectoris chukar</i>	5	14:16	0	On the ground
920	08/05/2024	VP03	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	2	14:20	0	On the ground
921	08/05/2024	VP03	12:15-14:45	Sunny	<i>Passer montanus</i>	10	14:25	0	On the ground
922	08/05/2024	VP03	12:15-14:45	Sunny	<i>Coracias garrulus</i>	3	14:27	20	On the wires
923	08/05/2024	VP03	12:15-14:45	Sunny	<i>Upupa epops</i>	2	14:30	10	Flight
924	08/05/2024	VP03	12:15-14:45	Sunny	<i>Oenanthe pleschanka</i>	2	14:33	0	On the ground
925	08/05/2024	VP03	12:15-14:45	Sunny	<i>Phylloscopus trochiloides</i>	1	14:42	0	On the ground
926	08/05/2024	VP03	12:15-14:45	Sunny	<i>Pica pica</i>	2	14:44	0	On the ground
927	08/05/2024	VP03	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	5	14:45	2	Local movements

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
928	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Turdus merula</i>	3	12:15	0	On the ground
929	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Passer montanus</i>	10	12:16	0	On the ground
930	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Upupa epops</i>	1	12:20	0	On the ground
931	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Milvus migrans</i>	2	12:36	100	Soaring
932	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Aegypius monachus</i>	3	12:59	300	Soaring
933	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Gypaetus barbatus</i>	2	13:13	100	Flight
934	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	13:36	20	Flight
935	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Falco tinnunculus</i>	1	13:40	50	Soaring
936	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Pica pica</i>	2	13:51	0	On the ground
937	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Columba livia</i>	10	14:02	20	Flight
938	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Phoenicurus erythronotus</i>	2	14:03	0	On the ground
939	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	4	14:16	20	Flight
940	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Motacilla personata</i>	2	14:30	0	On the ground
941	08/05/2024	VP0 2	12:15-14:45	Sunny	<i>Gyps himalayensis</i>	5	14:33	300	Soaring
942	09/05/2024	VP0 1	06:55-09:25	Sunny	<i>Pica pica</i>	2	06:58	20	Flight
943	09/05/2024	VP0 1	06:55-09:25	Sunny	<i>Upupa epops</i>	1	07:12	15	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
944	09/05/2024	VP01	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	2	07:13	30	Flight
945	09/05/2024	VP01	06:55-09:25	Sunny	<i>Oenanthe isabellina</i>	2	07:19	0	On the ground
946	09/05/2024	VP01	06:55-09:25	Sunny	<i>Turdus viscivorus</i>	2	07:23	0	On the ground
947	09/05/2024	VP01	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	07:29	0	On the ground
948	09/05/2024	VP01	06:55-09:25	Sunny	<i>Upupa epops</i>	2	07:33	20	Flight
949	09/05/2024	VP01	06:55-09:25	Sunny	<i>Columba livia</i>	1	07:40	5	On the power line
950	09/05/2024	VP01	06:55-09:25	Sunny	<i>Falco subbuteo</i>	1	07:41	50	Flight
951	09/05/2024	VP01	06:55-09:25	Sunny	<i>Turdus viscivorus</i>	1	07:50	5	On the power line
952	09/05/2024	VP01	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	3	07:54	20	Flight
953	09/05/2024	VP01	06:55-09:25	Sunny	<i>Milvus migrans</i>	3	08:12	100	Soaring
954	09/05/2024	VP01	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	4	08:25	20	Flight
955	09/05/2024	VP01	06:55-09:25	Sunny	<i>Pica pica</i>	3	08:34	30	Flight
956	09/05/2024	VP01	06:55-09:25	Sunny	<i>Melanocorypha calandra</i>	3	08:44	0	On the ground
957	09/05/2024	VP01	06:55-09:25	Sunny	<i>Passer domesticus</i>	10	08:52	0	On the ground
958	09/05/2024	VP01	06:55-09:25	Sunny	<i>Acridotheres tristis</i>	7	08:56	0	On the ground
959	09/05/2024	VP01	06:55-09:25	Sunny	<i>Pica pica</i>	1	09:07	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
960	09/05/2024	VP01	06:55-09:25	Sunny	<i>Buteo rufinus</i>	1	09:21	50	Soaring
961	09/05/2024	VP01	06:55-09:25	Sunny	<i>Acridotheres tristis</i>	8	09:22	20	Flight
962	09/05/2024	VP01	06:55-09:25	Sunny	<i>Motacilla personata</i>	2	09:25	0	On the ground
963	09/05/2024	VP02	09:35-12:05	Sunny	<i>Oenanthe sp.</i>	1	09:35	0	On the ground
964	09/05/2024	VP02	09:35-12:05	Sunny	<i>Motacilla personata</i>	2	09:41	0	On the ground
965	09/05/2024	VP02	09:35-12:05	Sunny	<i>Pica pica</i>	1	09:56	20	Flight
966	09/05/2024	VP02	09:35-12:05	Sunny	<i>Coracias garrulus</i>	2	10:00	20	On the ground
967	09/05/2024	VP02	09:35-12:05	Sunny	<i>Falco tinnunculus</i>	2	10:02	50	Soaring
968	09/05/2024	VP02	09:35-12:05	Sunny	<i>Pica pica</i>	1	10:13	0	On the ground
969	09/05/2024	VP02	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	2	10:20	0	On the ground
970	09/05/2024	VP02	09:35-12:05	Sunny	<i>Columba livia</i>	4	10:22	20	Flight
971	09/05/2024	VP02	09:35-12:05	Sunny	<i>Turdus merula</i>	2	10:36	3	On the ground
972	09/05/2024	VP02	09:35-12:05	Sunny	<i>Phoenicurus erythronotus</i>	2	10:45	2	On the ground
973	09/05/2024	VP02	09:35-12:05	Sunny	<i>Acanthis cannabina</i>	12	10:49	0	On the ground
974	09/05/2024	VP02	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	2	11:02	0	On the ground
975	09/05/2024	VP02	09:35-12:05	Sunny	<i>Pica pica</i>	1	11:07	20	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
976	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Acridotheres tristis</i>	10	11:14	10	Flight
977	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Columba livia</i>	10	11:24	30	Flight
978	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Aquila chrysaetos</i>	2	11:26	150	Soaring
979	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Gyps himalayensis</i>	4	11:26	100	Flight
980	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	2	11:40	20	Flight
981	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Passer montanus</i>	6	11:58	0	On the ground
982	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	1	12:01	20	Flight
983	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Motacilla personata</i>	2	12:03	0	On the ground
984	09/05/2024	VP0 2	09:35-12:05	Sunny	<i>Falco tinnunculus</i>	1	12:04	50	Soaring
985	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Gypaetus barbatus</i>	2	12:15	200	Soaring
986	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	2	12:33	20	Flight
987	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Columba rupestris</i>	7	12:39	30	On the ground
988	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Buteo rufinus</i>	2	13:02	50	Flight
989	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Pica pica</i>	2	13:15	30	Flight
990	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Monticola saxatilis</i>	1	13:24	20	On the ground
991	09/05/2024	VP0 3	12:15-14:45	Sunny	<i>Phylloscopus sp.</i>	1	13:33	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
992	09/05/2024	VP03	12:15-14:45	Sunny	<i>Parus flavipectus</i>	1	13:50	0	On the ground
993	09/05/2024	VP03	12:15-14:45	Sunny	<i>Motacilla personata</i>	2	14:01	0	On the ground
994	09/05/2024	VP03	12:15-14:45	Sunny	<i>Motacilla cinerea</i>	1	14:06	0	On the ground
995	09/05/2024	VP03	12:15-14:45	Sunny	<i>Pica pica</i>	2	14:20	20	Flight
996	09/05/2024	VP03	12:15-14:45	Sunny	<i>Columba oenas</i>	3	14:24	20	On the ground
997	09/05/2024	VP03	12:15-14:45	Sunny	<i>Alectoris chukar</i>	2	14:26	0	On the ground
998	09/05/2024	VP03	12:15-14:45	Sunny	<i>Phasianus colchicus mongolicus</i>	2	14:30	0	On the ground
999	09/05/2024	VP03	12:15-14:45	Sunny	<i>Oenanthe sp.</i>	2	14:32	0	On the ground
1000	09/05/2024	VP03	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	14:39	20	Flight
1001	09/05/2024	VP03	12:15-14:45	Sunny	<i>Gyps himalayensis</i>	2	14:41	100	Soaring
1002	09/05/2024	VP04	15:00-17:30	Sunny	<i>Parus flavipectus</i>	2	15:00	1	On the tree
1003	09/05/2024	VP04	15:00-17:30	Sunny	<i>Acridotheres tristis</i>	2	15:12	20	Flight
1004	09/05/2024	VP04	15:00-17:30	Sunny	<i>Pica pica</i>	1	15:15	1	On the tree
1005	09/05/2024	VP04	15:00-17:30	Sunny	<i>Corvus frugilegus</i>	2	15:29	1	On the tree
1006	09/05/2024	VP04	15:00-17:30	Sunny	<i>Pica pica</i>	1	15:33	20	Flight
1007	09/05/2024	VP04	15:00-17:30	Sunny	<i>Columba livia</i>	7	15:40	30	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1008	09/05/2024	VP04	15:00-17:30	Sunny	<i>Falco tinnunculus</i>	1	15:51	50	Soaring
1009	09/05/2024	VP04	15:00-17:30	Sunny	<i>Corvus frugilegus</i>	2	16:01	20	Flight
1010	09/05/2024	VP04	15:00-17:30	Sunny	<i>Milvus migrans</i>	2	16:03	50	Soaring
1011	09/05/2024	VP04	15:00-17:30	Sunny	<i>Passer montanus</i>	10	16:23	1	On the tree
1012	09/05/2024	VP04	15:00-17:30	Sunny	<i>Phalacrocorax carbo</i>	3	16:36	10	Flight
1013	09/05/2024	VP04	15:00-17:30	Sunny	<i>Anas platyrhynchos</i>	2	16:40	10	Flight
1014	09/05/2024	VP04	15:00-17:30	Sunny	<i>Phoenicurus erythronotus</i>	1	17:09	1	On the tree
1015	09/05/2024	VP04	15:00-17:30	Sunny	<i>Milvus migrans</i>	2	17:22	100	Soaring
1016	09/05/2024	VP04	15:00-17:30	Sunny	<i>Columba livia</i>	5	17:23	20	Flight
1017	09/05/2024	VP04	15:00-17:30	Sunny	<i>Milvus migrans</i>	1	17:26	20	Flight
1018	10/05/2024	VP04	06:55-09:25	Sunny	<i>Parus major</i>	1	06:59	1	On the tree
1019	10/05/2024	VP04	06:55-09:25	Sunny	<i>Columba livia</i>	3	07:03	30	Flight
1020	10/05/2024	VP04	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	07:12	20	Flight
1021	10/05/2024	VP04	06:55-09:25	Sunny	<i>Pica pica</i>	1	07:19	30	Flight
1022	10/05/2024	VP04	06:55-09:25	Sunny	<i>Acridotheres tristis</i>	5	07:22	1	On the tree
1023	10/05/2024	VP04	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	07:25	1	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1024	10/05/2024	VP04	06:55-09:25	Sunny	<i>Anas platyrhynchos</i>	2	07:30	10	Flight
1025	10/05/2024	VP04	06:55-09:25	Sunny	<i>Phasianus colchicus</i>	2	07:34	0	On the ground
1026	10/05/2024	VP04	06:55-09:25	Sunny	<i>Turdus merula</i>	3	07:41	1	On the tree
1027	10/05/2024	VP04	06:55-09:25	Sunny	<i>Parus flavipectus</i>	1	07:50	1	On the tree
1028	10/05/2024	VP04	06:55-09:25	Sunny	<i>Pica pica</i>	2	07:53	1	On the tree
1029	10/05/2024	VP04	06:55-09:25	Sunny	<i>Lanius collurio</i>	2	08:10	1	On the shrub
1030	10/05/2024	VP04	06:55-09:25	Sunny	<i>Buteo rufinus</i>	1	08:11	100	Soaring
1031	10/05/2024	VP04	06:55-09:25	Sunny	<i>Milvus migrans</i>	3	08:14	30	Soaring
1032	10/05/2024	VP04	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	08:20	20	Flight
1033	10/05/2024	VP04	06:55-09:25	Sunny	<i>Falco tinnunculus</i>	2	08:25	100	Soaring
1034	10/05/2024	VP04	06:55-09:25	Sunny	<i>Columba livia</i>	12	08:36	30	Flight
1035	10/05/2024	VP04	06:55-09:25	Sunny	<i>Milvus migrans</i>	1	08:46	100	Soaring
1036	10/05/2024	VP04	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	08:51	20	Flight
1037	10/05/2024	VP04	06:55-09:25	Sunny	<i>Larus cachinnans</i>	1	09:09	20	Flight
1038	10/05/2024	VP04	06:55-09:25	Sunny	<i>Phylloscopus collybita</i>	2	09:12	1	On the shrub
1039	10/05/2024	VP04	06:55-09:25	Sunny	<i>Corvus frugilegus</i>	1	09:17	1	On the tree

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1040	10/05/2024	VP04	06:55-09:25	Sunny	<i>Pica pica</i>	2	09:21	20	Flight
1041	10/05/2024	VP05	09:35-12:05	Sunny	<i>Ciconia nigra</i>	2	09:35	60	Soaring
1042	10/05/2024	VP05	09:35-12:05	Sunny	<i>Pica pica</i>	1	09:40	20	Flight
1043	10/05/2024	VP05	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	3	09:41	30	Flight
1044	10/05/2024	VP05	09:35-12:05	Sunny	<i>Passer montanus</i>	10	09:49	1	On the tree
1045	10/05/2024	VP05	09:35-12:05	Sunny	<i>Columba livia</i>	10	10:06	20	Flight
1046	10/05/2024	VP05	09:35-12:05	Sunny	<i>Gyps himalayensis</i>	3	10:12	200	Soaring
1047	10/05/2024	VP05	09:35-12:05	Sunny	<i>Aegypius monachus</i>	2	10:23	200	Soaring
1048	10/05/2024	VP05	09:35-12:05	Sunny	<i>Pica pica</i>	2	10:24	1	On the tree
1049	10/05/2024	VP05	09:35-12:05	Sunny	<i>Buteo rufinus</i>	2	10:36	100	Soaring
1050	10/05/2024	VP05	09:35-12:05	Sunny	<i>Parus flavipectus</i>	3	10:44	1	On the shrub
1051	10/05/2024	VP05	09:35-12:05	Sunny	<i>Pica pica</i>	1	10:59	1	On the tree
1052	10/05/2024	VP05	09:35-12:05	Sunny	<i>Cettia cetti</i>	1	11:09	1	On the shrub
1053	10/05/2024	VP05	09:35-12:05	Sunny	<i>Parus major</i>	2	11:25	1	On the shrub
1054	10/05/2024	VP05	09:35-12:05	Sunny	<i>Phoenicurus erythronotus</i>	3	11:27	1	On the tree
1055	10/05/2024	VP05	09:35-12:05	Sunny	<i>Anas platyrhynchos</i>	1	11:33	10	Flight

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1056	10/05/2024	VP05	09:35-12:05	Sunny	<i>Phalacrocorax carbo</i>	2	11:40	10	Flight
1057	10/05/2024	VP05	09:35-12:05	Sunny	<i>Ardea cinerea</i>	2	11:44	10	Flight
1058	10/05/2024	VP05	09:35-12:05	Sunny	<i>Acridotheres tristis</i>	10	11:55	20	Flight
1059	10/05/2024	VP05	09:35-12:05	Sunny	<i>Pica pica</i>	1	11:59	30	Flight
1060	10/05/2024	VP05	09:35-12:05	Sunny	<i>Corvus frugilegus</i>	2	12:02	50	Flight
1061	10/05/2024	VP06	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	4	12:36	100	Flight
1062	10/05/2024	VP06	12:15-14:45	Sunny	<i>Pica pica</i>	3	12:44	20	Flight
1063	10/05/2024	VP06	12:15-14:45	Sunny	<i>Phasianus colchicus</i>	2	12:58	0	On the ground
1064	10/05/2024	VP06	12:15-14:45	Sunny	<i>Phasianus colchicus</i>	2	13:07	0	On the ground
1065	10/05/2024	VP06	12:15-14:45	Sunny	<i>Pica pica</i>	2	13:12	20	Flight
1066	10/05/2024	VP06	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	3	13:25	0	On the ground
1067	10/05/2024	VP06	12:15-14:45	Sunny	<i>Alectoris chukar</i>	4	13:40	0	On the ground
1068	10/05/2024	VP06	12:15-14:45	Sunny	<i>Buteo rufinus</i>	2	13:52	150	Soaring
1069	10/05/2024	VP06	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	14:04	50	Flight
1070	10/05/2024	VP06	12:15-14:45	Sunny	<i>Aquila chrysaetos</i>	1	14:12	200	Soaring
1071	10/05/2024	VP06	12:15-14:45	Sunny	<i>Anthus spinoletta</i>	3	14:19	0	On the ground

N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
107 2	10/05/202 4	VP0 6	12:15-14:45	Sunny	<i>Oenanthe pleschanka</i>	2	14:21	0	On the ground
107 3	10/05/202 4	VP0 6	12:15-14:45	Sunny	<i>Oenanthe isabellina</i>	1	14:26	0	On the ground
107 4	10/05/202 4	VP0 6	12:15-14:45	Sunny	<i>Corvus frugilegus</i>	1	14:38	40	Flight
107 5	10/05/202 4	VP0 6	12:15-14:45	Sunny	<i>Pica pica</i>	3	14:39	50	Flight
107 6	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Buteo rufinus</i>	2	15:31	150	Soaring
107 7	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Pica pica</i>	1	15:34	0	On the ground
107 8	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Phylloscopus sp.</i>	2	15:46	1	On the tree
107 9	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Parus major</i>	2	15:50	1	On the tree
108 0	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Corvus frugilegus</i>	3	16:02	1	On the tree
108 1	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Galerida cristata</i>	2	16:04	0	On the ground
108 2	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Turdus merula</i>	4	16:06	1	On the tree
108 3	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Pica pica</i>	2	16:12	1	On the tree
108 4	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Acridotheres tristis</i>	4	16:28	0	On the ground
108 5	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Phoenicurus</i>	1	16:34	1	On the tree
108 6	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Falco tinnunculus</i>	1	17:06	50	Soaring
108 7	10/05/202 4	VP0 7	15:30-18:00	Sunny	<i>Passer montanus</i>	10	17:12	0	On the ground

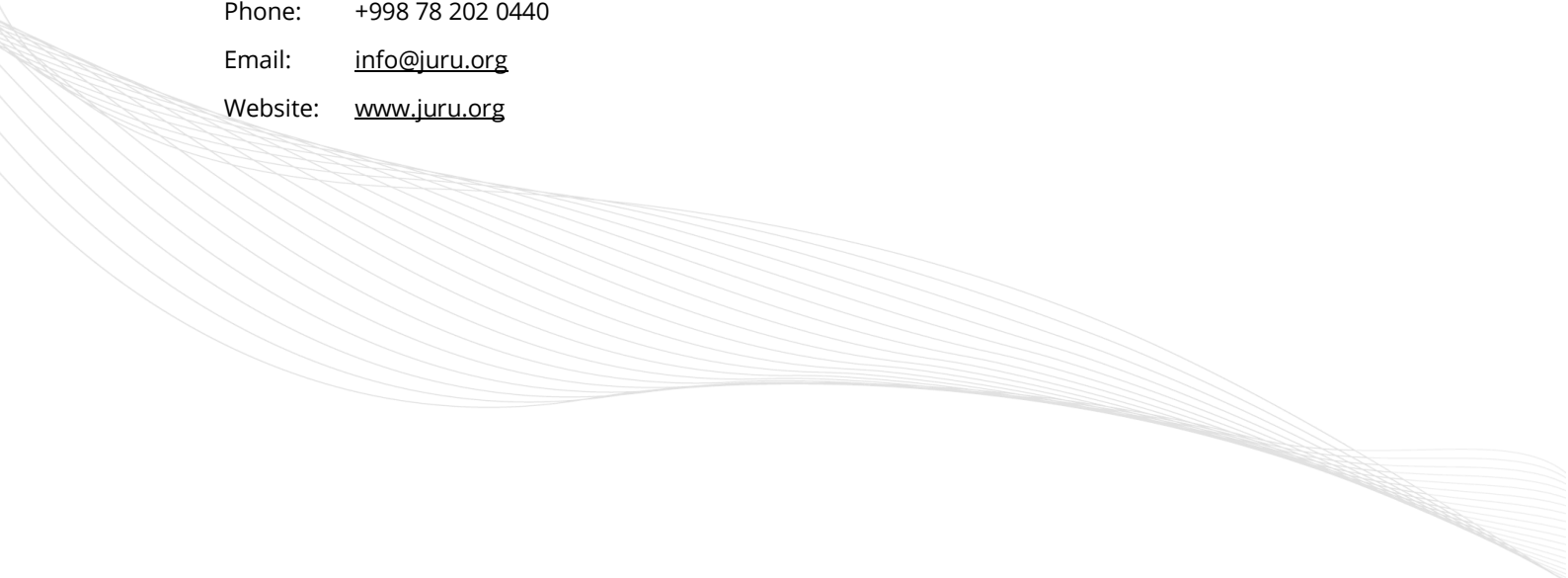
N	Date	VP	Time	Weather	Latin name	Number	Meeting time	Altitude	Comment
1088	10/05/2024	VP07	15:30-18:00	Sunny	<i>Oenanthe sp.</i>	2	17:26	0	On the ground
1089	10/05/2024	VP07	15:30-18:00	Sunny	<i>Motacilla personata</i>	2	17:30	0	On the ground
1090	10/05/2024	VP07	15:30-18:00	Sunny	<i>Buteo rufinus</i>	1	17:37	150	Soaring
1091	10/05/2024	VP07	15:30-18:00	Sunny	<i>Curruca communis</i>	2	17:42	1	On the tree

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Technical appendix 14:

Raptor nesting survey report



Raptor nesting survey report

48 km Kemin — Balykchy Interconnection (500 kV) Project

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Table of Content

1. Introduction	4
2. Materials and methods	5
3. Findings and Results	7
Himalayan vulture (<i>Gyps himalayensis</i>)	8
Long-legged buzzard (<i>Buteo rufinus</i>)	9
Common kestrel (<i>Falco tinnunculus</i>)	9
Eurasian sparrowhawk (<i>Accipiter nisus</i>)	10
Black stork (<i>Ciconia nigra</i>)	10
Common buzzard (<i>Buteo buteo</i>)	11
4. Conclusion	12

Table of Figures

Figure 1. 48 km Kemin-Balykchy Interconnection (500kV)	4
Figure 2. Survey tracks	5
Figure 3. Findings Map: Nests, Inactive nests, and Bird Encounters	7
Figure 4. The nest of <i>Gyps himalayensis</i> (highlighted in yellow) and two adult birds (highlighted in red)	9
Figure 5. The nest of the <i>Buteo rufinus</i>	9
Figure 6. <i>Falco tinnunculus</i> nest	10

Table of Tables

Table 1: Survey Schedule	6
Table 2: Results of the survey	8

1. Introduction

The proposed (500kV) Kemin — Balykchi Interconnection (the “Project”) is a 48 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built in Balykchy (Figure 1).

OHTL can cause fatal collisions for birds, especially for bustards, cranes, and large bodied waterbirds. These structures are also associated with bird electrocutions, which mainly affect raptors, vultures, and other large birds that tend to perch and/or nest on towers. For high-voltage OHTL, risks of bird collisions are considered to be high, but bird electrocution risk is generally considered to be low, as industry-standard designs generally have wide spacing of electrified parts and conductors suspended below rather than above support structures. However, the risk of raptors dying from electrocution on high-voltage OHTL structures exists. For instance, this can occur when droppings from a large bird perched on a support structure hit a wire and act as a conductor.

The raptor/vulture nest search was conducted in Spring and Summer 2024. The purpose of this survey was to find and locate active raptor nests, estimate their proximity to the OHTL, identify birds of conservation interest listed in the IUCN Red List and the Kyrgyzstan Red Book, and draw conclusions about the impact of OHTL on raptors nesting within a 5 km range.

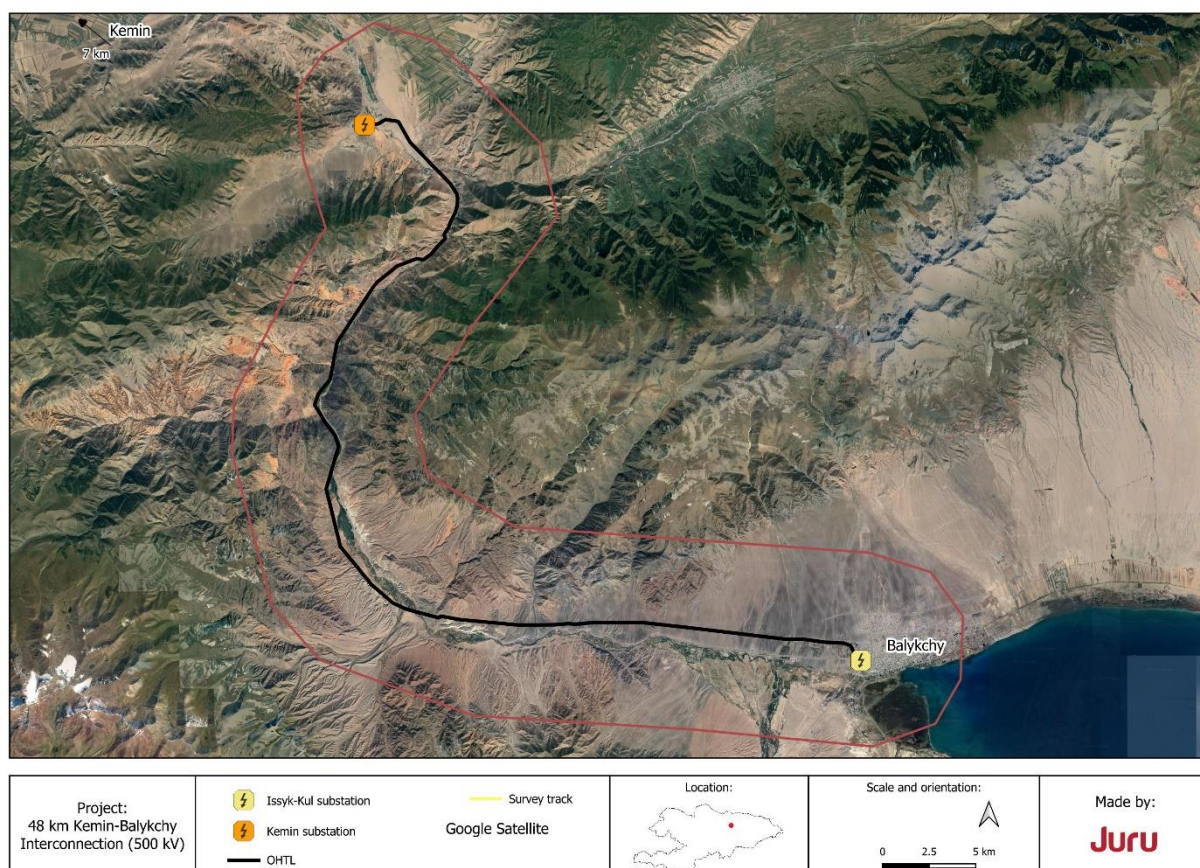


Figure 1. 48 km Kemin-Balykchy Interconnection (500kV)

2. Materials and methods

The study of raptor nesting for the Kemin-Balykchy OHTL was conducted within a 5 km buffer zone along the proposed OHTL route, covering a total surveyed area of approximately 633 km². Most of the surveyed area consists of the foothills of the Kungey Alatau range, characterized by mountain semi-deserts, forests, and meadows. Along the banks of the Chu River, which the proposed OHTL follows, tsugai forests and typical floodplain communities are prevalent.

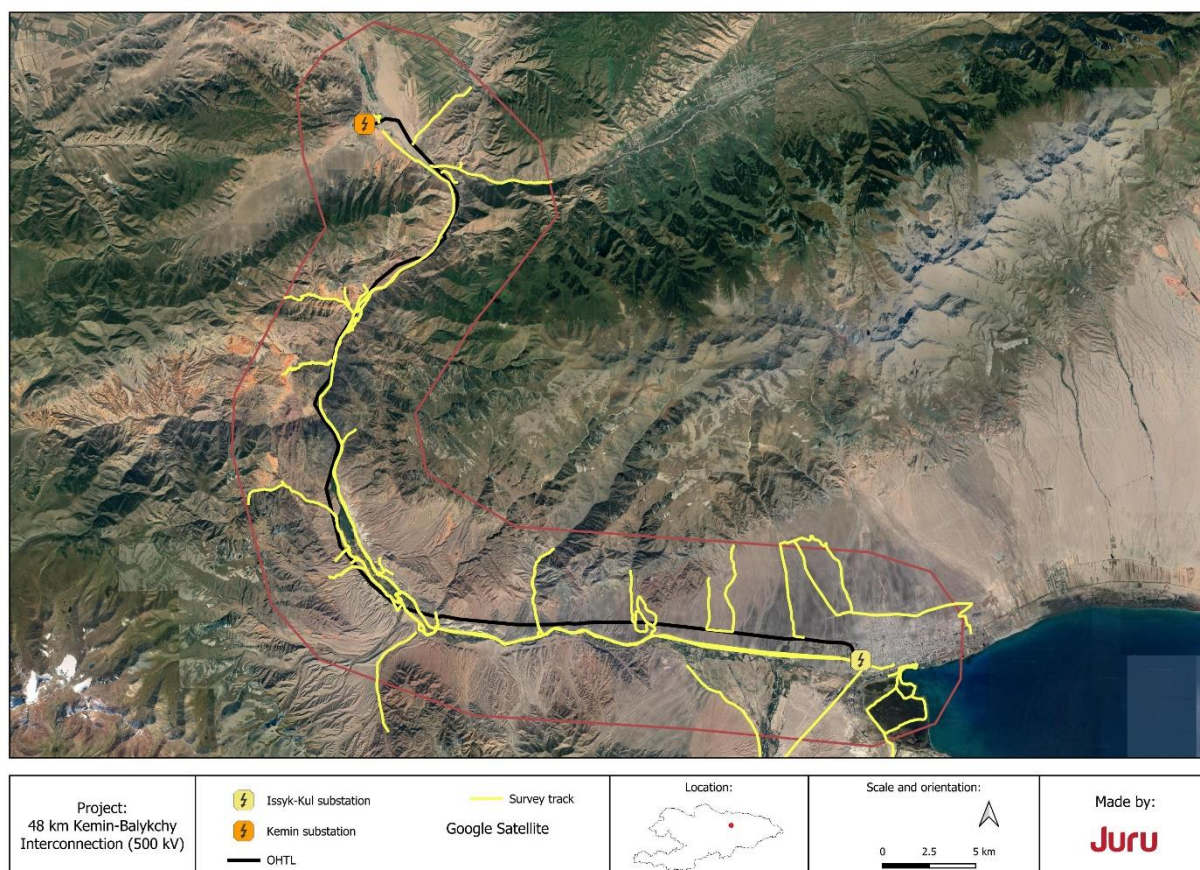


Figure 2. Survey tracks

Between May and late August, 2024, 16 days of raptor/vulture survey were conducted by local experts, generally following the survey routes shown in Figure 2. Dates on which surveys were conducted are shown in Table 1. Nest searches were conducted during the day, both by observing the birds and their behaviour, and by directly looking for nests. The experts took care not to approach the nests to avoid disturbing the birds. The survey effort was ground-based, and limited to accessible areas. Furthermore, the nest search was focused on likely nesting substrates and habitats for raptors and vultures, such as cliffs (rock niches), escarpments, caves, trees, OHTL poles, abandoned buildings, and other human-made structures. To ensure more objective data, bird observations were carried out at different times of the day and under various weather conditions.

The factors that negatively influenced the study include the following:

1. Cold spring

This year, temperatures in the study areas were nearly 10 degrees below the climatic norm

for this period. In March and April 2024, there was a significant amount of precipitation, and several times, heavy snowfalls occurred in the mountainous regions.

2. High precipitation

In May, temperatures were also below average, with significant amounts of rainfall. This affected the nesting periods of many birds, especially raptors.

By late April, many birds were still paired, and the females had not yet begun sitting on their nests.

3. Terrain features

Since most of Kyrgyzstan is mountainous, it was not always possible to fully explore potential nesting areas and locate nests. Some parts of the study area were close to busy highways, where raptors did not build nests in prominent, human-accessible places.

It was impossible to reach some survey points by car, and hiking in the mountains during rainy weather was significantly more challenging.

Table 1: Survey Schedule

Date	Part of OHTL
10/05	Eastern
16/05	Eastern
17/05	Central
18/05	Central
19/05	Northern
24/05	Northern
25/05	Central
26/05	Central
27/05	Central
28/05	Eastern
29/05	Eastern
30/05	Eastern
02/06	Northern
03/06	Central
25/08	Eastern
26/08	Central

During the observations, surveyors used the following equipment:

- two binoculars (BUSHNELL TROPHY 8x42)
- camera (Canon EOS 5D Mark 4 with lens Canon EF 500mm f4.5 and Canon EF 600mm f4)
- spotting scope (Levenhuk Blaze BASE 60)

3. Findings and Results

As a result of the study, six nests of the following species were found: *Gyps himalayensis* (1), *Buteo rufinus* (1), *Falco tinnunculus* (1), *Accipiter nisus* (3). Additionally, two nests occupied in previous years by *Ciconia nigra* and *Buteo buteo* (according to research from previous years) were found inactive during the survey.

All nests, except for one *Accipiter nisus* nest, were located within 660 meters of the planned power transmission line. The locations of all nests and other pertinent observations are shown in Figure 3, and additional details on these observations are provided in Table 2.

It is important to take into account that due to the inaccessibility of many areas, the actual number of nesting birds may be higher. Therefore, indirect signs of nesting should be considered, such as territorial pairs (moderate degree of reliability).

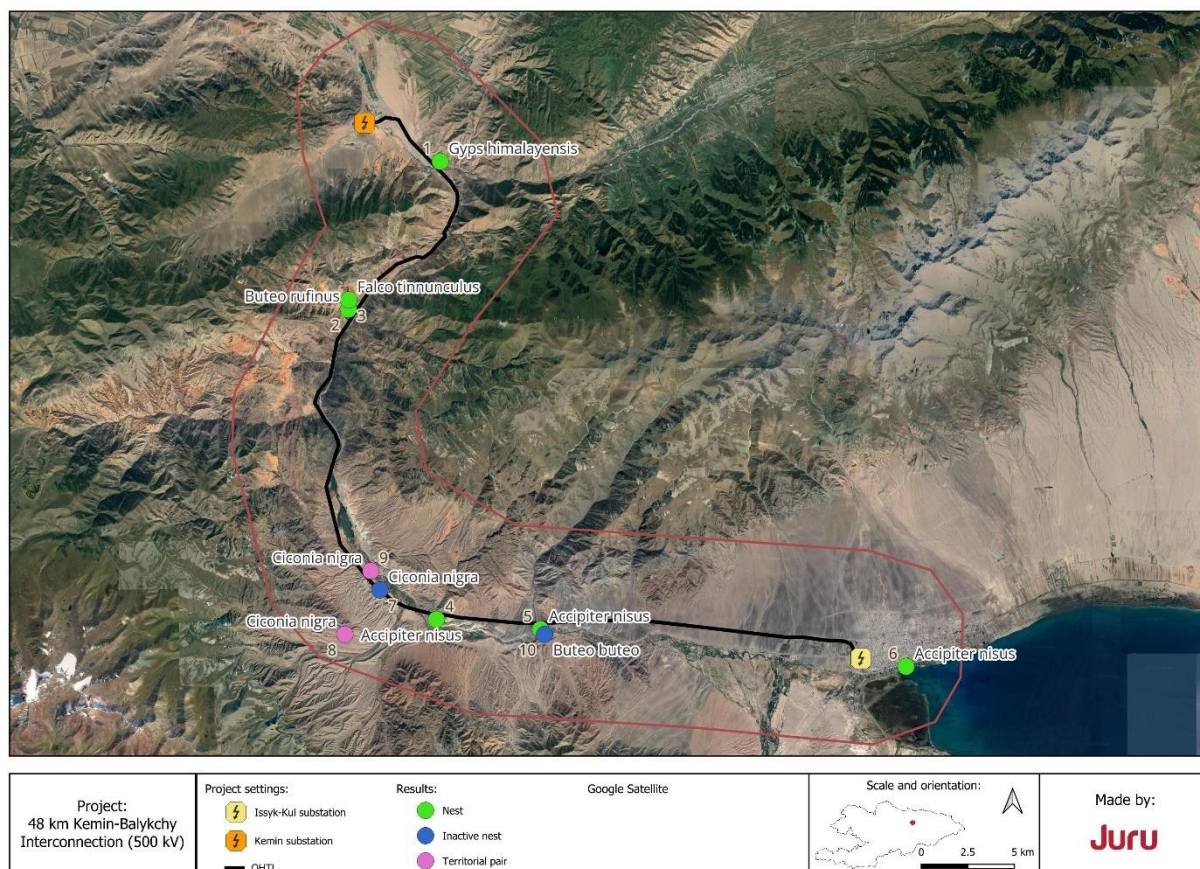


Figure 3. Findings Map: Nests, Inactive nests, and Bird Encounters

Table 2: Results of the survey

N	Date	Result	Location	IUCN	Kyrgyz RDB	Distance to OHTL, m	Comment
1	20.05.2024	<i>Gyps himalayensis</i>	42.694477° 75.883612°	NT ¹	NT (VI)	370	Active nest
2	24.05.2024	<i>Buteo rufinus</i>	42.623510° 75.823747°	LC	-	398	Active nest
3	24.05.2024	<i>Falco tinnunculus</i>	42.628018° 75.823928°	LC	-	660	Active nest
4	26.05.2024	<i>Accipiter nisus</i>	42.474386° 75.881147°	LC	-	222	Active nest
5	25.08.2024	<i>Accipiter nisus</i>	42.469636° 75.949077°	LC	-	341	Active nest (This year)
6	28.05.2024	<i>Accipiter nisus</i>	42.451729° 76.187520°	LC	-	2496	Active nest
7	09.05.2024	<i>Ciconia nigra</i>	42.488613° 75.844249°	LC	NT (VI)	5	Inactive nest, Territorial pairs
8	24.05.2024		42.467218° 75.821389°				
9	27.05.2024		42.497777° 75.838333°				
10	25.08.2024	<i>Buteo buteo</i>	42.467223° 75.951666°	LC	-	611	Inactive nest

Himalayan vulture (*Gyps himalayensis*)

On May 20, 2024, in the northern part of the planned power transmission line, a *Gyps himalayensis* nest with a pair of birds was discovered on a south-facing slope at an elevation of approximately 1,423 meters. The pair chose high, steep cliffs made up of granite, porphyry, and conglomerates for nesting. This slope overhangs a river and is characterized by slope processes such as rockfalls and landslides. Since *Gyps himalayensis* in this region typically begin nesting in January or February, there is a possibility that this clutch is the second one, following the loss of the first.

¹ The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated (NE), Data Deficient (DD), **Least Concern (LC)**, **Near Threatened (NT)**, Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX).



Figure 4. The nest of *Gyps himalayensis* (highlighted in yellow) and two adult birds (highlighted in red)

Long-legged buzzard (*Buteo rufinus*)

On May 24, 2024, a Long-legged buzzard's nest was discovered on the northeastern slope of a canyon at an elevation of 1,511 meters. The canyon is composed of rocky columns, primarily made of red sandstone. The pair of Long-legged buzzards built their nest on a ledge with a small cave on one of these columns.



Figure 5. The nest of the *Buteo rufinus*

Common kestrel (*Falco tinnunculus*)

During the same survey day (24th of May), 500 meters northwest of the Long-legged Buzzard's nest, a Common Kestrel nest was discovered on the southwestern slope. The Kestrel pair built their nest in one of the caves at an elevation of 1,535 meters. The distance to the planned power transmission line is 660 meters.



Figure 6. *Falco tinnunculus* nest

Eurasian sparrowhawk (*Accipiter nisus*)

Three nests of Eurasian sparrowhawk were found. All nests are located in the southern part of the proposed OHTL, within tree strips.

The first nest was observed on May 26, 2024, at an elevation of 1,570 meters. The nest is situated in close proximity to human structures (70 meters away) and an existing power line (130 meters away). The distance from the nest to the proposed OHTL is 222 meters.

The second Eurasian sparrowhawk's nest was discovered in late August during an additional survey of the area. This nest is also located near anthropogenic structures, 260 meters from an existing road, and 341 meters from the proposed OHTL.

The third nest is situated directly within the tree zone near the water's edge in the city of Kemin. The distance to the existing substation, from which the proposed OHTL will extend, is approximately 2,500 meters.

Black stork (*Ciconia nigra*)

It is well known that a pair of Black storks used to nest on cliffs in close proximity to a road. However, in 2019, a birdwatcher began leading tourist groups to showcase the nest. As a result, local residents noticed the nest, and the male stork was killed. Since then, the nest has remained abandoned. Nevertheless, 1-2 pairs of black storks are observed in the area each year, and in 2021, black stork chicks were recorded in the region.

This year, 1-2 pairs of black storks have been noted. Due to poor accessibility, some areas could not be surveyed, and there is a high likelihood that a nest exists within the project area. Additionally, the birds have been spotted several times perching on power line towers. This poses a direct risk if a new power line is constructed.

Common buzzard (*Buteo buteo*)

A large nest was found in a tall, withered tree within a tree strip. Two years ago, it was used by Common buzzard (based on observations from previous years). Although the nest has not been used in at least a year, its presence indicates that the area is suitable for nesting by Common buzzard.

4. Conclusion

During the study, six active nests from four bird species were found, along with two inactive nests from two species. Additionally, both during this survey and the Spring VP survey, species potentially nesting within the project territory were observed. There were significant encounters with *Gyps himalayensis* (IUCN: NT), *Gypaetus barbatus* (IUCN: NT, Kyrgyz RDB: NT), *Aegypius monachus* (IUCN: NT, Kyrgyz RDB: NT), *Aquila chrysaetos* (Kyrgyz RDB: NT), and *Ciconia nigra* (Kyrgyz RDB: NT). These species may potentially nest in the area but are difficult to locate due to their large home ranges, the rugged, inaccessible terrain, and, in the case of *Gyps himalayensis*, early-season nesting. Although much of the observed area lacks suitable nesting sites for these species, there is no doubt that the landscape is attractive to many raptor and vulture species.

Given *Gyps himalayensis* nesting, the potential nesting of *Ciconia nigra*, the high concentration of vultures, and the landscape features, the construction and operation of the OHTL could result in bird fatalities, including those of threatened species.

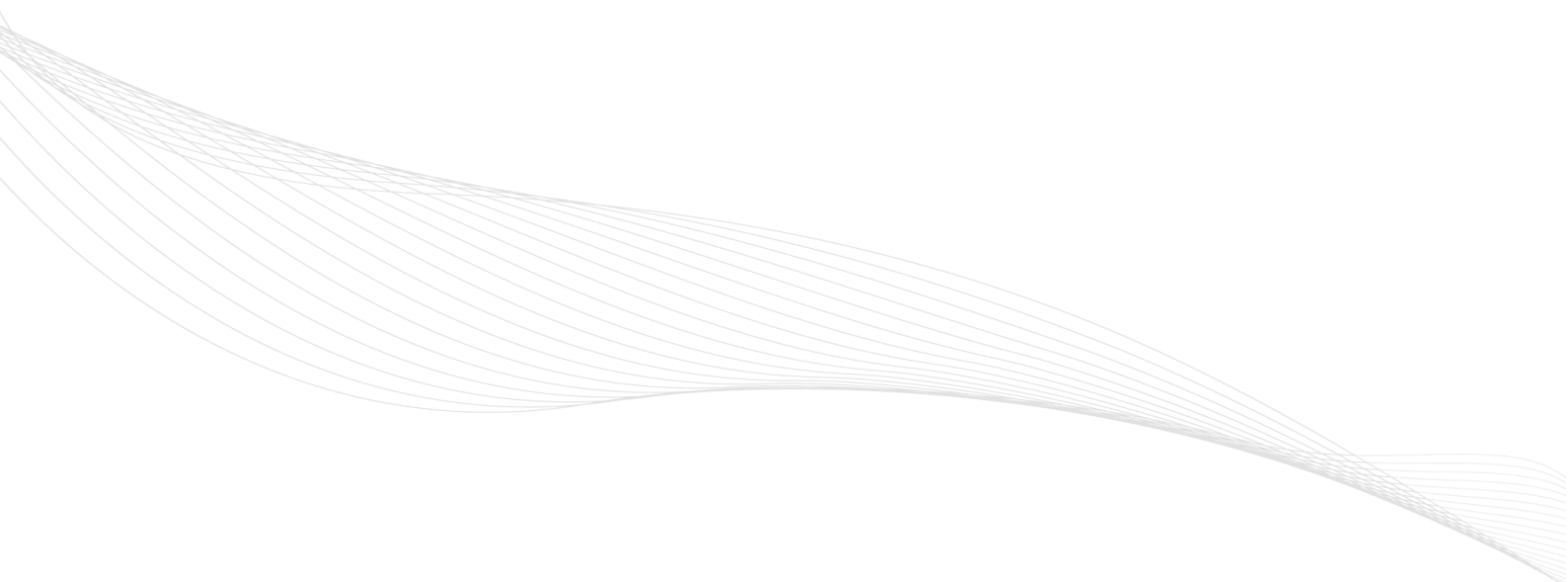


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Technical appendix 15:

Botanical report



Botanical Report

Kemin-Balykchy 500 kV OHTL Project

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Table of Contents

1	Introduction	5
2	Materials and methods	6
2.1	Habitat assessment methods	6
2.2	Botanical methods.....	7
3	Results	8
3.1	Habitat classification.....	8
	Alpine shrub (13.2 Shrubland - Subalpine/Alpine).....	19
	Bare Canyon Cliff (7.2.1 Scree, boulders and outcrops)	20
	Riverside forest.....	21
	Montane Steppe Grasslands (4.4 Temperate Grassland - Alpine).....	21
	Montane Xerophytic Shrubland (3.8 Desert Shrubland – Temperate)	22
	Rangeland (Mountain) (4.5 Temperate Grassland - Montane).....	23
	Riparian Forest (1.4.2 Riparian Forest - Temperate).....	24
	Stony foothill arid steppe (4.6 Temperate Grassland - Semi-arid)	25
	Scree Slopes (7.2.1 Scree, boulders and outcrops).....	25
	Rocky Outcrop Shrubland (7.2.1 Scree, boulders and outcrops).....	26
	Red Sandstone Desert Grassland (3.7 Desert Grassland – Temperate)	27
	Red Sandstone Desert Shrubland (3.8 Desert Shrubland – Temperate).....	28
3.2	Botanical survey.....	29
4	Discussion: Human Disturbance and Grazing Pressure in the OHTL Corridor Buffer Zonesion	149
	REFERENCES.....	150
	Appendix A. Species pictures.....	152
	Appendix B Floristic list of the study area.....	172
	Appendix C	177
	Appendix D.....	179

Abbreviations

Total Protective cover (TPC)

Protective cover (PC)

The International Union for Conservation of Nature (IUCN)

NE-Not Evaluated

LC- Least Concern

NT- Near Threatened

VU-Vulnerable

Red Data Book of Kyrgyzstan (Red list KG)

1 Introduction

The proposed (500kV) Kemin-Balykchi Interconnection (the “Project”) is a 52.9 km stretch of overhead transmission line (OHTL) that has been proposed to improve Kyrgyzstan’s grid. The Kemin-Balykchy 500kV transmission line will be constructed between the settlements of Kemin and Balykchy in the Kyrgyz Republic, with a substation to be built approximately 10 km west of Balykchy (Figure 1).

Botanical field surveys were conducted across the project site using traditional methods for sampling and mapping native vegetation to characterize the baseline condition of the vegetation for evaluating potential project-generated impacts on flora. The vegetation map was created in ArcGIS by interpreting satellite imagery alongside field data, a topographic map (1:100,000), and a regional soil map.

This report provides a detailed description of the methods and results, including the types of habitats represented, key habitat maps, and the status of protected plant species, as classified by the IUCN and the Red Data Book of Kyrgyzstan (KrRDB).

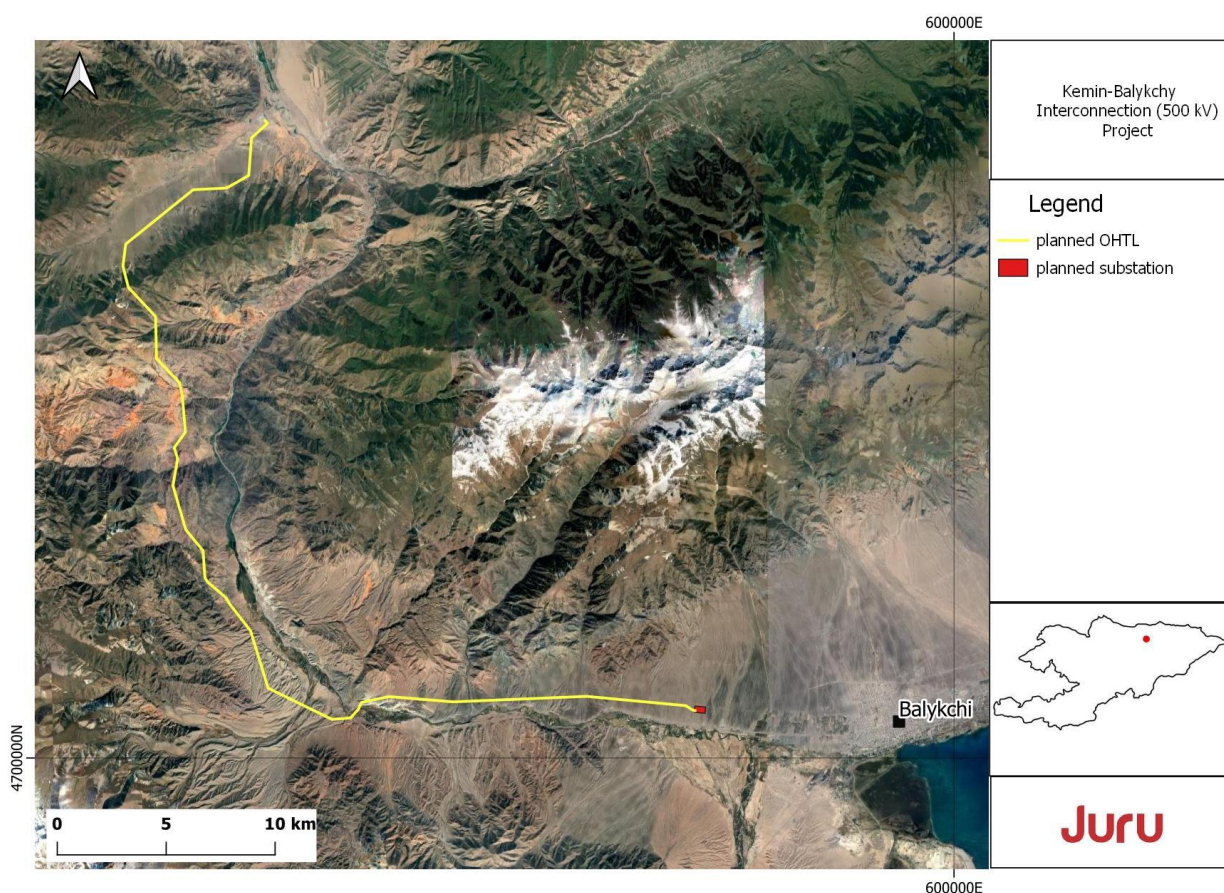


Figure 1: The route of the proposed Kemin-Balykchi OHTL route

2 Materials and methods

2.1 Habitat assessment method

To support habitat mapping and vegetation assessment in connection with the 2024–2025 botanical field surveys, land cover classification was performed using Landsat 8 OLI satellite imagery. The classification process integrated both unsupervised and manual refinement techniques to delineate major land cover types relevant to native plant communities (Figure 2). A 500 m buffer zone was established around the OHTL route to ensure comprehensive coverage of surrounding habitats and potential vegetation impacts (Figure 2). Image processing and classification were conducted in ENVI 5.3 software. Standard pre-processing steps were applied, including geometric correction, radiometric calibration, and conversion to top-of-atmosphere (TOA) reflectance. Further, surface reflectance values were derived using the FLAASH (Fast Line-of-sight Atmospheric Analysis of Spectral Hypercubes) module, which applies atmospheric correction and transforms pixel values into reflectance units ranging from 0 to 1 (Maas et al., 2010; Ali et al., 2018; Zhai et al., 2022). This remote sensing analysis was conducted to complement field-based botanical observations and provides a spatial framework for assessing habitat types, disturbance patterns, and potential land use impacts along the transmission corridor. The integration of satellite-based land cover classification with geobotanical data enhances the accuracy and relevance of subsequent habitat quality evaluations.

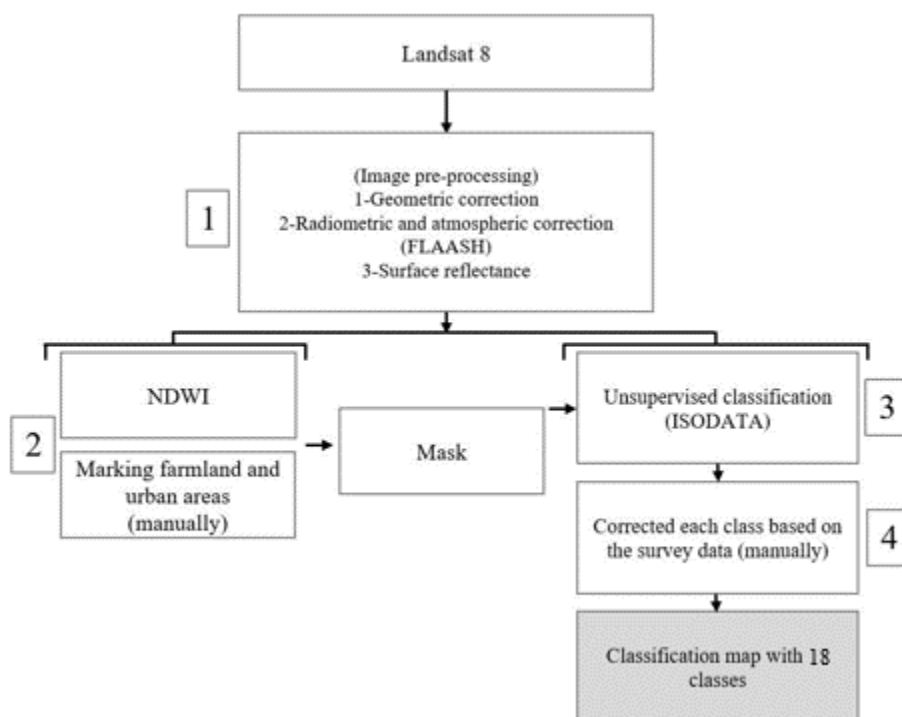


Figure 2: Flowchart of the methodology of the habitat map

After pre-processing, the Normalized Difference Water Index (NDWI) was calculated using the near-infrared (NIR) and green bands of Landsat 8 OLI imagery to delineate water bodies based on the contrast between water and other land cover types (Özelkan, 2020). Farmland and urban areas were manually delineated using high-resolution ArcGIS Imagery (0.84 m/pixel), enabling confident interpretation of objects larger than 1.0 hectare. These areas were excluded from further classification using a masking layer, refining the dataset and isolating regions of interest. The remaining unmasked areas were classified using an unsupervised classification approach. The ISODATA (Iterative Self-Organizing Data Analysis Technique) algorithm grouped pixels with similar spectral properties into

distinct clusters, minimizing spectral variance within clusters and maximizing variance between clusters. This provided a preliminary delineation of land cover classes. Field survey data collections have been integrated to validate and refine the classification map (Figure 2). For example, in several cases, preliminary classification had misidentified sparsely vegetated rocky outcrops as bare ground due to spectral similarities. However, during field verification, these areas were observed to support xerophytic shrubland and steppe communities. Notably, habitat patches initially classified as non-vegetated were found to host key indicator species such as *Artemisia terrae-albae*, *Anabasis salsa*, and *Sympegma regelii*. Additional observations revealed the presence of associated species including *Achnatherum splendens*, *Krascheninnikovia ceratoides*, *Stipa glareosa*, *Astragalus borodinii*, and *Kalidium caspicum*, indicating a distinct semi-desert or mountain xerophytic vegetation type. Based on these ground-based identifications, misclassified pixels were manually reassigned to appropriate habitat classes, enhancing the ecological validity of the land cover map. This process exemplifies how empirical botanical surveys directly informed and corrected automated classifications, especially in ecotonal zones or physiognomically subtle habitats where remote sensing data alone failed to resolve community-level variation. Observations of vegetation types, landforms, and soil conditions were used to adjust misclassified pixels and ensure alignment with ground conditions. Manual corrections, informed by expert knowledge, were applied to accurately delineate class boundaries and improve classification reliability.

2.2 Botanical assessment method

The study was conducted in a low-mountain zone situated on a plain at the eastern end of the Kyrgyz Range, extending approximately from the Chu River, the village of Kok-Moynok, to the western extremity of the Kungoy Ala-Too Range. The floristic data collected through this study will also be utilized for assessing the ecological condition and habitat quality of native plant communities in the context of ongoing landscape monitoring and infrastructure development.

To capture seasonal variation, the botanical field survey was conducted in two phases over two seasons. The two-seasonal approach was used to document both perennial (September 2024) and spring (May 2025) ephemeral vegetation, which dominate different phases of the growing season. Fieldwork was performed using standard botanical and geobotanical techniques commonly applied in the classification and spatial analysis of non-forest native vegetation (Field Geobotany, 1959–1976; Granitov, 1980; Kent, 2011). Vegetation was surveyed using 10 × 10-meter geobotanical plots established at 26 locations during the perennial seasons; and 46 locations in the spring season. These plots were distributed within a 500-meter buffer zone on either side of the OHTL (Figure 3). In each plot, the following parameters were recorded: GPS-based geographic location, landscape and physical characteristics, dominant land use and disturbance factors (e.g., grazing, roads), structural type of vegetation, total canopy cover (%), and complete floristic composition. All vascular plant species were recorded with estimates of their cover and abundance, and their respective life forms were classified.

Photographs of each sample plot and its surrounding landscape were taken using a digital camera for visual reference and archiving. Species were identified in the field where possible, using the “Conspectus Florae Asiae Mediae” (1963–1993) and the “Flora of the USSR” (1934–1964). Unidentified specimens were collected and processed for herbarium deposition. Their identification was later completed under laboratory conditions using the “Key to the Plants of Central Asia” (1968–1993), the “Flora of the Kirghiz SSR” (1952–1965), and through comparison with reference specimens. Taxonomic classification follows the APG IV system (2016). Scientific names were verified using authoritative online databases, including Plants of the World Online (POWO), the International Plant Names Index

(IPNI), and the Global Biodiversity Information Facility (GBIF). Identification of alien and invasive species was informed by additional references such as Nikitin (1983), IUCN/ISSG (2014), CABI (2017), and Sennikov et al. (2018). Conservation status assessments were guided by the Red Data Book of Kyrgyzstan (2006) and the IUCN Red List of Threatened Species (www.iucnredlist.org).

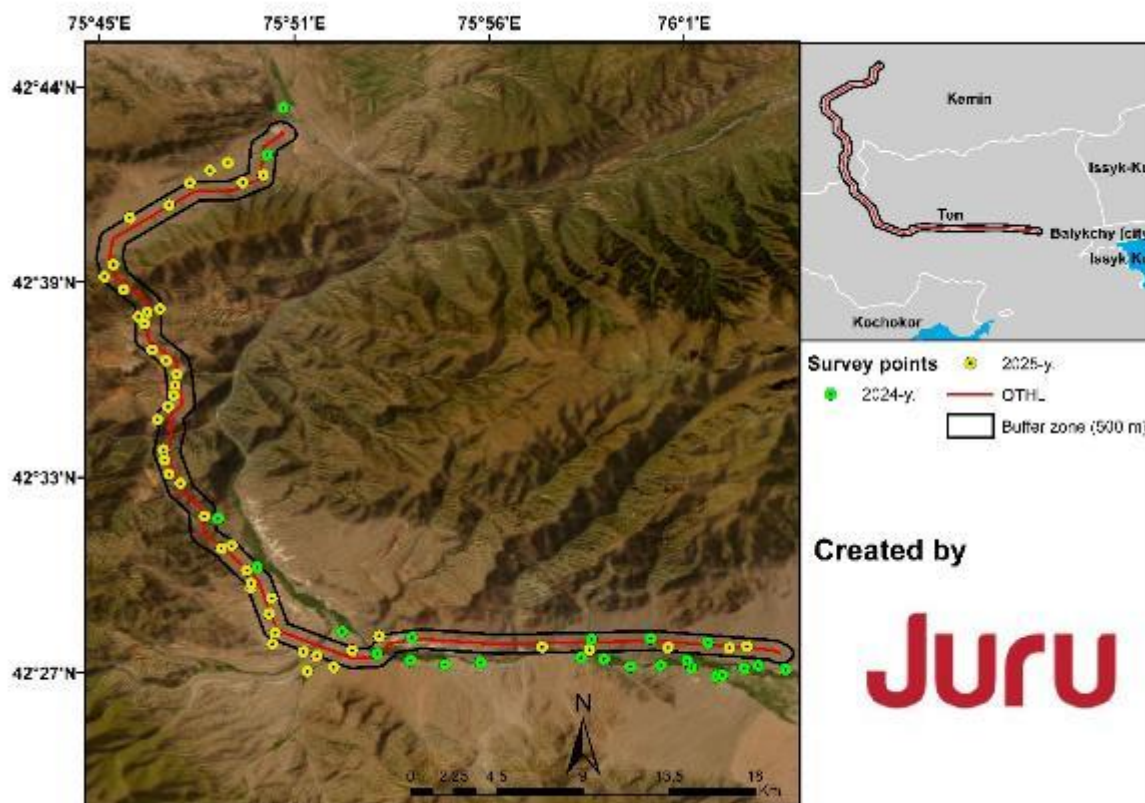


Figure 3: Botanical survey locations along the OTHL corridor and 500 m buffer zone (2024–2025)

3 Results

3.1 Habitat classification

The habitat classification analysis within the defined 500-meter buffer zone along the OTHL corridor in northeastern Kyrgyzstan (as shown in the study area map) reveals a complex and ecologically diverse landscape spanning approximately 5,355 hectares (Table 1). The landscape composition is predominantly natural, with Rocky Outcrop Shrubland and Stony Foothill Arid Steppe being the most extensive habitat types, representing 21.8% and 21.7% of the total area, respectively. These habitats are characteristic of rugged terrain and foothill regions, supporting xeric-adapted shrubs and drought-tolerant grasses. Montane Steppe Grasslands and Rangeland (Mountain) collectively account for 35.7% of the total area and are critical for seasonal livestock grazing, primarily by cattle and sheep, indicating active pastoral land-use. Mid-level contributions come from Montane Xerophytic Shrubland and Alpine Shrub with a combined share of 11.3%, highlighting ecological transitions on arid slopes and subalpine zones. Other ecologically significant habitats include Scree, which are erosion-prone rocky surfaces, and Red Sandstone Desert and Shrubland (1.9% combined), confined to lower

elevation benches and arid canyons. Riparian Forest and Riverside Forest comprise 2.8%, representing narrow belts of hygrophilous vegetation along intermittent and perennial watercourses. Anthropogenically modified areas constitute a minimal portion of the buffer zone. Urban areas cover 0.4%, while Agricultural Land accounts for just 0.1%, reflecting low-intensity cultivation or abandoned croplands.

Water Bodies are similarly limited (0.4%), primarily comprising small reservoirs or natural ponds. Bare Canyon Cliffs, although representing only 0.1% of the total area, offer high conservation value due to their ecological singularity and potential as microhabitats for endemic or cliff-specialist flora and fauna. This comprehensive habitat structure underscores the region's ecological heterogeneity and gradient of aridity, ranging from high-value montane steppes and shrublands to highly erodible desert and canyon systems.

Table 1: Classification of Project Area Habitat Types According to IUCN and EU Habitats Directive Frameworks

Habitat name	IUCN Code	IUCN Habitat Name	EU Habitats Code	EU Habitat Name	IUCN habitat code	Area in hectare
Rocky Outcrop Shrubland	7.2.1	Scree, boulders and outcrops	8210	Calcareous rocky slopes	7.2.1 Scree, boulders and outcrops	1167.8
Stony foothill arid steppe	4.6	Temperate Grassland - Semi-arid	EUNIS 62B0	Ponto-Sarmatic steppe grasslands	4.6 Temperate Grassland - Semi-arid	1160.4
Montane Steppe Grasslands	4.4	Temperate Grassland - Alpine	6170	Alpine calcareous grasslands	4.4 Temperate Grassland - Alpine	1034.7
Rangeland (Mountain)	4.5	Temperate Grassland - Montane	6520	Mountain hay meadows	4.5 Temperate Grassland - Montane	877.16
Alpine shrub	13.2	Shrubland - Subalpine/Alpine	4060	Alpine and subalpine dry heaths	13.2 Shrubland - Subalpine/Alpine	325.05
Montane Xerophytic Shrubland	3.8	Desert Shrubland - Temperate	5330	Thermo-Mediterranean and pre-desert scrub	3.8 Desert Shrubland - Temperate	279.41
Scree Slopes	7.2.1	Scree, boulders and outcrops	8211	Calcareous rocky slopes	7.2.1 Scree, boulders and outcrops	170.55

Red Sandstone Desert Grassland	3.7	Desert Grassland - Temperate	EUNIS F6.3	Desert-steppe grassland	3.7 Desert Grassland - Temperate	88.67
Riverside forest	1.4.2	Riparian Forest - Temperate	EUNIS 91E0	Alluvial forests	1.4.2 Riparian Forest - Temperate	76.9
Riparian Forest	1.4.2	Riparian Forest - Temperate	EUNIS 91E0	Alluvial forests	1.4.2 Riparian Forest - Temperate	71.67
Urban area	14.4	Urban Areas	EUNIS J1	Urban fabric	14.4 Urban Areas	23.17
Water body	5.1	Permanent Rivers/Streams/Creeks	3260	Water courses of plain to montane	5.1 Permanent Rivers/Streams/Creeks	21.52
Red Sandstone Desert Shrubland	3.8	Desert Shrubland - Temperate	EUNIS F6.3	Desert-steppe grassland	3.8 Desert Shrubland - Temperate	13.98
Bare Canyon Cliff	7.2.1	Scree, boulders and outcrops	8210	Calcareous rocky slopes	7.2.1 Scree, boulders and outcrops	7.56
Agricultural Land	14.2.1	Arable Land	EUNIS I1.1	Arable land	14.2.1 Arable Land	7.15

The detailed habitat classification was conducted for the 30-meter Right-of-Way (ROW) along either side of the outermost OHTL conductor, resulting in a total corridor width of approximately 60 meters (Table 2). The ROW spans 338 hectares and represents the area most directly affected by vegetation clearance, edge disturbance, and maintenance activities. Habitat mapping shows that the ROW traverses predominantly natural terrain, with Rocky Outcrop Shrubland (21.3%), Stony Foothill Arid Steppe (21.0%), Montane Steppe Grasslands (17.9%), and Rangeland (Mountain) (16.6%) being the most extensive habitat types. These land covers are characteristic of the regional foothill and montane zones. Smaller proportions of Montane Xerophytic Shrubland, Alpine Shrub, and Scree Slopes reflect localized topographic and climatic variation. Anthropogenically modified areas such as Urban Area (0.2%) and Water Body (0.1%) occupy very limited portions of the ROW. Overall, the corridor remains largely natural in composition. The habitat map of the OHTL ROW is provided below (moved from Annex C for clarity), followed by a summary table of land cover percentages within the ROW.

Table 2: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor

Habitat name	Area in hectare
Alpine shrub	20.83533
Bare Canyon Cliff	0.227855

Montane Steppe Grasslands	60.46201
Montane Xerophytic Shrubland	16.454496
Rangeland (Mountain)	56.144414
Red Sandstone Desert Grassland	3.763119
Riparian Forest	3.733367
Riverside forest	2.853707
Rocky Outcrop Shrubland	72.135337
Scree Slopes	8.585852
Stony foothill arid steppe	71.00458
Urban area	0.529975
Water body	0.477093

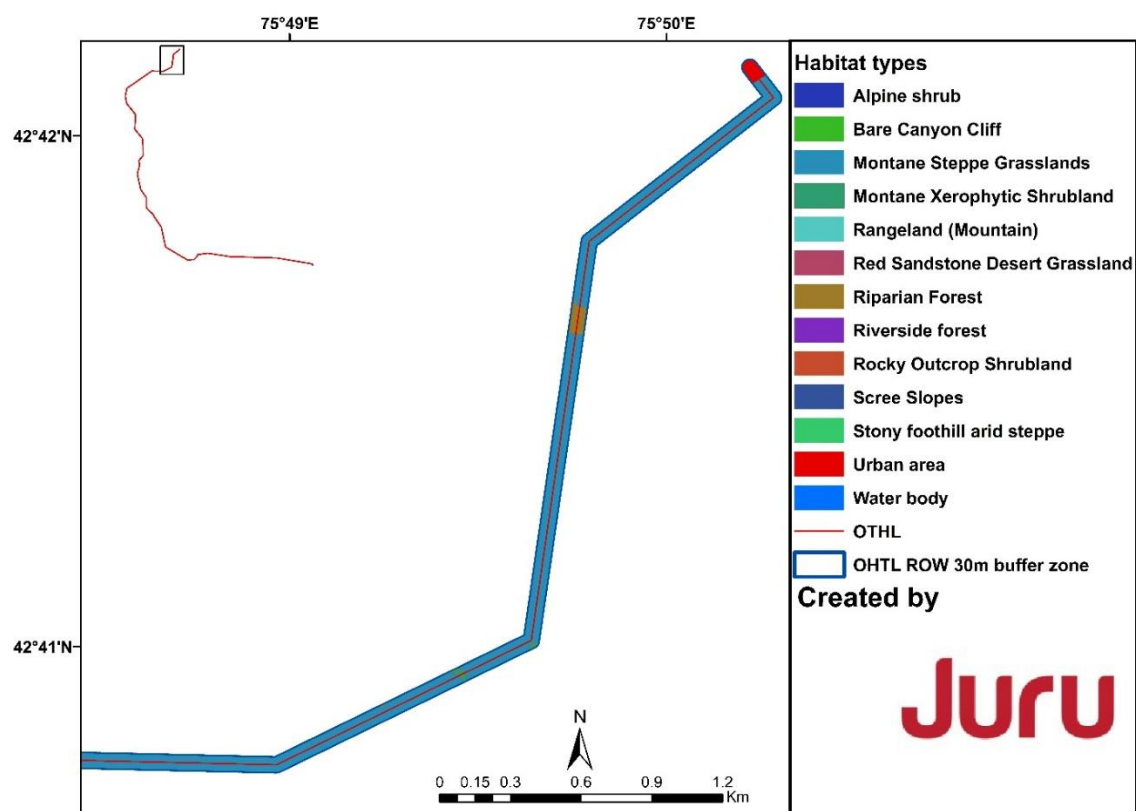


Figure 4: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (1-5 km of OHTL line)

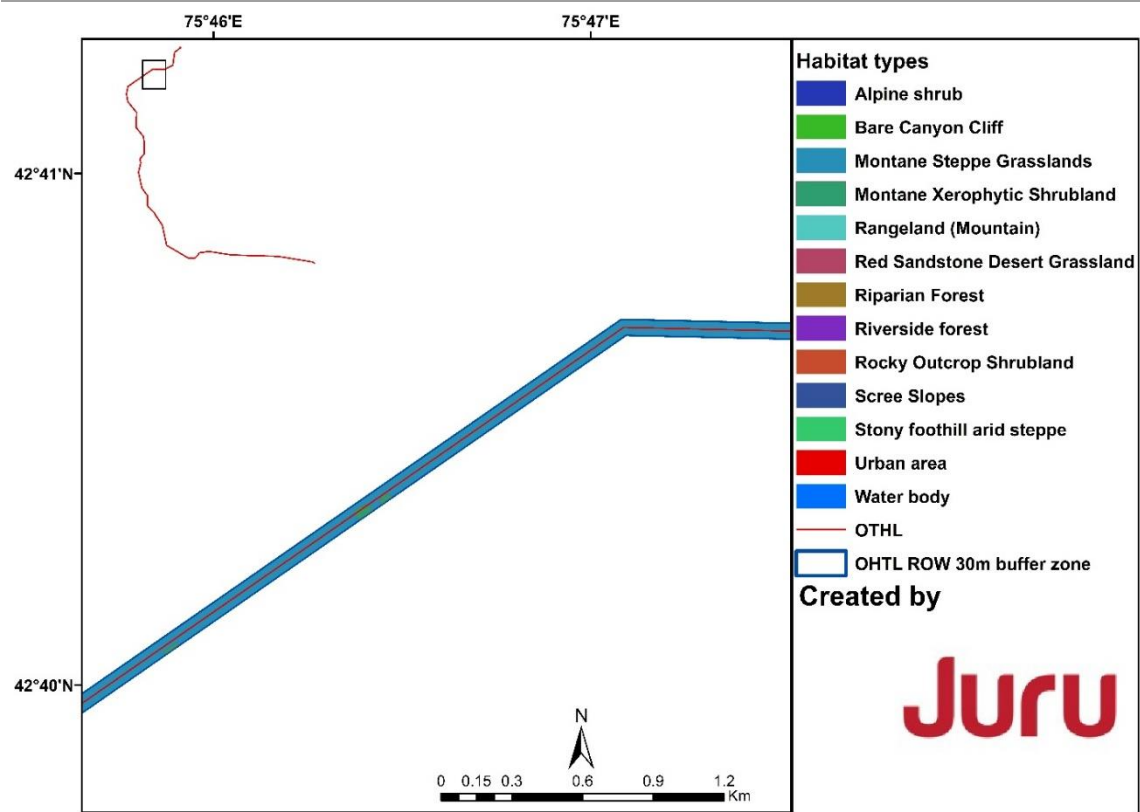


Figure 5: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (5-9 km of OHTL line)

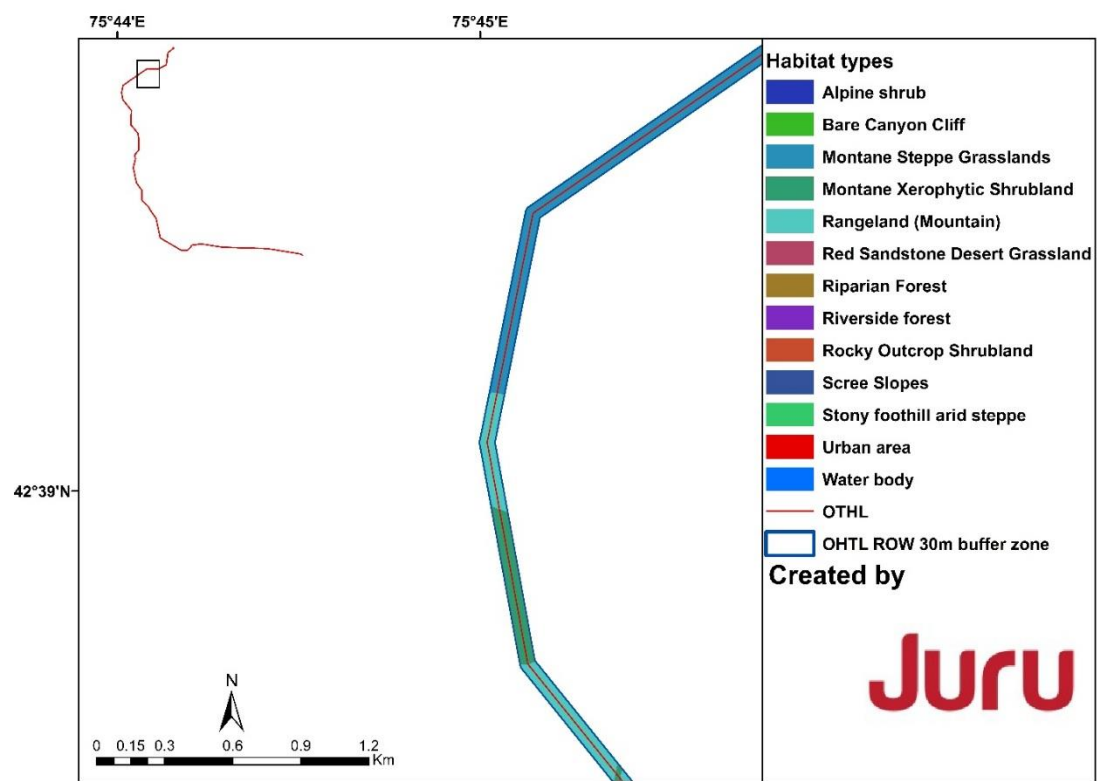


Figure 6: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (9-13 km of OHTL line)



Figure 7: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (13-17 km of OHTL line)

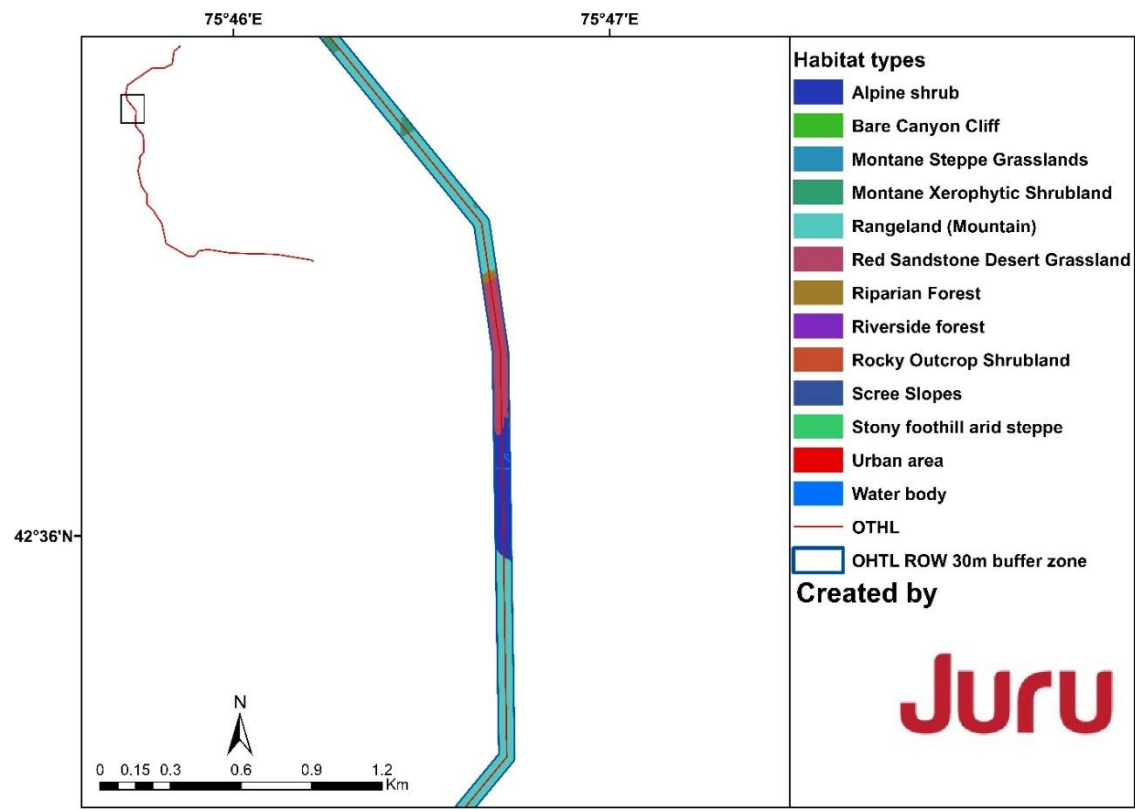


Figure 8: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (17-20 km of OHTL line)

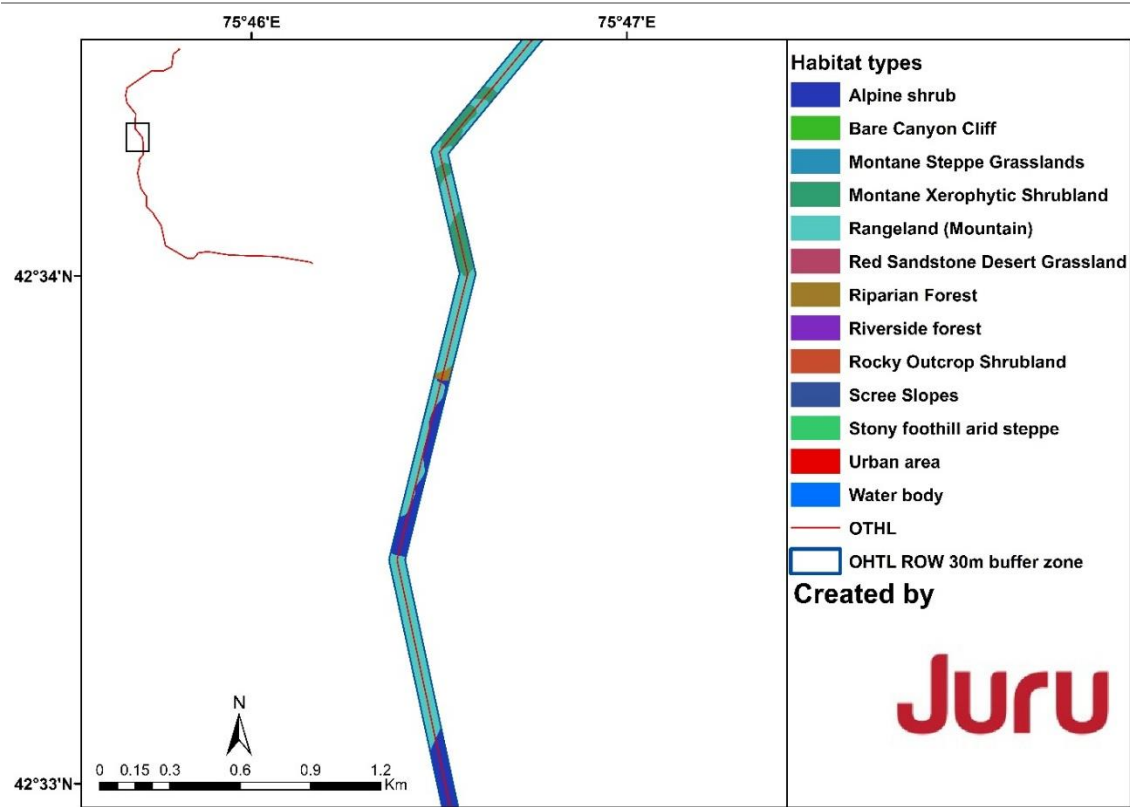


Figure 9: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (20-23 km of OHTL line)

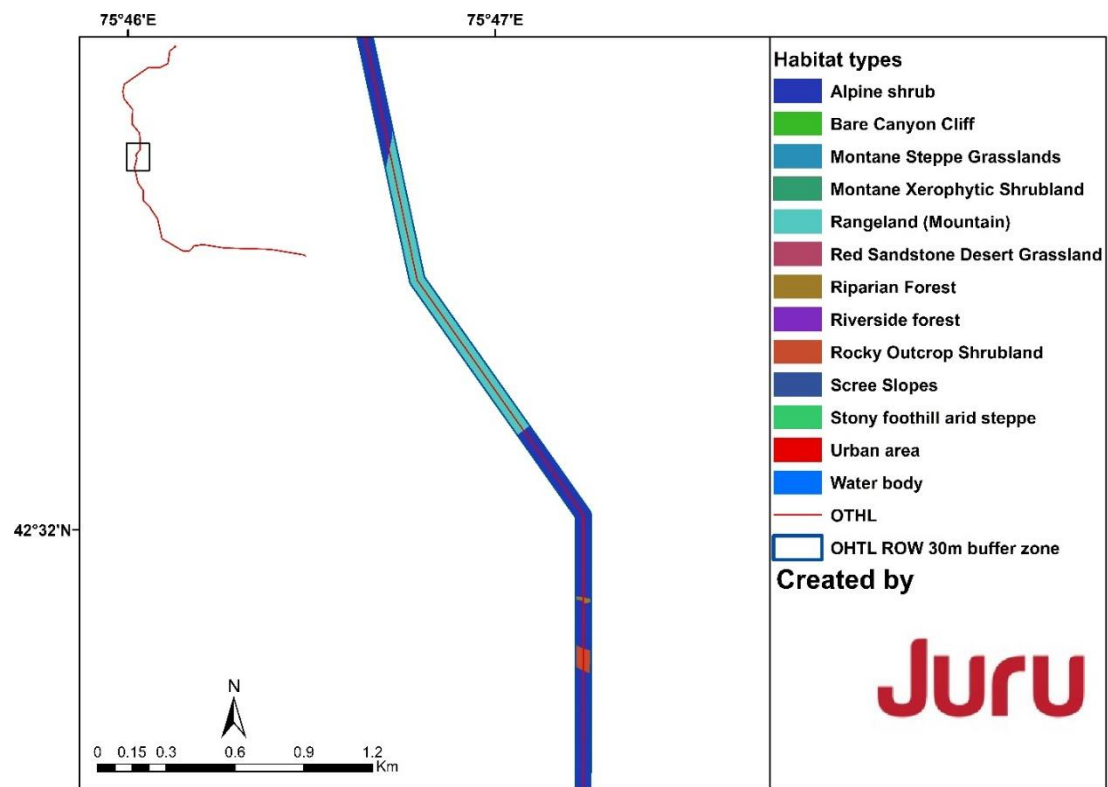


Figure 10: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (23-26 km of OHTL line)

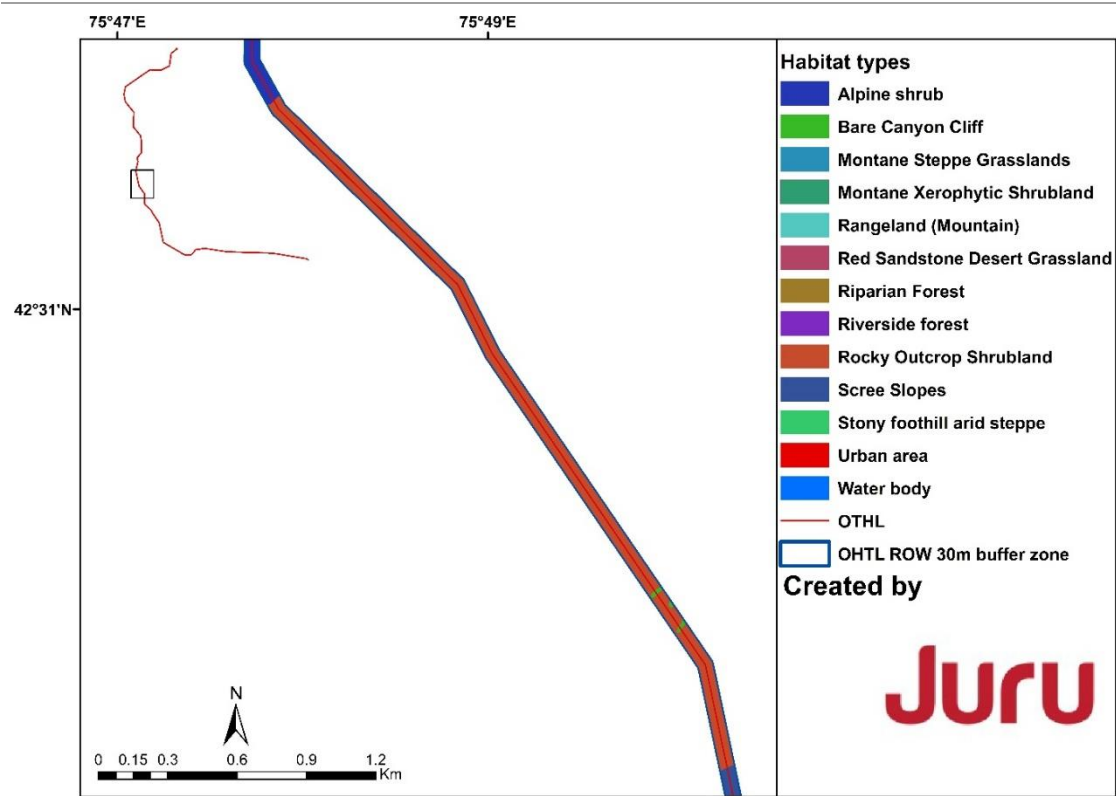


Figure 11: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (26-29 km of OHTL line)

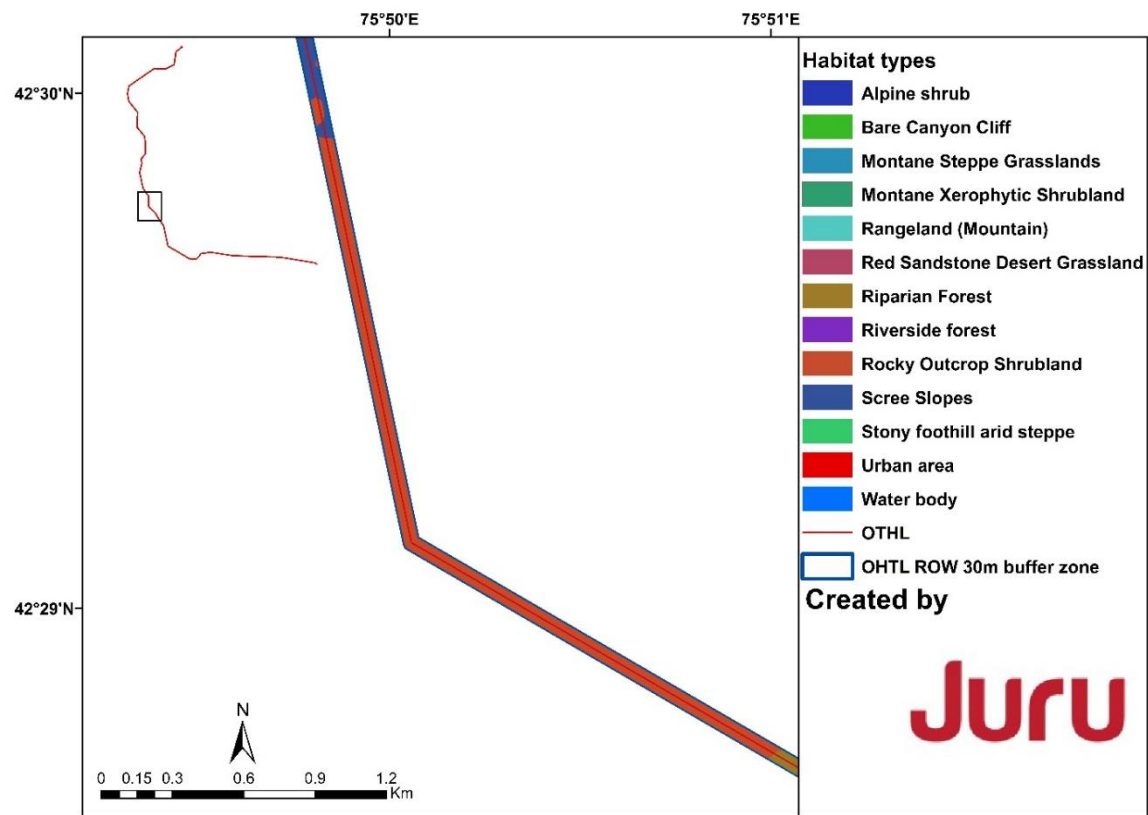


Figure 12: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (29-32 km of OHTL line)



Figure 13: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (32-35 km of OHTL line)

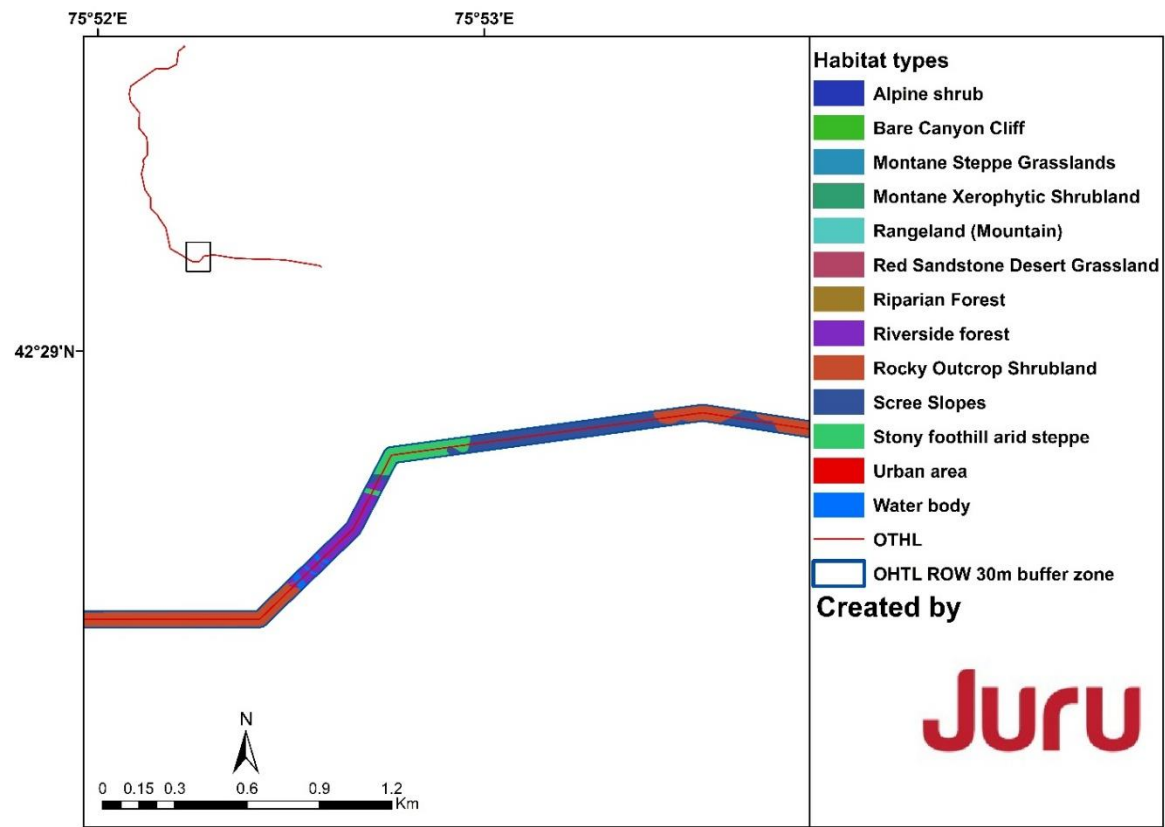


Figure 14: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (35-39 km of OHTL line)

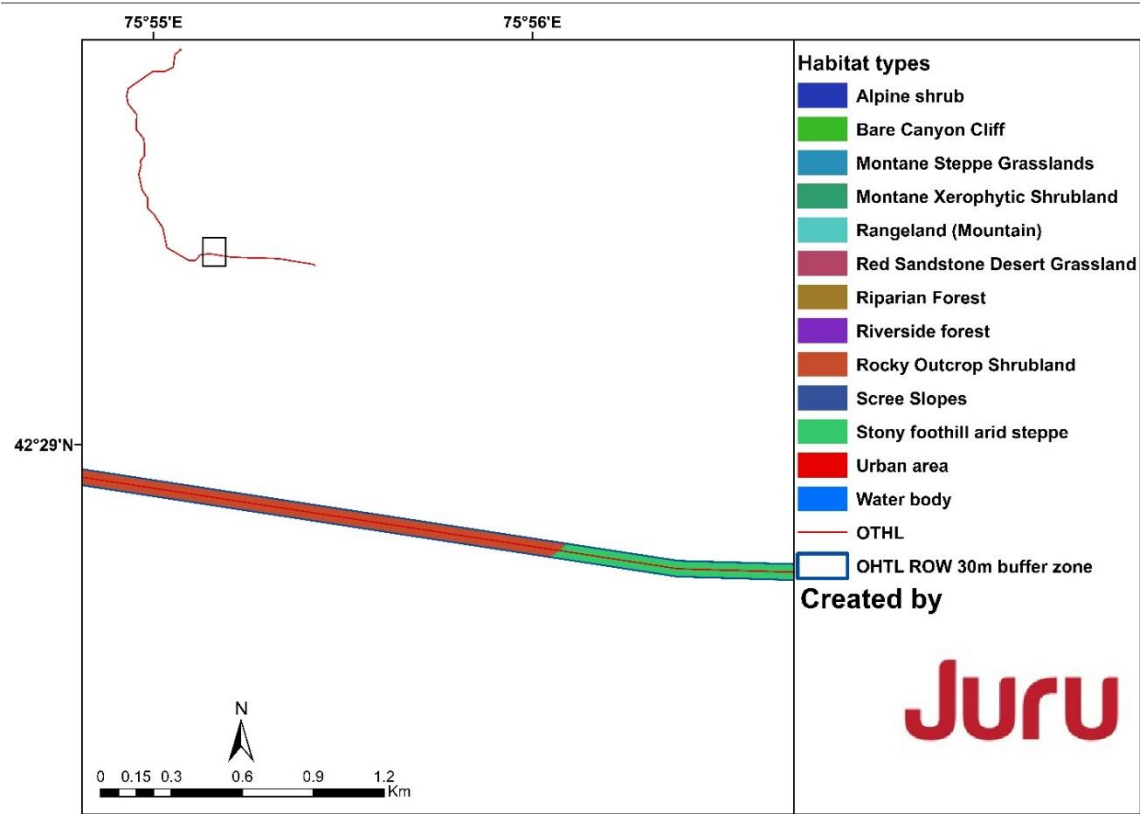


Figure 15: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (39-42 km of OHTL line)

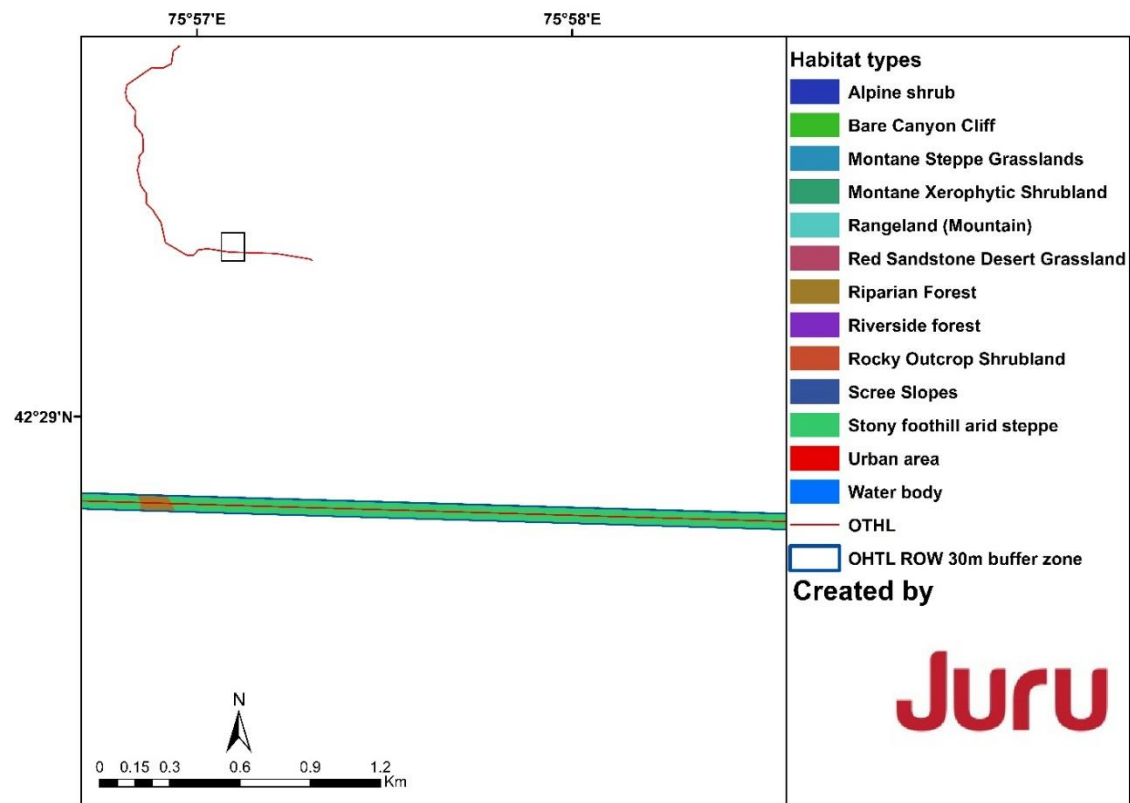


Figure 16: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (42-45 km of OHTL line)

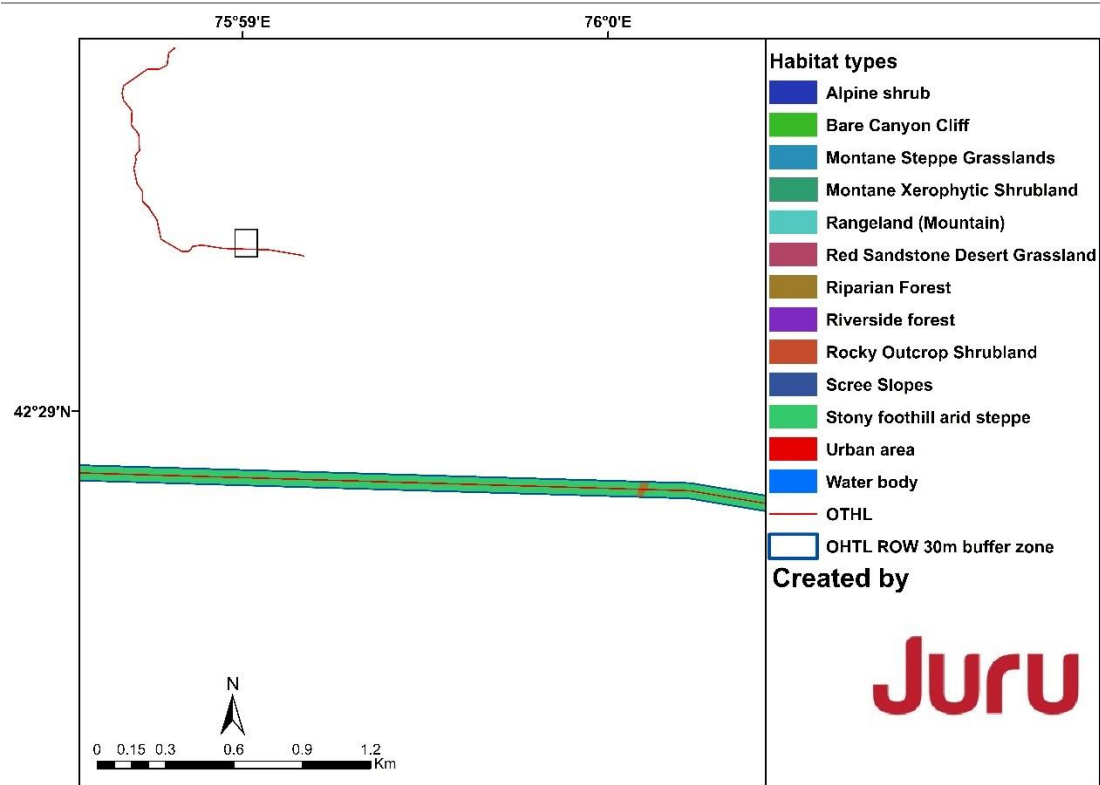


Figure 17: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (45-47 km of OHTL line)

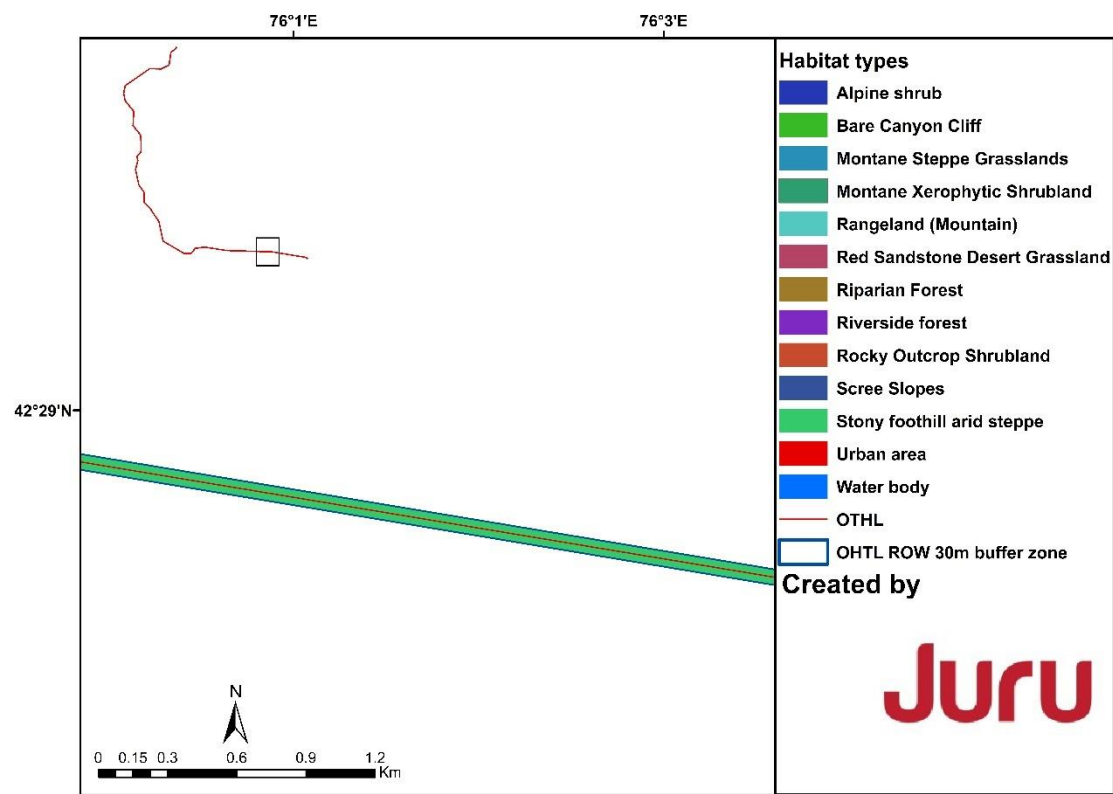


Figure 18: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (47-50 km of OHTL line)

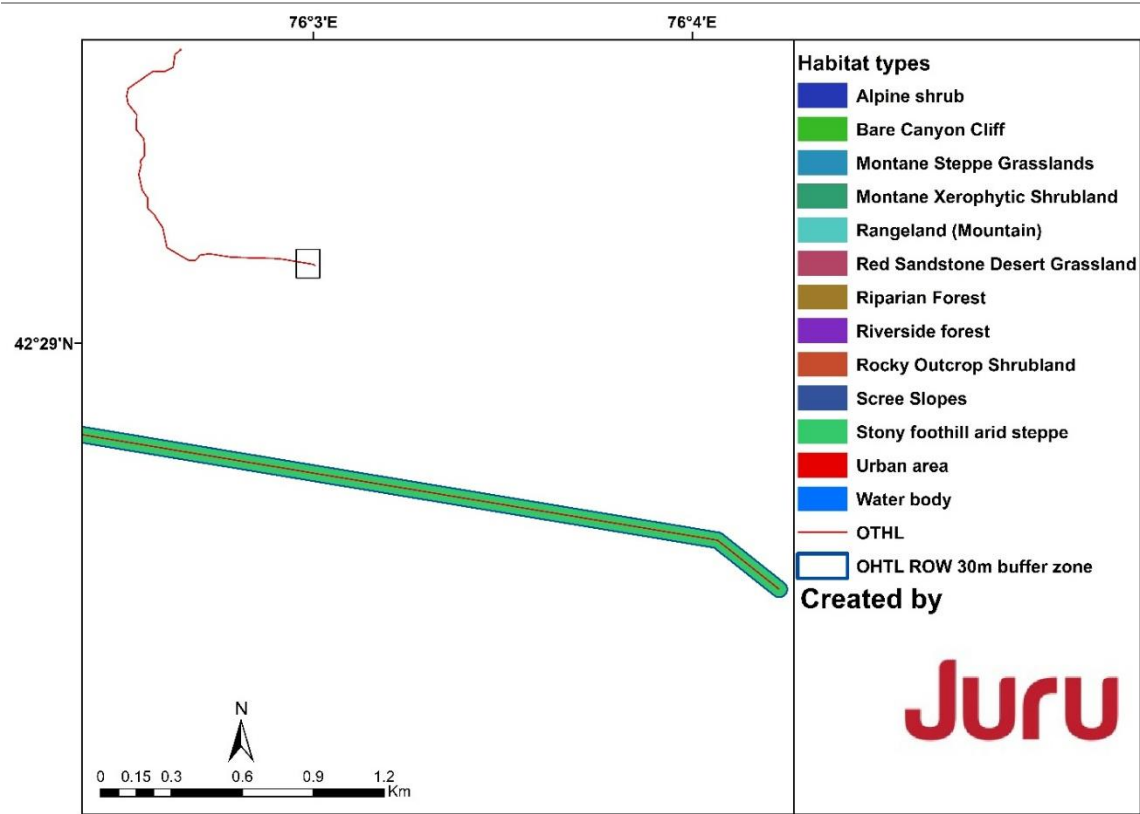


Figure 19: Habitat Types within the 30 m Buffer Zone along the OHTL Corridor (50-52 km of OHTL line)

Alpine shrub (13.2 Shrubland - Subalpine/Alpine)

The Alpine shrub habitat is predominantly distributed in the northern sections of the OHTL corridor within the buffer zone. These habitats are typically found in mid to high-elevation zones and are characterized by dense shrub cover that thrives under cool, moist conditions. The proximity to mountain slopes and ridges creates a favorable environment for species such as dwarf shrubs and other hardy vegetation adapted to alpine climates. The distribution of alpine shrubs along the OHTL highlights the interaction between the natural landscape and infrastructure development, emphasizing the need for careful management to minimize ecological impacts.



Figure 20: View of Alpine shrub.

Bare Canyon Cliff (7.2.1 Scree, boulders and outcrops)

The Bare Canyon Cliff habitat is primarily located in the southern sections of the OHTL corridor within the designated 500 m buffer zone. This habitat is characterized by steep, eroded sandstone formations with minimal soil development and very sparse vegetation cover, typically limited to drought-resistant shrubs and ephemerals clinging to rock crevices. The rugged terrain and striking red and white canyon walls create a distinctive visual landscape, offering important microhabitats for cliff-adapted species such as reptiles and birds of prey. In addition to its ecological uniqueness, this habitat exhibits high geotourism potential due to its scenic geological formations, attracting increasing numbers of visitors and outdoor enthusiasts. Its growing popularity as a destination for eco-tourism and photography further underscores the importance of managing this area to balance conservation priorities with sustainable recreational use.



Figure 21: View of Bare Canyon Cliff.

Riverside forest.

Riverside forests are primarily distributed along streams and rivers within the study area. These habitats typically feature species from the genera willow (*Salix*), poplar (*Populus*), birch (*Betula*), and tamarix (*Tamarix*). In some areas, they are also interspersed with sea buckthorn (*Hippophae rhamnoides* L.), which thrives in riparian conditions.



Figure 22: View of Riverside forests.

Montane Steppe Grasslands (4.4 Temperate Grassland - Alpine)

The Rangeland (Mountain) habitat type is widely distributed along mid- to upper-elevation zones within the 500 m buffer of the OHTL corridor. This habitat is defined by gently sloping to moderately steep terrain covered with a mosaic of grasses, forbs, and scattered xerophytic shrubs. Dominated by herbaceous vegetation, it serves as a key seasonal grazing area for livestock, especially sheep and cattle, and is integral to local pastoral livelihoods. The relatively open structure of this habitat allows for moderate ecological resilience, although signs of overgrazing can be observed in some sections. In addition to its pastoral value, the Rangeland (Mountain) landscape also presents scenic vistas of surrounding valleys and ridges, attracting occasional nature tourists and hikers. Its dual function as both a cultural grazing landscape and a natural habitat highlights the importance of sustainable rangeland management to support biodiversity and local economies.



Figure 23: View of Montane Steppe Grasslands.

Montane Xerophytic Shrubland (3.8 Desert Shrubland – Temperate)

The Montane Xerophytic Shrubland habitat, as observed along the OHTL corridor within the 500 m buffer zone, is typically found on dry, south-facing slopes and moderately steep hillsides. This habitat is characterized by sparse to moderately dense stands of drought-tolerant woody shrubs interspersed with grasses and herbaceous species. The vegetation is well-adapted to arid montane conditions with shallow soils and high solar exposure. Dominant shrub species often include *Artemisia*, *Atraphaxis*, and other xerophytes capable of surviving prolonged dry periods. These habitats serve as important ecological transition zones between steppe and alpine environments and support a specialized assemblage of flora and fauna. The presence of access roads and powerline towers increases the visibility of these landscapes, occasionally drawing tourists and photographers interested in semi-arid mountain ecosystems. However, the fragile structure of xerophytic shrublands makes them sensitive to disturbance, necessitating careful monitoring and management in the face of infrastructure development.



Figure 24: View of Montane Xerophytic Shrubland.

Rangeland (Mountain) (4.5 Temperate Grassland - Montane)

The Rangeland (Mountain) habitat within the 500 m buffer zone of the OHTL corridor is primarily located in mid- to upper-elevation zones and is dominated by a mosaic of herbaceous vegetation and scattered shrubs. These rangelands are extensively used for grazing by livestock, particularly sheep and cattle, and support a variety of drought-adapted grasses such as *Festuca* and *Stipa*, along with subshrubs like *Artemisia* and *Acantholimon*. The terrain is typically rolling to moderately steep, with soils that are often shallow and prone to erosion under intensive grazing. While these areas are of moderate to high pastoral value, they are ecologically vulnerable to overgrazing and trampling. The visual openness of the rangeland and its integration with scenic mountainous backdrops also contributes to its attractiveness for recreational hiking and ecotourism. The proximity of this habitat to the transmission line infrastructure underscores the importance of sustainable grazing practices and landscape-level planning to balance biodiversity conservation with traditional land use.



Figure 25: View of Rangeland (Mountain).

Riparian Forest (1.4.2 Riparian Forest - Temperate)

The Riparian Forest habitat along the OHTL corridor buffer zone occurs in narrow, linear formations adjacent to streams and seasonal watercourses. These areas are characterized by relatively dense woody vegetation and moisture-dependent flora, including species such as *Salix* (willows), *Populus* (poplars), and understory plants like *Rosa* and *Berberis*. This habitat plays a crucial ecological role by stabilizing stream banks, filtering runoff, and providing habitat connectivity for terrestrial and aquatic species. Unlike other land classes, Riparian Forests serve as vital ecological corridors, facilitating species migration and genetic exchange. The microclimatic conditions created by canopy shade and consistent soil moisture distinguish this zone from the surrounding arid and semi-arid uplands. Human impact is generally low due to the terrain and seasonal water flow, though occasional browsing by livestock and erosion from upstream disturbances can affect vegetation structure. Importantly, these riparian belts act as biodiversity refugia in dry landscapes and should be prioritized for protection and integrated into hydrological and habitat restoration efforts.



Figure 26: View of Riparian Forest.

Stony foothill arid steppe (4.6 Temperate Grassland - Semi-arid)

The Stony Foothill Arid Steppe habitat is predominantly distributed in the southern portion of the buffer zone. This habitat is characterized by arid conditions, stony soils, and sparse vegetation, primarily composed of drought-tolerant grasses, shrubs, and herbs adapted to semi-arid environments.



Figure 27: View of Stony Foothill Arid Steppe.

Scree Slopes (7.2.1 Scree, boulders and outcrops)

The Scree Slopes habitat type within the OHTL ROW buffer zone is characterized by loose, fragmented rock debris that accumulates on steep inclines, often at the base of cliffs or escarpments. These zones are defined more by geomorphology than vegetation, with unstable substrates limiting plant

establishment. However, a unique assemblage of pioneer and crevice-dwelling species—such as *Ephedra*, *Cousinia*, or cushion-forming *Acantholimon*—may be present, adapted to withstand mechanical stress, poor soil retention, and drought. Unlike other habitats, Scree Slopes provide microhabitats for cold-adapted and disturbance-tolerant species and can serve as refuges from grazing due to their inaccessibility. They also contribute to slope stabilization and act as sediment sources for adjacent ecosystems. From a conservation perspective, these habitats are significant for supporting rare or endemic flora and fauna adapted to harsh, rocky environments. The visual contrast and geomorphological features of scree terrain also enhance its scientific and geotourism value, warranting careful consideration during infrastructure development or slope modification activities.



Figure 28: View of Stony Foothill Arid Steppe.

Rocky Outcrop Shrubland (7.2.1 Scree, boulders and outcrops)

The Rocky Outcrop Shrubland habitat is one of the most structurally distinctive and ecologically significant types within the OHTL ROW buffer zone. It is characterized by rugged terrain with exposed rock surfaces interspersed with drought-adapted shrubs such as *Artemisia*, *Spiraea*, and *Berberis*. These outcrops often occur along ridgelines, escarpments, and elevated slopes where soil development is minimal, and vegetation establishes in crevices or shallow pockets. The habitat supports a specialized flora that tolerates intense sun exposure, limited moisture, and nutrient-poor substrates, and may also harbor localized endemic or relict species. Due to its inaccessibility for agriculture and low palatability for livestock, this habitat typically remains relatively undisturbed, serving as a refuge for native biodiversity. Additionally, the mosaic of rocks and vegetation provides microhabitats for reptiles, invertebrates, and ground-nesting birds. From an ecological and visual perspective, Rocky Outcrop Shrublands contribute significantly to landscape heterogeneity and resilience, reinforcing their importance for conservation planning and habitat integrity along the OHTL ROW.



Figure 29: View of Rocky Outcrop Shrubland.

Red Sandstone Desert Grassland (3.7 Desert Grassland – Temperate)

This habitat occurs primarily on gently sloping terraces and plateau-like surfaces formed by eroded red sandstone substrates within the lower zones of the OHTL ROW buffer. It is dominated by sparse but structured communities of drought-resistant grasses such as *Stipa*, *Achnatherum*, and *Poa bulbosa*, interspersed with low forbs and occasional ephemeral species that respond to short moisture pulses. The striking red geological backdrop and limited soil depth create a visually unique and ecologically stressed environment, where plant cover rarely exceeds 25%. Unlike true steppe or shrubland, this habitat lacks significant woody plant structure and is shaped primarily by edaphic constraints and aridity. Its open terrain and geological aesthetic offer high geotourism appeal, though the grassland's low resilience to trampling and off-road access calls for strict management to prevent degradation.



Figure 30: View of Red Sandstone Desert Grassland.

Red Sandstone Desert Shrubland (3.8 Desert Shrubland – Temperate)

Occupying eroded slopes, canyon rims, and dissected sandstone hillsides, the Red Sandstone Desert Shrubland is defined by the dominance of hardy xerophytic shrubs such as *Anabasis salsa*, *Haloxylon persicum*, and *Reaumuria soongarica*. These species are adapted to extreme temperature fluctuations, low precipitation, and high substrate salinity or alkalinity often associated with sandstone-derived soils. The vegetation is discontinuous, forming isolated patches on rocky outcrops or in sediment-accumulating hollows. This habitat plays a critical role in stabilizing fragile sandstone formations and sustaining faunal species adapted to open, arid shrubland conditions. Its spatial distribution is often limited to specific geomorphological niches, making it an ecologically important yet vulnerable component of the desert landscape. Additionally, its scenic value contributes to visitor interest, especially among nature photographers and eco-tourists exploring arid mountain environments.



Figure 31: View of Red Sandstone Desert Shrubland.

3.2 Botanical survey

The botanical surveys were performed on the 14–18 September 2024, and the 12–14 May 2025. This botanical investigation encompassed a total of 72 geobotanical survey points spanning an altitudinal gradient in the eastern extension of the along the OTHL ROW and 500 m buffer zone. The area surveyed includes habitats from riparian woodlands and high-elevation grasslands to arid semi-desert shrublands. The dataset captured substantial floristic and structural variation across these ecosystems. The field surveys were conducted in two distinct phenological phases—spring and autumn—which allowed for the documentation of both ephemeral and perennial vegetation components. This two-seasonal strategy was particularly effective in recording geophytes such as *Tulipa ostrowskiana*, whose phenology is confined to the early growing season. The species was often absent in autumn observations, underscoring the value of early-season monitoring for bulbous plants.

A total of over 300 vascular plant taxa were identified during the survey, representing a wide array of life forms including perennial grasses, subshrubs, geophytes, sedges, shrubs, climbers, and annual herbs. Dominant taxa across grassland sites include *Festuca valesiaca*, *Poa pratensis*, *Carex stenophylloides*, and *Achillea wilhelmsii*. These species collectively form the backbone of mesic and subalpine meadow communities and are widely distributed across relatively undisturbed alpine zones. Floristically, the most species-rich family recorded during the survey was *Asteraceae*, represented by more than 20 genera and over 30 species including *Achillea*, *Artemisia*, *Cirsium*, *Onopordum*, and *Taraxacum*, which were present across diverse ecological zones. This was followed by *Poaceae* (true grasses), with over 20 taxa such as *Stipa*, *Festuca*, *Poa*, *Achnatherum*, and *Setaria*, occupying a range of habitats from alpine turf to semi-desert steppe. The *Amaranthaceae* family also featured prominently, especially in arid and halophytic communities, with drought-adapted genera such as *Krascheninnikovia*, *Salsola*, *Halogeton*, and *Sympegma*. Other highly represented families include *Fabaceae* (e.g., *Caragana*, *Astragalus*, *Oxytropis*), *Rosaceae* (e.g., *Rosa*, *Crataegus*, *Potentilla*), *Brassicaceae*, and *Lamiaceae*, contributing to both structural and functional diversity across the vegetation zones. This taxonomic distribution reflects the region's transitional location between steppe, montane, and desert biomes, and highlights the ecological breadth of plant strategies, from drought-resistance to grazing tolerance. The data also underline the key role of grass and forb species in maintaining pasture integrity and ecosystem resilience in both upland and lowland plant communities.

In arid and semi-desert habitats, the vegetation is primarily composed of xeromorphic and psammophytic shrubs such as *Ephedra intermedia*, *Caragana kirghisorum*, *Krascheninnikovia ceratoides*, *Zygophyllum obliquum*, and *Salsola australis*. These species exhibit adaptations to drought, salinity, and extreme soil conditions. Herbaceous cover in these zones is typically low, with species such as *Stipa glareosa*, *Achnatherum splendens*, and *Peganum harmala* forming sparse but ecologically significant ground layers.

The species with the highest conservation designation is the recurring presence of *Tulipa ostrowskiana* in at least 14 survey points, with varying abundance and habitat types. This species, classified as Near Threatened (NT) globally and Vulnerable (VU) in the Red Data Book of Kyrgyzstan, was found predominantly in subalpine meadows, rocky montane slopes, and mesic steppe communities. In some locations, it contributed up to 10% of total plant cover. This suggests that the study area

represents a core zone of its ecological distribution, with viable populations capable of flowering and regeneration. Plots such as P_KG25_K_P10, P_KG25_K_P11, and P_KG25_K_P9 exhibited particularly rich geophyte diversity, with *T. ostrowskiana* co-occurring alongside *Gagea lutea*, *Tulipa tarda*, and *Allium oreoprasum*. These plots were often located in valleys or transitional zones between dry slopes and wetter depressions, indicating the importance of topographic microhabitats for geophyte persistence.

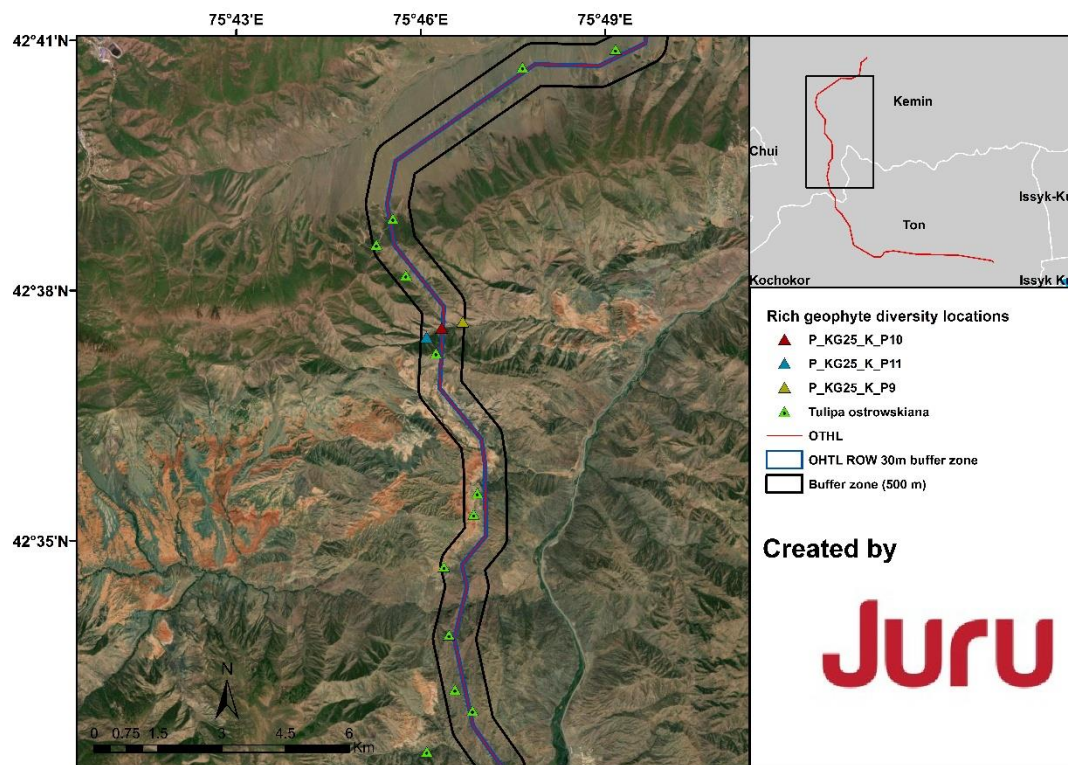


Figure 32: Locations of *Tulipa ostrowskiana* along the OTHL buffer zones

Another species with conservation status is the *Malus sieversii*, the wild progenitor of the cultivated apple. This species was encountered only twice during the survey (P_KG25_K_P11, P_KG24_K_P26). This species is recognized as Vulnerable (VU) on the IUCN Red List. Its presence in two ravine thickets adds genetic and conservation value to the wider survey area, given its role in the evolutionary history of global apple varieties. Though rare in the surveyed area, its detection aligns with known relic populations in the Tien Shan and supports the importance of riparian zones for harboring long-lived woody taxa of high genetic relevance.

In addition to *Tulipa ostrowskiana*, the survey also recorded the presence of *Tulipa zenaidae*, a rare geophyte species listed as Vulnerable (VU) in the Red Data Book of Kyrgyzstan. Although its local abundance was low, its occurrence in dry steppe grasslands and piedmont basins underscores the importance of these habitats as refugia for bulbous flora. As with other spring ephemerals, *T. zenaidae* is highly sensitive to early-season grazing and soil disturbance, making it a valuable indicator of habitat integrity and a priority species for ongoing monitoring and conservation planning.

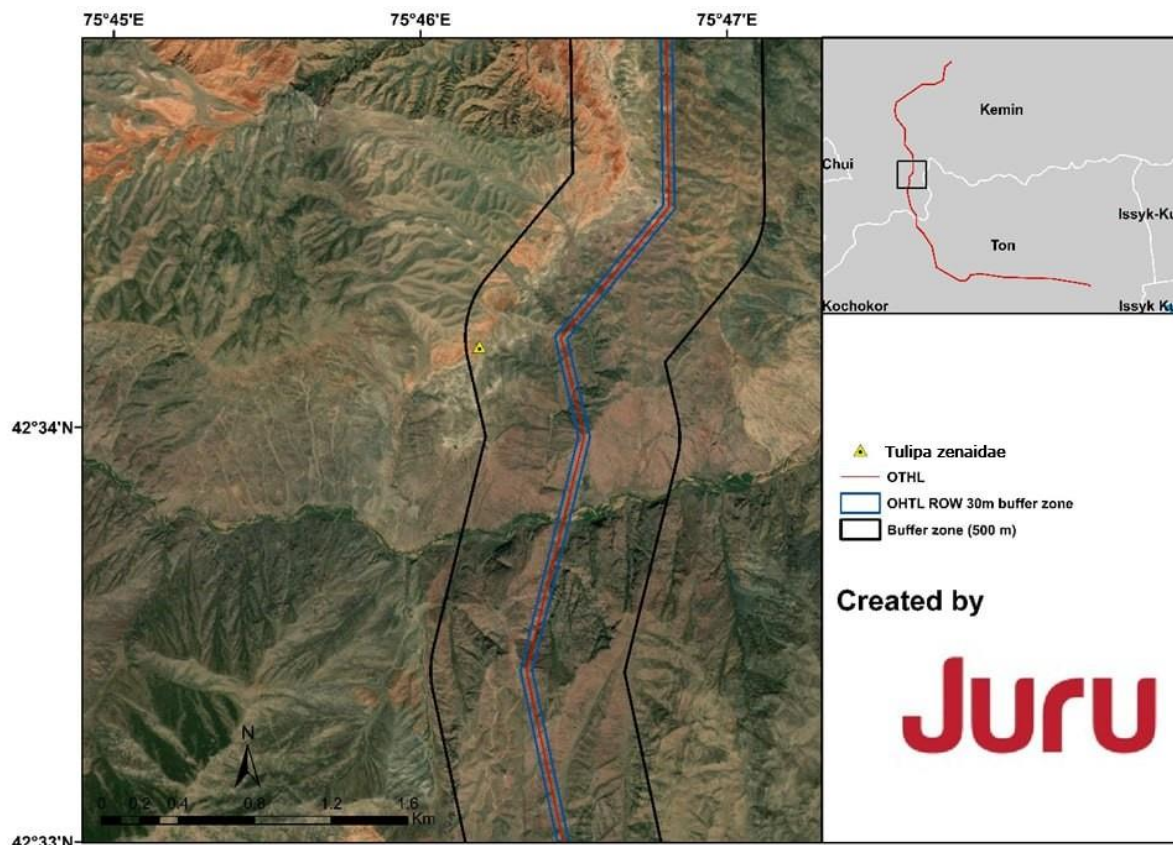


Figure 33: Locations of *Tulipa zenaidae* along the OTHL buffer zones

The high species turnover observed across short distances is a reflection of the landscape's topographic heterogeneity, soil diversity, and moisture gradients. Plant communities transition sharply from lush riparian thickets (dominated by *Salix gmelinii*, *Rosa beggeriana*, and *Phragmites australis*) to sparse desert shrublands (dominated by *Ephedra intermedia*, *Caragana kirghisorum*, and *Kochia prostrata*). Each of these vegetation types plays a role in supporting floristic diversity and maintaining landscape function. Several plots exhibited relatively intact subalpine grasslands with dense sod-forming species, indicating low disturbance levels and high ecological resilience. The most intact examples of this vegetation type include P_KG25_K_P41 and P_KG25_K_P40, where *Poa pratensis*, *Festuca valesiaca*, and *Carex stenophylloides* formed dense turfs capable of supporting livestock grazing without evident signs of degradation. Other plots, especially those located on heavily grazed piedmont plains, showed signs of pasture stress, including low total projective cover, dominance of unpalatable taxa, and increased frequency of ruderal and nitrophilous species. This is evident in plots such as P_KG25_K_P25 and P_KG24_K_P16, where perennial cover is minimal, and erosion-prone substrates are only sparsely stabilized by deep-rooted shrubs. Floristic data show that no plant species endemic solely to Kyrgyzstan were recorded during the survey. However, many species with restricted Central Asian distributions were documented, including taxa endemic to the broader Dzungarian-Tien Shan-Alai floristic province.

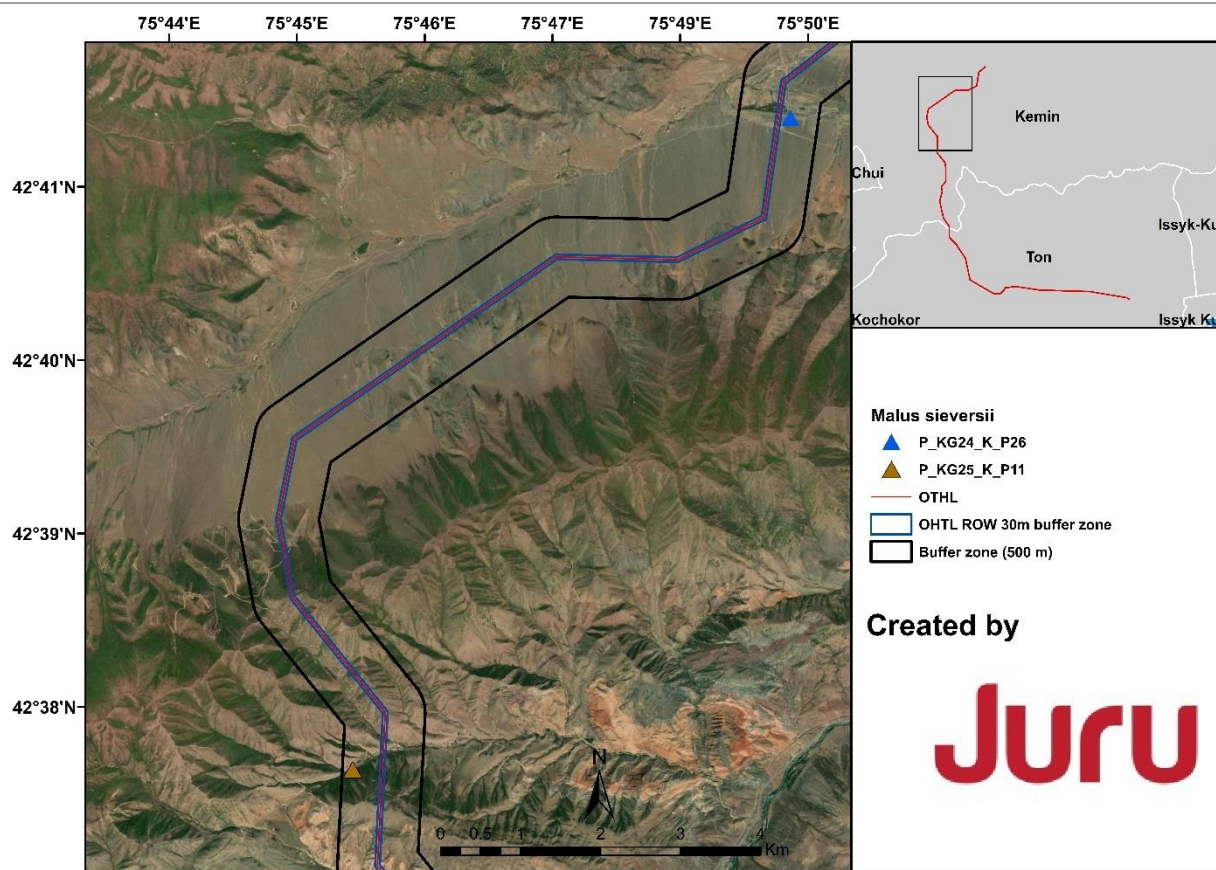


Figure 34: Location of *Malus sieversii* along the OTHL buffer zones

From a landscape perspective, areas of mixed shrub-grass vegetation-particularly those with transitional features (e.g., P_KG25_K_P39 and P_KG25_K_P38)-were among the richest in species composition and exhibited stratified vegetation structures, which contribute to habitat complexity and ecological buffering. Among the most ecologically significant plant communities recorded were those with high geophyte representation, particularly *Tulipa ostrowskiana*. Its flowering success appears to be strongly associated with seasonal snowmelt, grazing exclusion during early spring, and moderately developed soils. These factors may serve as ecological indicators for other bulbous species in Central Asia's montane zones. Numerous plots support ethnobotanically important species, such as *Peganum harmala*, *Perovskia abrotanoides*, *Elaeagnus angustifolia*, and *Hippophae rhamnoides*. While not globally threatened, these species offer medicinal, cultural, and ecological services, contributing to the socio-ecological value of the surveyed landscapes.

In conclusion, the floristic richness, structural diversity, and geographic span of the surveyed area provide a strong foundation for understanding the distribution of conservation-priority species in the Kyrgyz Range. Although only three Red Book species were confirmed-*Tulipa ostrowskiana*, *Tulipa zenaidae*, and *Malus sieversii*-their ecological requirements, population structure, and distribution patterns offer insight into the conservation value of the landscape.

Table 3: Summary of plant species documented during the botanical surveys. Numbers in the habitat columns represent the number of sample plots in each habitat type in which each species was recorded (Alien species are marked with asterix*)

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Screes Slopes	Stony foothill arid steppe	Grand Total
<i>Acer semenovii</i>	NE	Not listed	Tree										1		1
<i>Achillea millefolium</i>	LC	Not listed	Perennial herb		2								1		3
<i>Achillea wilhelmsii</i>	NE	Not listed	Perennial herb		5	2	2								9
<i>Achnatherum caragana</i>	NE	Not listed	Perennial grass					1	1	1					3
<i>Achnatherum splendens</i>	NE	Not listed	Perennial grass		2		8	2	2	4	8	5	2	10	43
<i>Acroptilon australe</i>	NE	Not listed	Perennial herb											1	1
<i>Aegilops squarrosa</i>	NE	Not listed	Annual grass			1									1
<i>Aeluropus littoralis</i>	LC	Not listed	Perennial grass		4										4
<i>Alfredia nivea</i>	NE	Not listed	Perennial herb			1									1
<i>Allium montanum</i>	NE	Not listed	Perennial geophyte (bulb)				1								1
<i>Allium oreoprasum</i>	NE	Not listed	Perennial geophyte (bulb)				2				5	1	1	4	13

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Alyssum desertorum</i>	NE	Not listed	Annual herb		2		2			1					5
<i>Amygdalus petunnikowii</i>	NE	Not listed	Shrub		3										3
<i>Anabasis tianschanica</i>	NE	Not listed	Subshrub (xerophyte)				1	2					1		4
<i>Androsace ovczinnikovii</i>	NE	Not listed	Perennial herb				1								1
<i>Androsace septentrionalis</i>	NE	Not listed	Perennial herb		1										1
<i>Artemisia compacta</i>	NE	Not listed	Subshrub		1	1					7	5	1	2	17
<i>Artemisia dracunculus</i>	NE	Not listed	Perennial herb				1					1			2
<i>Artemisia rhodatha</i>	NE	Not listed	Subshrub				1								1
<i>Artemisia santolinifolia</i>	NE	Not listed	Subshrub		5	2	7	3		1			1		19
<i>Artemisia schrenkiana</i>	NE	Not listed	Subshrub										1	1	2
<i>Artemisia sieversiana</i>	NE	Not listed	Subshrub			1									1
<i>Artemisia tenuisecta</i>	NE	Not listed	Subshrub	1	1	1	1								4
<i>Artemisia tianschanica</i>	NE	Not listed	Subshrub		3		3	3	1				1		11
<i>Asparagus neglectus</i>	NE	Not listed	Perennial herb		1								1		2
<i>Aster canescens</i>	NE	Not listed	Perennial herb		3		2						2		7
<i>Astragalus borodina</i>	NE	Not listed	Perennial herb						1						1

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Astragalus borodinii</i>	NE	Not listed	Perennial herb				4	2	1			1		1	9
<i>Astragalus mollissimus</i>	NE	Not listed	Perennial herb		1		1								2
<i>Astragalus sieversianus</i>	NE	Not listed	Perennial herb			1	1								2
<i>Astragalus sp.</i>	NE	Not listed	Mostly perennial herb							1	2			1	4
<i>Atraphaxis virgata</i>	NE	Not listed	Perennial shrub		1				1	3	4	2	1	5	16
<i>Atriplex sp.</i>	NE	Not listed	Annual		1					1	1		2		5
<i>Berberis sphaerocarpa</i>	NE	Not listed	Shrub		1			1					1		3
<i>Bothriochloa ischaemum</i>	NE	Not listed	Perennial grass		3										3
<i>Bupleurum falcatum</i>	NE	Not listed	Perennial herb			1									1
<i>Calamagrostis epigeios</i>	NE	Not listed	Perennial grass											1	1
<i>Calamagrostis sp.</i>	NE	Not listed	Perennial grass		1								1		2
<i>Caragana aurantiaca</i>	NE	Not listed	Shrub					1							1
<i>Caragana kirghisorum</i>	NE	Not listed	Shrub		1	1		2		1	6	9	2	9	31
<i>Caragana kirgisorum</i>	NE	Not listed	Shrub	1						1	1				3
<i>Caragana laeta</i>	NE	Not listed	Shrub			2							1		3

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Caragana leucophloea</i>	NE	Not listed	Shrub							1				4	5
<i>Carduus acanthoides</i>	NE	Not listed	Annual herb			1									1
<i>Carex chordorrhiza</i>	LC	Not listed	Perennial sedge		3	1									4
<i>Carex pachystylis</i>	NE	Not listed	Perennial herb								1				1
<i>Carex pseudofetida</i>	NE	Not listed	Perennial sedge				2								2
<i>Carex stenocarpa</i>	NE	Not listed	Perennial sedge			1	1								2
<i>Carex stenophylloides</i>	NE	Not listed	Perennial sedge		2	1	1								4
<i>Carex turkestanica</i>	NE	Not listed	Perennial sedge		5		2								7
<i>Centaurea depressa</i>	NE	Not listed	Perennial herb										1		1
<i>Centaurea squarrosa</i>	NE	Not listed	Annual herb		1							1		2	4
<i>Cerasus tianschanica</i>	NE	Not listed	Tree		1										1
<i>Ceratocephala testiculata</i>	NE	Not listed	Annual herb								2	2			4
<i>Chenopodium album</i>	NE	Not listed	Annual herb								3	1		2	6
<i>Chenopodium botrys</i>	NE	Not listed	Annual herb							1		1		3	5

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Chondrilla juncea</i>	NE	Not listed	Perennial herb		1								1		2
<i>Chondrilla sp.</i>	NE	Not listed	Perennial herb		1						1		1		3
<i>Chorispora sibirica</i>	NE	Not listed	Annual herb				1								1
<i>Cirsium esculentum</i>	NE	Not listed	Perennial herb		5	3	2								10
<i>Cirsium incanum</i>	NE	Not listed	Perennial herb								1				1
<i>Clematis orientalis</i>	NE	Not listed	Perennial climbing herb		1					3	3		1	1	9
<i>Clematis songarica</i>	NE	Not listed	Perennial herb (climber)						1	1	5	2	1	1	11
<i>Clematis songorica</i>	NE	Not listed	Perennial climbing herb							2	1	1	1	2	7
<i>Convolvulus arvensis</i>	LC	Not listed	Perennial herb (climbing)		1						1			1	3
<i>Convolvulus tragacanthoides</i>	NE	Not listed	Subshrub	1	1		2		1	1	2	5	1	2	16
<i>Cotoneaster sp.</i>	NE	Not listed	Shrub		1								1		2
<i>Crataegus korolkowii</i>	NE	Not listed	Shrub		1								1		2
<i>Crataegus pontica</i>	LC	Not listed	Shrub		1	1									2

Species	IUCN status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Crocus alatavicus</i>	NE	Not listed	Perennial geophyte (corm)			1									1
<i>Cynodon dactylon</i>	LC	Not listed	Perennial grass (stoloniferous)			1									1
<i>Draba altaica</i>	NE	Not listed	Perennial herb		3		2			1					6
<i>Draba cana</i>	NE	Not listed	Perennial herb		2		1	1							4
<i>Draba huetii</i>	NE	Not listed	Perennial herb		1										1
<i>Elaeagnus angustifolia</i>	LC	Not listed	Tree		1										1
<i>Enneapogon borealis</i>	NE	Not listed	Perennial grass											1	1
<i>Ephedra distachya</i>	LC	Not listed	Shrub				1	1							2
<i>Ephedra equisetina</i>	NE	Not listed	Shrub				1	2		1		1	1	1	7
<i>Ephedra intermedia</i>	LC	Not listed	Shrub	1		3	8	3	2	4	7	10	2	10	50
<i>Eragrostis minor</i>	NE	Not listed	Annual grass		4	1				2	4	2	1		14
<i>Eremostachys isochila</i>	NE	Not listed	Perennial herb				2	1							3
<i>Eritrichium villosum</i>	NE	Not listed	Perennial herb		1										1
<i>Erodium cicutarium</i>	NE	Not listed	Annual herb		4	1									5

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Euphorbia alata</i>	NE	Not listed	Perennial herb			1	2								3
<i>Euphorbia ferganensis</i>	NE	Not listed	Perennial herb		5	2	2			1					10
<i>Festuca polesica</i>	NE	Not listed	Perennial grass				1								1
<i>Festuca valesiaca</i>	NE	Not listed	Perennial grass		8	2	4			1	2	2	1		20
<i>Filipendula vulgaris</i>	NE	Not listed	Perennial herb			1									1
<i>Gagea lutea</i>	NE	Not listed	Perennial geophyte (bulb)		1	2									3
<i>Galatella coriacea</i>	NE	Not listed	Perennial herb										1		1
<i>Gentiana turkestanorum</i>	NE	Not listed	Perennial herb			1									1
<i>Glaucium fimbriigerum</i>	NE	Not listed	Biennial herb					1							1
<i>Glaucium squamigerum</i>	NE	Not listed	Perennial herb										1		1
<i>Glycyrrhiza soongorica</i>	NE	Not listed	Perennial herb		1										1
<i>Goniolimon cuspidatum</i>	NE	Not listed	Perennial herb						1						1
<i>Halimodendron halodendron</i>	NE	Not listed	Shrub		1		1			2			1	3	8

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Halogeton glomeratus</i>	NE	Not listed	Annual herb								1			2	3
<i>Halogeton sp.</i>	NE	Not listed	Annual herb						1	1	3	1		3	9
<i>Hippophae rhamnoides</i>	NE	Not listed	Shrub	1	1		1			2			1		6
<i>Hippophae turkestanica</i>	NE	Not listed	Shrub			1	1			2	4			2	10
<i>Hordeum brevisubulatum</i>	NE	Not listed	Perennial grass			2									2
<i>Hordeum leporinum</i>	NE	Not listed	Annual grass		2	1	2			1					6
<i>Hymenolaena nana</i>	NE	Not listed	Perennial herb				1								1
<i>Impatiens parviflora</i> *	NE	Not listed	Annual herb		1								1		2
<i>Inula caspica</i>	NE	Not listed	Perennial herb			1									1
<i>Iris loczyi</i>	NE	Not listed	Perennial geophyte herb			1									1
<i>Juncus articulatus</i>	LC	Not listed	Perennial rush (wetland herb)							1	3				4
<i>Juniperus sabina</i>	LC	Not listed	Evergreen shrub			1									1

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<i>Juniperus semiglobosa</i>	LC	Not listed	Evergreen tree				1								1
<i>Kalidium caspicum</i>	NE	Not listed	Subshrub (halophyte)								1			3	4
<i>Klasea procumbens</i>	NE	Not listed	Perennial herb									1			1
<i>Kobresia capilliformis</i>	NE	Not listed	Perennial sedge (turf-forming)					1							1
<i>Kobresia stenocarpa</i>	NE	Not listed	Perennial sedge (turf-forming)					2							2
<i>Kochia prostrata</i>	NE	Not listed	Subshrub (xerophyte)									2		2	4
<i>Kochia prostrata</i>	NE	Not listed	Subshrub						1	1	3	1		5	11
<i>Koeleria gracilis</i>	NE	Not listed	Perennial grass			1									1
<i>Krascheninnikovia ceratoides</i>	NE	Not listed	Subshrub		1	1			1	2	7	4	3	8	27
<i>Krascheninnikoviana ceratoides</i>	NE	Not listed	Subshrub											1	1
<i>Lactuca saligna</i>	NE	Not listed	Annual herb					1							1

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Lactuca tatarica</i>	NE	Not listed	Perennial herb									1		1	2
<i>Lagochilus platyacanthus</i>	NE	Not listed	Subshrub								2		1	1	4
<i>Lagochilus sp.</i>	NE	Not listed	Subshrub								1				1
<i>Lonicera microcarpa</i>	NE	Not listed	Shrub		1								1		2
<i>Lycium dasystemum</i>	NE	Not listed	Shrub					1							1
<i>Lycium ferocissimum</i>	NE	Not listed	Shrub				1					1			2
<i>Lycium ruthenicum</i>	NE	Not listed	Deciduous shrub				1								1
<i>Malus sieversii</i>	VU	LC-Least Concern	Deciduous tree		1		1								2
<i>Mentha asiatica</i>	NE	Not listed	Perennial herb								2				2
<i>Myricaria bracteata</i>	NE	Not listed	Shrub											1	1
<i>Myricaria sp.</i>	NE	Not listed	Shrub								1			1	2
<i>Nassella trichotoma</i> *	NE	Not listed	Perennial grass				1								1
<i>Neotorularia korolkowii</i>	NE	Not listed	Annual or biennial herb		1				1						2
<i>Nitraria sibirica</i>	NE	Not listed	Shrub (halophyte)							3	9	4		7	23
<i>Onopordum acanthium</i>	NE	Not listed	Biennial or perennial herb										1		1

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<i>Onopordum illyricum</i>	NE	Not listed	Biennial herb				1								1
<i>Onosma dichroantha</i>	NE	Not listed	Perennial herb			1	1								2
<i>Orostachys thyrsiflora</i>	NE	Not listed	Succulent perennial herb					1	2		3	3	1	1	11
<i>Oxytropis macrocarpa</i>	NE	Not listed	Perennial herb				1								1
<i>Peganum harmala</i>	NE	Not listed	Perennial herb		2				1	3	9	7	1	11	34
<i>Perovskia abrotanoides</i>	NE	Not listed	Subshrub						1		5	3	1	2	12
<i>Phleum alpinum</i>	NE	Not listed	Perennial grass		1		2								3
<i>Phragmites australis</i>	NE	Not listed	Perennial grass		1		2			4	4		1	2	14
<i>Pilosella procera</i>	NE	Not listed	Perennial herb		1		2								3
<i>Plantago depressa</i>	NE	Not listed	Perennial herb				1								1
<i>Plantago lanceolata</i>	NE	Not listed	Mostly perennial herb											1	1
<i>Plantago minuta</i>	NE	Not listed	Annual herb									2			2

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Plantago sp.</i>	NE	Not listed	Mostly perennial herb											1	1
<i>Poa bulbosa</i>	NE	Not listed	Perennial grass		7		2			1					10
<i>Poa pratensis</i>	LC	Not listed	Perennial grass		2								1		3
<i>Poa sp.</i>	NE	Not listed	Perennial grass								1				1
<i>Polygonum rupestre</i>	NE	Not listed	Perennial herb				2	1							3
<i>Polygonum viviparum</i>	NE	Not listed	Perennial herb			1									1
<i>Potentilla arenaria</i>	NE	Not listed	Perennial herb		1										1
<i>Potentilla asiatica</i>	NE	Not listed	Perennial herb			1									1
<i>Potentilla bifurca</i>	NE	Not listed	Perennial herb								1				1
<i>Potentilla orientalis</i>	NE	Not listed	Perennial herb		1	1	2			1					5
<i>Potentilla sp.</i>	NE	Not listed	Perennial herb							1					1
<i>Pseudosophora alopecuroides</i>	NE	Not listed	Deciduous shrub					1							1
<i>Ptilagrostis mongholica</i>	NE	Not listed	Perennial grass				1								1

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Ptilagrostis mongolica</i>	NE	Not listed	Perennial grass				1								1
<i>Ranunculus natans</i>	NE	Not listed	Perennial aquatic herb			1									1
<i>Reaumuria songarica</i>	NE	Not listed	Subshrub								1			6	7
<i>Reaumuria sp.</i>	NE	Not listed	Shrub or semi-shrub						1						1
<i>Rhodiola linearifolia</i>	NE	Not listed	Perennial herb (succulent)			1									1
<i>Rochelia retorta</i>	NE	Not listed	Annual herb										1		1
<i>Rosa alberti</i>	NE	Not listed	Shrub		1	3	1								5
<i>Rosa beggeriana</i>	NE	Not listed	Shrub	1	1		4	1		3	3			2	15
<i>Rosa sp.</i>	NE	Not listed	Shrub		1								1		2
<i>Rosularia glabra</i>	NE	Not listed	Succulent perennial herb								3	2		1	6
<i>Rosularia sp.</i>	NE	Not listed	Succulent perennial herb						1		1	1			3
<i>Rumex pamiricus</i>	NE	Not listed	Perennial herb							1	3			2	6
<i>Rumex paulsenianus</i>	NE	Not listed	Perennial herb								1				1

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<i>Salix sp</i>	NE	Not listed	Tree							1					1
<i>Salix blakii</i>	NE	Not listed	Tree							1					1
<i>Salix gmelinii</i>	NE	Not listed	Tree		1					1	3		1	2	8
<i>Salix sp.</i>	NE	Not listed	Tree		1					1	2		1	1	6
<i>Salsola australis</i>	NE	Not listed	Annual herb						1	1	6	3		9	20
<i>Salsola montana</i>	NE	Not listed	Subshrub							1				4	5
<i>Salvia aethiopis*</i>	NE	Not listed	Perennial herb		1										1
<i>Scorzonera circumflexa</i>	NE	Not listed	Perennial herb		2	1									3
<i>Scorzonera inconspicua</i>	NE	Not listed	Perennial herb		2	1									3
<i>Scutellaria przewalskii</i>	NE	Not listed	Perennial herb								3	1			4
<i>Setaria viridis</i>	NE	Not listed	Annual grass		2				1	3	8	2	2	6	24
<i>Sideritis montana</i>	NE	Not listed	Perennial herb		1								1		2
<i>Silybum marianum</i>	LC	Not listed	Annual herb							1					1
<i>Sinapis arvensis</i>	LC	Not listed	Annual herb			1									1
<i>Sonchus paluster</i>	NE	Not listed	Annual or biennial herb								1				1
<i>Spiraea hypericifolia</i>	NE	Not listed	Shrub	1	1				1	1			2		6

Species	IUCN status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Stipa capillata</i>	NE	Not listed	Perennial grass		1								1		2
<i>Stipa caucasica</i>	NE	Not listed	Perennial grass	1	1										2
<i>Stipa glareosa</i>	NE	Not listed	Perennial grass	1	1	1	3		1	1	8	10	2	7	35
<i>Stipa orientalis</i>	NE	Not listed	Perennial grass		1										1
<i>Strigosella stenopetala</i>	NE	Not listed	Annual herb						1	1					2
<i>Sympegma regelii</i>	NE	Not listed	Subshrub							1				2	3
<i>Sympegma sp.</i>	NE	Not listed	Semi-shrub						1						1
<i>Tamarix ramosissima</i>	NE	Not listed	Shrub								1			1	2
<i>Taraxacum erythrospermum</i>	NE	Not listed	Perennial herb		4										4
<i>Taraxacum officinale</i>	LC	Not listed	Perennial herb											1	1
<i>Taraxacum serotinum</i>	NE	Not listed	Perennial herb			3	3			1					7
<i>Thermopsis turkestanica</i>	NE	Not listed	Perennial herb											1	1
<i>Tulipa zenaidae</i>	VU	VU-Vulnerable	Perennial geophyte (bulb)						1						1
<i>Tulipa ostrowskiana</i>	NT	VU-Vulnerable	Perennial geophyte (bulb)	1	1	4	6	1							13

Species	IUC N status	Kyrgyz status	Growth form	Alpine shrub	Montane Steppe Grasslands	Montane Xerophytic Shrubland	Rangeland (Mountain)	Red Sandstone Desert Grassland	Red Sandstone Desert Shrubland	Riparian Forest	Riverside forest	Rocky Outcrop Shrubland	Scree Slopes	Stony foothill arid steppe	Grand Total
<i>Tulipa tarda</i>	NE	Not listed	Perennial geophyte (bulb)			1									1
<i>Tussilago farfara</i>	NE	Not listed	Perennial herb		1		2								3
<i>Verbascum songaricum</i>	NE	Not listed	Biennial herb		1										1
<i>Verbascum virgatum</i>	NE	Not listed	Perennial herb				1								1
<i>Veronica longifolia</i>	NE	Not listed	Perennial herb								2				2
<i>Zygophyllum obliquum</i>	NE	Not listed	Subshrub		2				1		7	6	1	7	24
<i>Zygophyllum rosowii</i>	NE	Not listed	Perennial herb		1		2					2			5

Survey point name: P_KG24_K_P1

Vegetation community: *Achnatherum splendens* + *Nitraria sibirica*

Coordinates: N42.460489 E76.053138

TPC: 40%

The P_KG24_K_P1 site is situated within a sandy desert ecosystem, characterized by loose-textured, sandy substrates. Vegetation is sparse and adapted to arid conditions, with dominant xerophytic life forms. The area serves as a spring pasture, supporting seasonal livestock grazing. A total of 13 vascular plant species were recorded, representing diverse life forms typical of desert ecosystems, including perennial grasses, shrubs, subshrubs, herbs, climbers, and one tree species. The most dominant species by projective cover (PC) is *Achnatherum splendens* (25%), followed by *Nitraria sibirica* (10%) and *Setaria viridis* (5%). Other species occur sporadically with minimal cover, often marked as "+" (present but <1%). No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were observed. Additionally, no endemic plant species to Kyrgyzstan were recorded during the survey. Several taxa have ornamental and medicinal value, including *Clematis songarica*, *Clematis orientalis*, *Hippophae turkestanica*, and *Peganum harmala*, indicating the ecological and ethnobotanical significance of the site.



Figure 35: *Achnatherum splendens* + *Nitraria sibirica* community

Table 4: Results of survey point P_KG24_K_P1 (N42.460489 E76.053138)

Species	Life form	PC	IUCN	Red list KG
<i>Achnatherum splendens</i>	Perennial grass	25	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	10	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Setaria viridis</i>	Annual grass	5	NE	Not listed
<i>Poa sp.</i>	Perennial grass	1	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	1	NE	Not listed
<i>Rumex paulsenianus</i>	Perennial herb	+	NE	Not listed
<i>Clematis songarica</i>	Perennial climber (vine)	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial climber (vine)	+	NE	Not listed
<i>Potentilla bifurca</i>	Perennial herb	+	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Salix gmelinii</i>	Tree	+	NE	Not listed

Survey point name: P_KG24_K_P2

Vegetation community: *Ephedra intermedia* + *Caragana kirgisorum*

Coordinates: N42.456531 E76.040292

TPC: 35%

The P_KG24_K_P2 site is located within a sandy desert ecosystem and is seasonally utilized as spring and autumn pasture. The vegetation is sparse and composed primarily of xerophytic species well-adapted to arid environmental conditions. The estimated pasture productivity ranges from 1 to 3 centners per hectare (100–300 kg/ha). A total of 15 vascular plant species were recorded during the survey. The community is dominated by shrubs, subshrubs, perennial grasses, and annual herbs. The most dominant species in terms of projective cover is *Ephedra intermedia* (20%), followed by *Caragana kirghisorum* (10%) and *Krascheninnikovia ceratoides* (5%). Other species are sparsely distributed and occur with minimal cover (denoted as "+"). No plant species listed in the IUCN Red List as threatened, nor any included in the Red Data Book of Kyrgyzstan, were observed during the survey. Moreover, no endemic species to Kyrgyzstan were recorded at the site. Some taxa exhibit important medicinal or ornamental properties, including *Ephedra intermedia* and *Peganum harmala*, which enhance the ecological and ethnobotanical significance of this pasture area.



Figure 36: *Ephedra intermedia* + *Caragana kirghisorum* community

Table 5: Results of survey point P_KG24_K_P2 (N42.456531 E76.040292)

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub (gymnosperm)	20	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	5	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Chenopodium album</i>	Annual herb	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	1	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Halogeton glomeratus</i>	Annual herb	+	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Lagochilus platyacanthus</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P3

Vegetation community: *Enneapogon borealis* + *Salsola australis*

Coordinates: N42.460515 E76.028482

TPC: 30%

The P_KG24_K_P3 site is located within a semi-desert ecosystem characterized by rocky and sandy soils, scattered vegetation cover, and mountainous terrain in the background. The area is currently used as seasonal pasture during spring and autumn. The vegetation structure reflects a typical arid

shrub-steppe landscape with low biomass and patchy species distribution. A total of 12 vascular plant species were recorded, dominated by shrubs, subshrubs, perennial grasses, and annual herbs. *Enneapogon borealis* (15% cover) and *Salsola australis* (10%) are the most abundant species. *Ephedra intermedia* is present at 5% cover and holds both ecological and ethnobotanical significance. Most other species occur in trace amounts. No plant species listed in the IUCN Red List as threatened were observed. No species included in the Red Data Book of Kyrgyzstan were recorded. Notable species such as *Ephedra intermedia* and *Peganum harmala* are traditionally used for medicinal and ornamental purposes, adding cultural and ecological value to the pasture.



Figure 37: *Enneapogon borealis* + *Salsola australis* community

Table 6. Results of survey point P_KG24_K_P3 (N42.460515 E76.028482)

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Enneapogon borealis</i>	Perennial grass	15	NE	Not listed
<i>Salsola australis</i>	Annual herb	10	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	+	NE	Not listed
<i>Astragalus borodini</i>	Perennial herb	+	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed

Survey point name: P_KG24_K_P4

Vegetation community: *Kalidium caspicum* + *Krascheninnikoviana ceratoides*

Coordinates: N42.463996 E76.026315

TPC: 40%

The P_KG24_K_P4 site is located within a semi-arid desert ecosystem dominated by shrubs, subshrubs, and halophytes, as shown in the Figure-6. The terrain consists of coarse-textured, slightly saline soils with scattered perennial cover and seasonal herbaceous layers. The area is used as pasture in spring, autumn, and winter, supporting extensive seasonal livestock grazing. A total of 24 plant species were identified. The community is dominated by drought- and salt-tolerant subshrubs, such as *Krascheninnikovia ceratoides* (20%) and *Kalidium caspicum* (10%). Grasses like *Kochia prostrata* (5%) and several perennial herbs contribute to ground cover, while numerous other species occur in trace amounts. Several species hold ethnobotanical value. Notably, *Ephedra intermedia*, *Peganum harmala*, *Perovskia abrotanoides*, and *Scutellaria przewalskii* are traditionally used for medicinal or ornamental purposes, enhancing the ecological value of the habitat beyond forage. Based on the current survey's scope, the area may not represent critical habitat for the aforementioned sensitive species categories.



Figure 38: *Kalidium caspicum*+ *Krascheninnikoviana ceratoides* community

Table 7: Results of survey point P_KG24_K_P4 (N42.463996 E76.026315)

Species	Life form	PC	IUCN	Red list KG
<i>Krascheninnikovia ceratoides</i>	Subshrub	20	NE	Not listed
<i>Kalidium caspicum</i>	Subshrub (halophyte)	10	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Chenopodium album</i>	Annual herb	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Clematis songarica</i>	Perennial herb (climber)	+	NE	Not listed
<i>Ceratocephala testiculata</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Succulent perennial herb	+	NE	Not listed
<i>Rosularia glabra</i>	Succulent perennial herb	+	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Scutellaria przewalskii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P5

Vegetation community: *Halimodendron halodendron* + *Achnatherum splendens*

Coordinates: N42.46167 E76.013912

TPC: 40%

The P_KG24_K_P5 site is situated in a semi-arid riverine zone at the foothills of a mountainous region. The vegetation reflects a shrub-grass mosaic with seasonal herbaceous cover and moisture-favoring woody species. The site is currently utilized as a pasture during spring and autumn, with an estimated forage productivity of 1–3 centners per hectare (100–300 kg/ha). The plant community comprises a mix of shrubs, perennial grasses, annual herbs, and climbing perennials. A total of 16 species were recorded. *Halimodendron halodendron* dominates with 25% cover, followed by *Achnatherum splendens* (10%) and *Phragmites australis* (5%). Other species appear in trace amounts. Based on the current survey's scope, the area may not represent critical habitat for the aforementioned sensitive species categories.



Figure 39: *Halimodendron halodendron* + *Achnatherum splendens* community

Table 8: Results of survey point P_KG24_K_P5 (N42.46167 E76.013912)

Species	Life form	PC	IUCN	Red list KG
<i>Halimodendron halodendron</i>	Shrub	25	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	10	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Rumex pamiricus</i>	Perennial herb	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	1	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Salix gmelinii</i>	Tree	1	NE	Not listed
<i>Clematis songarica</i>	Perennial herb (climber)	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial herb (climber)	+	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	+	NE	Not listed
<i>Astragalus</i> sp.	Perennial herb	+	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed
<i>Myricaria</i> sp.	Shrub	+	NE	Not listed

Survey point name: P_KG24_K_P6

Vegetation community: *Salix sp.* + *Hippophae rhamnoides* + *Rosa beggeriana*.

Coordinates: N42.461179 E75.99971

TPC: 70%

This P_KG24_K_P6 is located within a dense riparian shrubland at the base of foothill mountains, characterized by moist microhabitats interspersed with xerophytic and mesophytic elements. The area is used seasonally for grazing during spring and autumn. The presence of both woody and herbaceous species with varying cover suggests a structurally complex, moisture-influenced environment. A total of 24 plant species were recorded. The vegetation is dominated by *large Salix spp.* shrubs (30%) and *Hippophae turkestanica* (20%), followed by *Rosa beggeriana* (10%). These woody species form a dense thicket, likely benefiting from higher water availability. The herbaceous layer includes reed, grasses, bulbous and climbing species, mostly with minor cover. No threatened species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan, nor any plant species endemic to Kyrgyzstan, were recorded during the survey. The area supports numerous medicinal species, including *Peganum harmala*, *Elaeagnus angustifolia*, *Hippophae rhamnoides*, *Glycyrrhiza soongorica*, *Berberis sphaerocarpa*, *Clematis orientalis*, and *Phragmites australis*. These species add ethnobotanical and ecological value, especially in traditional medicine and habitat stability.



Figure 40: *Salix sp.* + *Hippophae rhamnoides* + *Rosa sp.* Community

Table 9: Results of survey point P_KG24_K_P6 (N42.461179 E75.99971)

Species	Life form	PC	IUCN	Red list KG
<i>Salix sp.</i>	Shrub or small tree	30	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	20	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	10	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (reed)	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Juncus articulatus</i>	Perennial herb (rush)	+	LC	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Rumex pamiricus</i>	Perennial herb	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Clematis songorica</i>	Perennial herb (climber)	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial herb (climber)	+	NE	Not listed
<i>Atriplex sp.</i>	Annual	+	NE	Not listed
<i>Caragana kirgisorum</i>	Shrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Scutellaria przewalskii</i>	Perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Chondrilla sp.</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P7

Vegetation community: *Krascheninnikoviana ceratoides* + *Nitraria sibirica*

Coordinates: N42.457173 E76.042956

TPC: 30%

The P_KG24_K_P7 is located in a desert shrubland ecosystem with coarse-textured, rocky soils and low vegetative cover. The vegetation is adapted to arid and saline conditions, and the area is used for seasonal grazing in spring and autumn. A total of 25 plant species were recorded, dominated by subshrubs and drought-resistant shrubs, along with sparse grasses and herbs. The most abundant species include *Krascheninnikovia ceratoides* (15%) and *Nitraria sibirica* (10%). Other species, including several medicinal plants, occur in trace amounts. No threatened species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan, nor any plant species endemic to Kyrgyzstan, were recorded during the survey. The site includes important medicinal plants, such as *Ephedra intermedia* and *Peganum*

harmala, traditionally used in regional medicine. These species enhance the cultural and ecological value of the landscape.



Figure 41: *Krascheninnikoviana ceratoides* + *Nitraria sibirica* community

Table 10: Results of survey point P_KG24_K_P7 (N42.457173 E76.042956)

Species	Life form	PC	IUCN	Red list KG
<i>Krascheninnikovia ceratoides</i>	Subshrub	15	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Chenopodium album</i>	Annual herb	1	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	1	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Clematis songarica</i>	Perennial herb (climber)	+	NE	Not listed
<i>Ceratocephala testiculata</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Succulent perennial herb	+	NE	Not listed
<i>Rosularia sp.</i>	Succulent perennial herb	+	NE	Not listed

<i>Caragana kirghisorum</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Scutellaria przewalskii</i>	Perennial herb	+	NE	Not listed
<i>Lagochilus platyacanthus</i>	Subshrub	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P8

Vegetation community *Salix gmelinii* + *Hippophae rhamnoides* + *Rosa beggeriana*

Coordinates: N42.464725 E75.987317

TPC: 60%

The P_KG24_K_P8 surveyed area represents a riparian pasture ecosystem used during spring and autumn for livestock grazing. The landscape is composed of a dense belt of woody vegetation, particularly *Salix gmelinii*, with accompanying herbaceous and halophytic plants. A total of 21 plant species were identified. The site is dominated by woody vegetation, notably *Salix gmelinii* (30%) and *Hippophae turkestanica* (20%), which are common in moist, riverine habitats. Other species include perennial and annual herbs and grasses, with minor contributions from halophytes and medicinal plants. This site hosts multiple medicinal species, including *Hippophae rhamnoides*, *Mentha asiatica*, and *Peganum harmala*, which are known for their ethnopharmacological relevance in Central Asian traditional medicine. No plant species identified as threatened on the IUCN Red List, included in the Red Data Book of Kyrgyzstan, or endemic to Kyrgyzstan were recorded during the survey.



Figure 42: *Salix gmelinii* + *Hippophae rhamnoides* + *Rosa beggeriana* community

Table 11: Results of survey point P_KG24_K_P8 (N42.464725 E75.987317)

Species	Life form	PC	IUCN	Red list KG
<i>Salix gmelinii</i>	Tree	30	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	20	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	10	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Juncus articulatus</i>	Perennial herb (rush)	1	LC	Not listed
<i>Rumex pamicus</i>	Perennial herb	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Astragalus sp.</i>	Mostly perennial herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Convolvulus arvensis</i>	Perennial herb (vine)	+	LC	Not listed
<i>Mentha asiatica</i>	Perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Cirsium incanum</i>	Perennial herb	+	NE	Not listed
<i>Sonchus paluster</i>	Annual or biennial herb	+	NE	Not listed
<i>Veronica longifolia</i>	Perennial herb	+	NE	Not listed
<i>Carex pachystylis</i>	Perennial herb	1	NE	Not listed

Survey point name: P_KG24_K_P9

Vegetation community *Achnatherum splendens*+*Halimodendron halodendron* +*Nitraria sibirica*

Coordinates: N42.465291 E75.976474

TPC: 50%

The P_KG24_K_P9 site is located in a foothill desert ecosystem, with rocky-sandy soils and patchy shrub-steppe vegetation. The landscape supports seasonal grazing in spring and autumn, with a pasture productivity estimated at 1–3 centners/ha (100–300 kg/ha). A total of 18 plant species were recorded, dominated by drought-resistant shrubs and subshrubs with accompanying perennial grasses and medicinal herbs. *Halimodendron halodendron* dominates the community (30% cover), followed by *Ephedra intermedia* and *Achnatherum splendens* (10% each). Other species are sparse and occur with minimal cover. This site includes several medicinally important species, such as *Ephedra intermedia*, *Thermopsis turkestanica*, and *Peganum harmala*. Their presence adds functional value to the pasture, beyond forage provision. No species listed as threatened in the IUCN Red List, included in the Red Data Book of Kyrgyzstan, or endemic to Kyrgyzstan were identified during the survey.



Figure 43: *Achnatherum splendens*+*Halimodendron halodendron* +*Nitraria sibirica* community

Table 12: Results of survey point *P_KG24_K_P9* (N42.465291 E75.976474)

Species	Life form	PC	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	30	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Achnatherum splendens</i>	Perennial grass	10	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	1	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Chenopodium album</i>	Annual herb	+	NE	Not listed
<i>Krascheninnikoviana ceratoides</i>	Subshrub	1	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Thermopsis turkestanica</i>	Perennial herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed
<i>Tamarix ramosissima</i>	Shrub	+	NE	Not listed
<i>Convolvulus arvensis</i>	Perennial herb (climber)	+	NE	Not listed
<i>Acroptilon australe</i>	Perennial herb	+	NE	Not listed
<i>Centaurea squarrosa</i>	Annual herb	+	NE	Not listed
<i>Lactuca tatarica</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P10

Vegetation community: *Achnatherum splendens* + *Halimodendron halodendron*

Coordinates: N42.46308 E75.929181

TPC: 60%

The P_KG24_K_P10 site lies within a semi-desert foothill zone bordering a meandering river, forming a transitional habitat between dry uplands and periodically moistened riparian margins. It is used seasonally for livestock grazing in spring and autumn, with an estimated pasture productivity of 1–3 centners/ha (100–300 kg/ha). The terrain includes sandy alluvial flats, rocky slopes, and sparse herbaceous layers, as shown in the accompanying landscape image. A total of 20 plant species were recorded. Vegetation is dominated by shrubs and perennial grasses, especially *Halimodendron halodendron* (30%) and *Achnatherum splendens* (20%). The structure is enhanced by scattered halophytes, succulents, and medicinal herbs, contributing to the ecological diversity of the site. Several recorded species possess medicinal and ornamental significance, including *Ephedra intermedia*, *Peganum harmala*, *Perovskia abrotanoides*, and *Thermopsis turkestanica*. These taxa enhance the cultural and ecological utility of the pasture. No plant species identified as threatened on the IUCN Red List, included in the Red Data Book of Kyrgyzstan, or endemic to Kyrgyzstan were recorded during the survey.



Figure 44: *Achnatherum splendens* + *Halimodendron halodendron* community

Table 13: Results of survey point P_KG24_K_P10 (N42.465291 E75.976474)

Species	Life form	PC	IUCN	Red list KG
<i>Halimodendron halodendron</i>	Shrub	30	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	20	NE	Not listed
<i>Ephedra intermedia</i>	Shrub (gymnosperm)	5	LC	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Nitraria sibirica</i>	Shrub	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Clematis songorica</i>	Perennial climber (vine)	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed
<i>Rosularia glabra</i>	Perennial succulent herb	+	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Centaurea squarrosa</i>	Annual herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	1	NE	Not listed

Survey point name: P_KG24_K_P11

Vegetation community: *Caragana kirghisorum* + *Ephedra intermedia*

Coordinates: N42.462104 E75.91246

TPC: 20%

This P_KG24_K_P11 rocky slope with sparse vegetation is used as a spring and autumn pasture. The habitat is arid, with low plant cover and dominance of xerophytic shrubs and herbs adapted to stony substrates. A total of 20 species were recorded. The dominant species are *Ephedra intermedia* and *Caragana kirghisorum* (each 10%). The vegetation includes medicinal and ornamental species, such as *Peganum harmala*, *Perovskia abrotanoides*, and *Ephedra intermedia*.

No species are listed in the IUCN Red List as threatened and No Red Book or endemic species were recorded.



Figure 45: *Caragana kirghisorum* + *Ephedra intermedia* community

Table 14: Results of survey point P_KG24_K_P11

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub (gymnosperm)	10	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Clematis songarica</i>	Perennial climber (herbaceous vine)	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Rosularia sp.</i>	Perennial succulent herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Centaurea squarrosa</i>	Annual herb	+	NE	Not listed
<i>Lactuca tatarica</i>	Perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P12

Vegetation community: *Ephedra intermedia* + *Caragana kirgisorum*

Coordinates: N42.463967 E75.89624

TPC: 20%

This rocky, arid foothill area is used as spring and autumn pasture. Vegetation is sparse and adapted to stony slopes and extreme dryness, dominated by drought-resistant shrubs and herbs. A total of 19 plant species were recorded. *Caragana kirgisorum* is the dominant shrub (15%), followed by *Ephedra intermedia* (5%) and *Atraphaxis virgata*, *Nitraria sibirica* (1% each). The rest of the species are scattered and occur with minimal cover. Notable medicinal species include *Ephedra intermedia*, *Peganum harmala*, and *Perovskia abrotanoides*. No threatened species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan, nor any plant species endemic to Kyrgyzstan, were recorded during the survey.



Figure 46: *Ephedra intermedia* + *Caragana kirgisorum* community

able-12

Table 15: Results of survey point P_KG24_K_P12

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	15	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Clematis songarica</i>	Perennial herbaceous vine	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed
<i>Rosularia glabra</i>	Perennial succulent herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb or subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Lagochilus sp.</i>	Subshrub	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P13

Vegetation community: *Salix gmelinii* + *Rosa beggeriana*

Coordinates: N42.467148 E75.880536

TPC: 70%

The surveyed P_KG24_K_P13 is actively used as a spring and autumn pasture. The plant community includes a variety of species with medicinal and ornamental value, such as *Ephedra intermedia*, *Peganum harmala*, *Hippophae rhamnoides*, and others. The dominant species recorded include *Salix gmelinii* (50% projective cover), *Rosa beggeriana* (15%), and *Phragmites australis* (10%), alongside a range of perennial grasses (*Achnatherum splendens*, *Stipa glareosa*) and herbaceous plants. Notably, no plant species listed as threatened on the IUCN Red List or included in the Red Data Book of Kyrgyzstan were identified during the survey. Additionally, no endemic plant species to Kyrgyzstan were observed. The flora is composed of widespread Central Asian taxa, including shrubs (*Hippophae turkestanica*, *Myricaria sp.*, *Nitraria sibirica*), perennial herbs (*Mentha asiatica*, *Veronica longifolia*), and subshrubs (*Perovskia abrotanoides*, *Artemisia compacta*, *Krascheninnikovia ceratoides*), indicating a resilient riparian and semi-desert vegetation mosaic adapted to seasonal hydrological variation.



Figure 47: *Salix gmelinii* + *Rosa beggeriana* community

Table 16: Results of survey point P_KG24_K_P13

Species	Life form	PC	IUCN	Red list KG
<i>Salix gmelinii</i>	Tree	50	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Rosa beggeriana</i>	Shrub	15	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (reed)	10	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Juncus articulatus</i>	Perennial herb (rush)	1	LC	Not listed
<i>Rumex pamiricus</i>	Perennial herb	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Clematis songarica</i>	Perennial herbaceous vine	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial herbaceous vine	+	NE	Not listed
<i>Astragalus sp.</i>	Mostly perennial herb	+	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed
<i>Myricaria sp.</i>	Shrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Mentha asiatica</i>	Perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Veronica longifolia</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P14

Vegetation community: *Salix gmelinii* + *Rosa beggeriana* + *Ephedra intermedia*

Coordinates: N42.461643 E76.059768

TPC: 60%

The P_KG24_K_P14 site lies in a moist riparian zone along a dry mountain valley, with dense shrub-tree thickets and an understory of grasses and perennial herbs. The area is used as spring and autumn pasture. The soil is alluvial, with leaf litter and organic deposits from seasonal flooding. The high presence of willows and fruiting shrubs suggests both ecological and ethnobotanical value. A total of 17 plant species were recorded. Vegetation is dominated by *Salix gmelinii* (35%) and *Rosa beggeriana* (10%), forming the upper woody layer. *Ephedra intermedia* and *Hippophae turkestanica* contribute to the medicinal shrub component, while grasses and herbs form a diverse lower layer. This site contains multiple medicinal and culturally important species, including *Ephedra intermedia*, *Peganum harmala*, and *Hippophae turkestanica*. These species have long-standing traditional use in local pharmacopoeia. No plant species identified as threatened on the IUCN Red List, included in the Red Data Book of Kyrgyzstan, or endemic to Kyrgyzstan were recorded during the survey.



Figure 48: *Salix gmelinii* + *Rosa beggeriana*+ *Ephedra intermedia* community

Table-14

Table 17.Results of survey point P_KG24_K_P14

Species	Life form	PC	IUCN	Red list KG
<i>Salix gmelinii</i>	Tree	35	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Salix sp.</i>	Tree	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Calamagrostis epigeios</i>	Perennial grass	+	NE	Not listed
<i>Rumex pamiricus</i>	Perennial herb	+	NE	Not listed
<i>Plantago lanceolata</i>	Mostly perennial herb	+	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed
<i>Myricaria bracteata</i>	Shrub	1	NE	Not listed
<i>Plantago sp.</i>	Mostly perennial herb	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Taraxacum officinale</i>	Perennial herb	+	LC	Not listed

Survey point name: P_KG24_K_P15

Vegetation community: *Krascheninnikovia ceratoides* + *Caragana kirghisorum*

Coordinates: N42.459731 E76.072652

TPC: 30%

The P_KG24_K_P15 site is used as a seasonal pasture during spring and autumn. The vegetation is composed of arid-adapted shrubland and semi-desert species, dominated by *Krascheninnikovia ceratoides* (15% projective cover), *Caragana kirghisorum* (10%), and *Ephedra intermedia* (5%). The floristic composition includes various shrubs and subshrubs such as *Atraphaxis virgata*, *Kalidium caspicum*, *Reaumuria songarica*, and *Kochia prostrata*, along with annual and perennial grasses including *Stipa glareosa*, *Achnatherum splendens*, and *Setaria viridis*. Halophytic and ruderal species such as *Halogeton glomeratus*, *Salsola australis*, *Salsola montana*, and *Chenopodium botrys* are also present, indicating soil salinity and disturbance tolerance. Ethnobotanically important species like *Peganum harmala* and *Ephedra intermedia* were noted among the vegetation. No species listed as threatened in the IUCN Red List or the Red Data Book of Kyrgyzstan were identified, and no endemic species to Kyrgyzstan were recorded during the survey. Overall, the plant community reflects a well-adapted assemblage to dry, rocky terrain under conditions of grazing pressure and climatic aridity.



Figure 49: *Krascheninnikovia ceratoides* + *Caragana kirghisorum* community

Table 18: Results of survey point P_KG24_K_P15

Species	Life form	PC	IUCN	Red list KG
<i>Krascheninnikovia ceratoides</i>	Subshrub	15	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Kalidium caspicum</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Salsola montana</i>	Perennial herb or subshrub	+	NE	Not listed
<i>Halogeton glomeratus</i>	Annual herb	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed
<i>Chenopodium botrys</i>	Annual herb	+	NE	Not listed
<i>Caragana leucophloea</i>	Shrub	+	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P16

Vegetation community: *Ephedra intermedia* + *Salsola australis* + *Caragana kirghisorum*

Coordinates: N42.472359 E76.036061

TPC: 25%

The P_KG24_K_P16 site is utilized as a seasonal pasture during spring and autumn. The vegetation is characteristic of arid mountain foothills and rocky semi-desert environments, composed primarily of xerophytic shrubs, subshrubs, and annual herbs. Dominant species include *Ephedra intermedia* (10% projective cover), *Caragana kirghisorum* (8%), and *Salsola australis* (5%). The plant assemblage also features common dryland grasses such as *Stipa glareosa*, *Achnatherum splendens*, and *Setaria viridis*, as well as halophytic and drought-tolerant taxa like *Kalidium caspicum*, *Kochia prostrata*, and *Sympegma regelii*. Several medicinal and culturally significant species were recorded, including *Ephedra intermedia*, *Krascheninnikovia ceratoides*, and *Peganum harmala*. No plant species listed as threatened in the IUCN Red List or the Red Data Book of Kyrgyzstan were observed, and no endemic species to Kyrgyzstan were identified. The floristic composition reflects a well-adapted shrub-steppe ecosystem, resilient to grazing and extreme climatic conditions.



Figure 50: *Ephedra intermedia*+ *Salsola australis* + *Caragana kirghisorum* community

Table 19: Results of survey point P_KG24_K_P16

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	8	NE	Not listed
<i>Salsola australis</i>	Annual herb	5	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	2	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Kalidium caspicum</i>	Subshrub (halophyte)	+	NE	Not listed
<i>Salsola montana</i>	Subshrub	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed
<i>Sympegma regelii</i>	Subshrub	+	NE	Not listed
<i>Chenopodium botrys</i>	Annual herb	+	NE	Not listed
<i>Caragana leucophloea</i>	Shrub	1	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P17

Vegetation community: *Salix gmelinii* + *Rosa beggeriana* + *Ephedra intermedia*

Coordinates: N42.474258 E76.009185

TPC: 60%

The P_KG24_K_P17 site is utilized as a spring and autumn pasture and is characterized by a mosaic of riparian and semi-arid foothill vegetation. The dominant species include *Salix gmelinii* (30% projective cover), *Rosa beggeriana* (15%), and *Ephedra intermedia* (10%). The vegetation structure reflects a combination of tree and shrub layers along streambeds (*Salix spp.*, *Hippophae turkestanica*, *Nitraria sibirica*), accompanied by herbaceous and subshrub species such as *Phragmites australis*, *Kochia prostrata*, *Sympegma regelii*, and *Achnatherum splendens*. Climbing vines (*Clematis orientalis*, *C. songorica*) and drought-resistant perennials like *Krascheninnikovia ceratoides* and *Caragana spp.* contribute to the plant community diversity. Several species with medicinal or ornamental importance were recorded, including *Ephedra intermedia*, *Peganum harmala*, and *Hippophae rhamnoides*. No species listed as threatened in the IUCN Red List or the Red Data Book of Kyrgyzstan were found, and no endemic plant species to Kyrgyzstan were identified during the survey. The species assemblage reflects a transitional ecosystem between riverine gallery forests and arid foothill shrublands, resilient to seasonal grazing and water availability fluctuations.



Figure 51: *Ephedra intermedia* + *Salsola australis* + *Caragana kirghisorum* community

Table 20: Results of survey point P_KG24_K_P17

Species	Life form	PC	IUCN	Red list KG
<i>Salix gmelinii</i>	Tree	30	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	15	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Nitraria sibirica</i>	Shrub	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	1	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Salsola montana</i>	Subshrub	+	NE	Not listed
<i>Halogeton</i> sp.	Annual herb	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	1	NE	Not listed
<i>Sympegma regelii</i>	Subshrub	+	NE	Not listed
<i>Chenopodium botrys</i>	Annual herb	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial vine	+	NE	Not listed
<i>Clematis songorica</i>	Perennial vine	+	NE	Not listed
<i>Salix</i> sp.	Tree	1	NE	Not listed
<i>Potentilla</i> sp.	Perennial herb	+	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Caragana leucophloea</i>	Shrub	1	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P18

Vegetation community: *Stipa glauca* + *Salsola australis* + *Caragana kirghisorum*

Coordinates: N42.473938 E75.981204

TPC: 25%

This P_KG24_K_P18 site, used as a spring and autumn pasture, is located within an arid steppe landscape characterized by sparse vegetation cover and stony soils. The plant community is dominated by xerophytic shrubs and subshrubs adapted to harsh climatic conditions and poor substrates. Key species include *Caragana kirghisorum* and *Salsola australis* (each with 10% projective cover), and *Setaria viridis* (5%), along with widely distributed subshrubs such as *Krascheninnikovia ceratoides*, *Reaumuria songarica*, *Sympegma regelii*, *Zygophyllum obliquum*, and *Kochia prostrata*. Perennial grasses like *Stipa glauca* and *Achnatherum splendens* are present but sparse, while

Halogeton spp., *Salsola montana*, and *Chenopodium botrys* indicate tolerance to salinity and seasonal disturbance. Climbing species such as *Clematis songorica* and aromatic herbs like *Peganum harmala* and *Perovskia abrotanoides* contribute to the functional diversity of the habitat. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded during the survey, and no endemic taxa to Kyrgyzstan were identified. The floristic composition reflects a typical desert-steppe ecosystem with high resilience to grazing and limited moisture availability.



Figure 52: *Stipa glauca* + *Salsola australis* + *Caragana kirghisorum* community

Table 21: Results of survey point P_KG24_K_P18

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Salsola australis</i>	Annual herb	10	NE	Not listed
<i>Setaria viridis</i>	Annual grass	5	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Salsola montana</i>	Subshrub	+	NE	Not listed
<i>Kalidium caspicum</i>	Subshrub	+	NE	Not listed
<i>Halogeton</i> sp.	Annual herb	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Sympegma regelii</i>	Subshrub	+	NE	Not listed
<i>Chenopodium botrys</i>	Annual herb	+	NE	Not listed
<i>Clematis songorica</i>	Perennial vine	1	NE	Not listed
<i>Caragana leucophloea</i>	Shrub	+	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P19

Vegetation community: *Salsola australis* + *Caragana kirghisorum*+ *Stipa glauca*

Coordinates: N42.477449 E75.864046

TPC: 30%

The P_KG24_K_P19 site is used as a spring and autumn pasture and is situated within a semi-desert zone characterized by skeletal soils, rocky substrates, and sparse vegetation. The floristic composition is dominated by drought-resistant shrubs and subshrubs such as *Caragana kirghisorum* (10% projective cover), *Salsola australis* (10%), *Ephedra intermedia* (5%), and *Krascheninnikovia ceratoides* (1%). Perennial and annual grasses including *Stipa glareosa*, *Setaria viridis*, *Achnatherum splendens*, *Festuca valesiaca*, and *Eragrostis minor* contribute to ground cover, although patchy. The site also supports annual herbaceous species like *Chenopodium botrys*, *Chenopodium album*, and *Ceratocephala testiculata*, along with succulents (*Orostachys thyrsiflora*, *Rosularia glabra*) adapted to shallow, nutrient-poor soils. Medicinal and ethnobotanical plants such as *Peganum harmala*, *Perovskia abrotanoides*, and *Scutellaria przewalskii* are also present. The presence of *Zygophyllum obliquum*, *Kochia prostrata*, and *Artemisia compacta* reflects a community adapted to extreme aridity and grazing pressure. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded, and no endemic species to Kyrgyzstan were identified during the survey. The overall vegetation structure reflects a resilient semi-desert community shaped by climate, edaphic conditions, and seasonal anthropogenic use.



Figure 53: *Salsola australis* + *Caragana kirghisorum*+ *Stipa glauca* community

Table 22: Results of survey point P_KG24_K_P19

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Salsola australis</i>	Annual herb	10	NE	Not listed
<i>Stipa glauca</i>	Perennial grass	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Chenopodium botrys</i>	Annual herb	+	NE	Not listed
<i>Chenopodium album</i>	Annual herb	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	1	NE	Not listed
<i>Kochia prostrata</i>	Subshrub	+	NE	Not listed
<i>Halogeton sp.</i>	Annual herb	+	NE	Not listed
<i>Clematis songorica</i>	Perennial vine	+	NE	Not listed
<i>Ceratocephala testiculata</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed
<i>Rosularia glabra</i>	Perennial succulent herb	+	NE	Not listed

<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed
<i>Scutellaria przewalskii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P20

Vegetation community: *Caragana kirghisorum*+ *Salsola australis*

Coordinates: N42.507692 E75.824218

TPC: 15%

This area is used as a seasonal (spring and autumn) pasture and is located in a dry gravelly foothill zone with very low vegetation cover. The plant community is dominated by drought-tolerant species including *Caragana kirghisorum* and *Salsola australis* (each with approximately 5% projective cover), with *Ephedra intermedia* and *Stipa glareosa* sparsely represented (1%). Other common species include subshrubs like *Krascheninnikovia ceratoides* and *Zygophyllum obliquum*, as well as succulent herbs such as *Rosularia glabra*. Annual herbs and grasses, including *Setaria viridis* and the medicinally valuable *Peganum harmala*, are scattered across the terrain. No species listed as threatened in the IUCN Red List or included in the Red Data Book of Kyrgyzstan were recorded, and no endemic plant species to Kyrgyzstan were identified during the survey. The sparse and patchy vegetation structure reflects a degraded or naturally poor semi-desert habitat under the influence of seasonal grazing and extreme aridity.



Figure 54: *Caragana kirghisorum*+ *Salsola australis* community

Table 23: Results of survey point P_KG24_K_P20

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Salsola australis</i>	Annual herb	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Rosularia glabra</i>	Perennial succulent herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG24_K_P21

Vegetation community: *Hippophae rhamnoides* + *Ephedra intermedia*

Coordinates: N42.530522 E75.805801

TPC: 20%

The P_KG24_K_P21 site functions as a spring and autumn pasture, situated within a semi-arid valley ecosystem dominated by drought-resistant shrubs and grasses. The most prominent species recorded include *Hippophae turkestanica* and *Ephedra intermedia* (each with 10% projective cover), both of which are well-known for their medicinal value. The herbaceous layer is composed of annual grasses such as *Setaria viridis* and *Eragrostis minor*, as well as perennial grasses including *Phragmites australis*, *Achnatherum splendens*, and *Stipa glareosa*. The shrub layer is complemented by species like *Krascheninnikovia ceratoides*, *Nitraria sibirica*, *Rosa beggeriana*, and *Atraphaxis virgata*, while climbing perennials such as *Clematis songarica* and *Clematis orientalis* add structural diversity to the vegetation. The presence of *Peganum harmala* and *Perovskia abrotanoides* highlights the ethnobotanical significance of the flora. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded, and no endemic plant species to Kyrgyzstan were identified. The plant community reflects a resilient assemblage adapted to variable soil moisture, grazing, and seasonal climatic extremes characteristic of foothill and valley-bottom desert-steppe environments.



Figure 55: *Hippophae rhamnoides* + *Ephedra intermedia* community

Table 24: Results of survey point P_KG24_K_P21

Species	Life form	PC	IUCN	Red list KG
<i>Hippophae turkestanica</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Atriplex</i> sp.	Annual herb	+	NE	Not listed
<i>Clematis songarica</i>	Perennial climbing herb	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial climbing herb	+	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	1	NE	Not listed
<i>Astragalus</i> sp.	Perennial	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed

Survey point name: P_KG24_K_P22

Vegetation community: mixed shrub and mixed herb

Coordinates: N42.474703 E75.896961

TPC: 55%

The P_KG24_K_P22 site is located in a well-vegetated mountain valley and serves as a spring and autumn pasture. The area supports a diverse and structurally complex plant community composed of trees, shrubs, semi-shrubs, perennial grasses, and climbing vines. Key dominants include *Phragmites australis* and *Rosa* species (each with 10% projective cover), *Salix gmelinii*, *Crataegus korolkowii*, and *Caragana kirghisorum* (each with 5%), as well as grasses such as *Stipa glareosa* and *Achnatherum splendens*. Moisture-favoring species like *Salix* spp., *Phragmites australis*, and *Impatiens parviflora* suggest intermittent water availability along the valley bottom. The floristic composition is enriched by medicinal and ornamental species including *Ephedra intermedia*, *Peganum harmala*, *Hippophae rhamnoides*, *Perovskia abrotanoides*, and *Clematis orientalis*. Additional taxa such as *Lonicera microcarpa*, *Berberis sphaerocarpa*, and *Spiraea hypericifolia* add to the ecological complexity. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded, and no endemic plant species to Kyrgyzstan were observed during the survey. The habitat represents a transitional zone between riparian shrublands and dry steppe slopes, supporting a high diversity of woody and herbaceous species well adapted to elevation, slope, and seasonal grazing pressures.



Figure 56: Mixed shrub and mixed herb community

Table 25: Results of survey point P_KG24_K_P22

Species	Life form	PC	IUCN	Red list KG
<i>Phragmites australis</i>	Perennial grass (reed)	10	NE	Not listed
<i>Rosa</i> sp.	Shrub	10	NE	Not listed
<i>Salix gmelinii</i>	Tree	5	NE	Not listed
<i>Crataegus korolkowii</i>	Shrub	5	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed

<i>Ephedra equisetina</i>	Shrub	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	1	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	5	NE	Not listed
<i>Calamagrostis sp.</i>	Perennial grass	+	NE	Not listed
<i>Asparagus neglectus</i>	Perennial herb	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial herb (bulbous)	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Salix sp.</i>	Tree	+	NE	Not listed
<i>Atriplex sp.</i>	Annual or semi-shrub	+	NE	Not listed
<i>Clematis songarica</i>	Perennial liana	1	NE	Not listed
<i>Clematis orientalis</i>	Perennial liana	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Semi-shrub	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Succulent perennial herb	+	NE	Not listed
<i>Berberis sphaerocarpa</i>	Shrub	+	NE	Not listed
<i>Spiraea hypericifolia</i>	Shrub	1	NE	Not listed
<i>Glaucium squamigerum</i>	Perennial herb	+	NE	Not listed
<i>Cotoneaster sp.</i>	Shrub	+	NE	Not listed
<i>Caragana laeta</i>	Shrub	+	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	1	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Semi-shrub	+	NE	Not listed
<i>Acer semenovii</i>	Tree	+	NE	Not listed
<i>Lonicera microcarpa</i>	Shrub	+	NE	Not listed
<i>Impatiens parviflora</i>	Biennial herb	1	NE	Not listed
<i>Perovskia abrotanoides</i>	Semi-shrub	+	NE	Not listed
<i>Lagochilus platyacanthus</i>	Semi-shrub	+	NE	Not listed
<i>Artemisia compacta</i>	Semi-shrub	1	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed
<i>Galatella coriacea</i>	Perennial herb	+	NE	Not listed
<i>Chondrilla sp.</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P23

Vegetation community: *Stipa glauca* + *Salsola australis* + *Reaumuria sp*

Coordinates: N75.81535517 E42.6289516

TPC: 25%

The P_KG24_K_P23 site, used as a spring and autumn pasture, lies within a semi-desert zone characterized by rocky soils and sparse, low-structured vegetation. The plant community is dominated by xerophytic and halophytic shrubs and semi-shrubs such as *Reaumuria sp.* (10% projective cover), *Kochia prostrata*, *Krascheninnikovia ceratoides*, and *Salsola australis* (each ~5%). Perennial grasses like *Stipa glareosa* and *Achnatherum splendens*, along with annual grasses such as *Setaria viridis*, contribute to a limited herbaceous layer. The floristic composition also includes drought-adapted herbs (*Peganum harmala*, *Astragalus borodina*), succulents (*Rosularia sp.*, *Orostachys thyrsiflora*), and climbers such as *Clematis songarica*. Medicinal and decorative species including

Ephedra intermedia, *Perovskia abrotanoides*, and *Convolvulus tragacanthoides* were observed. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded, and no endemics to Kyrgyzstan were identified. The vegetation represents a typical desert-steppe assemblage with high ecological resilience to aridity, grazing pressure, and soil salinity.



Figure 57: *Stipa glauca* + *Salsola australis* + *Reaumuria* sp community

Table 26: Results of survey point P_KG24_K_P23

Species	Life form	PC	IUCN	Red list KG
<i>Reaumuria</i> sp.	Shrub or semi-shrub	10	NE	Not listed
<i>Kochia prostrata</i>	Semi-shrub	5	NE	Not listed
<i>Salsola australis</i>	Annual herb	5	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	5	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	1	LC	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	+	NE	Not listed
<i>Clematis songarica</i>	Perennial liana	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Semi-shrub	+	NE	Not listed
<i>Halogeton</i> sp.	Annual herb	+	NE	Not listed
<i>Sympegma</i> sp.	Semi-shrub	1	NE	Not listed
<i>Orostachys thyrsoiflora</i>	Succulent perennial herb	+	NE	Not listed
<i>Rosularia</i> sp.	Succulent perennial herb	+	NE	Not listed
<i>Astragalus borodina</i>	Perennial herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed

<i>Zygophyllum obliquum</i>	Semi-shrub	+	NE	Not listed
<i>Perovskia abrotanoides</i>	Semi-shrub	+	NE	Not listed

Survey point name: P_KG24_K_P24

Vegetation community: Mixed grass with *Artemisia santolinifolia* + *Artemisia tianschanica* + *Stipa capillata*

Coordinates: N42.474703 E75.896961

TPC: 30%

The P_KG24_K_P24 site, located in the lowland zone adjacent to agricultural and residential areas, is used as a spring and autumn pasture. The vegetation is dominated by grassland species with a moderate cover of semi-shrubs and herbs. Dominant grasses include *Setaria viridis*, *Poa pratensis*, *Stipa capillata*, and *Festuca valesiaca* (each with ~5% projective cover), forming the primary ground layer. Semi-shrubs such as *Krascheninnikovia ceratoides*, *Artemisia santolinifolia*, and *Artemisia tianschanica* are scattered throughout, reflecting grazing-tolerant and drought-adapted elements. The herbaceous layer includes medicinal and decorative plants like *Achillea millefolium*, *Sideritis montana*, *Aster canescens*, *Onopordum acanthium*, and *Chondrilla juncea*. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were identified, and no endemic plant species to Kyrgyzstan were recorded. The plant community represents a secondary or disturbed steppe formation influenced by pasture use and proximity to human activities, with moderate floristic diversity and strong resilience to seasonal grazing and trampling.



Figure 58: Mixed grass with *Artemisia santolinifolia* + *Artemisia tianschanica* + *Stipa capillata* community

Table 27: Results of survey point P_KG24_K_P24

Species	Life form	PC	IUCN	Red list KG
<i>Setaria viridis</i>	Annual grass	5	NE	Not listed
<i>Poa pratensis</i>	Perennial grass	5	LC	Not listed
<i>Stipa capillata</i>	Perennial grass	5	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Semi-shrub	+	NE	Not listed
<i>Atriplex sp.</i>	Annual herb	+	NE	Not listed
<i>Sideritis montana</i>	Annual herb	+	NE	Not listed
<i>Rochelia retorta</i>	Annual herb	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Semi-shrub	5	NE	Not listed
<i>Artemisia tianschanica</i>	Semi-shrub	5	NE	Not listed
<i>Centaurea depressa</i>	Perennial herb	+	NE	Not listed
<i>Onopordum acanthium</i>	Biennial or perennial herb	+	NE	Not listed
<i>Achillea millefolium</i>	Perennial herb	+	LC	Not listed
<i>Chondrilla juncea</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	1	NE	Not listed

Survey point name: P_KG24_K_P25

Vegetation community: *Atraphaxis virgata* + *Bothriochloa ischaemum*

Coordinates: N42.723559 E75.83663

TPC: 30%

The P_KG24_K_P25 site, located in close proximity to industrial infrastructure, is used as a spring and autumn pasture. The vegetation structure reflects a disturbed steppe ecosystem dominated by herbaceous perennials and semi-shrubs. *Bothriochloa ischaemum* is the dominant species (20% projective cover), with *Atraphaxis virgata* also well represented (10%). Other common species include perennial grasses such as *Poa bulbosa*, *Stipa orientalis*, *Stipa capillata*, and *Festuca valesiaca*. The vegetation includes characteristic xerophytic taxa such as *Krascheninnikovia ceratoides* and medicinal or ethnobotanically important plants like *Achillea millefolium*, *Convolvulus tragacanthoides*, and *Sideritis montana*. A mixture of perennial herbs and shrubs, including *Potentilla arenaria*, *Spiraea hypericifolia*, and *Caragana kirghisorum*, contributes to a moderately diverse community adapted to grazing and soil degradation. No species listed in the IUCN Red List or the Red Data Book of Kyrgyzstan were recorded, and no endemic species to Kyrgyzstan were identified. The community reflects a resilient but anthropogenically influenced steppe habitat with signs of secondary succession and grazing tolerance.



Figure 59: *Atraphaxis virgata* + *Bothriochloa ischaemum* community

Table 28: Results of survey point P_KG24_K_P25

Species	Life form	PC	IUCN	Red list KG
<i>Bothriochloa ischaemum</i>	Perennial grass	20	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	10	NE	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	5	NE	Not listed
<i>Stipa orientalis</i>	Perennial grass	1	NE	Not listed
<i>Stipa capillata</i>	Perennial grass	1	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Semi-shrub	+	NE	Not listed
<i>Alyssum desertorum</i>	Perennial herb	+	NE	Not listed
<i>Potentilla arenaria</i>	Perennial herb	+	NE	Not listed
<i>Cerasus tianschanica</i>	Tree	+	NE	Not listed
<i>Spiraea hypericifolia</i>	Shrub	+	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Sideritis montana</i>	Perennial herb	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb or vine	+	NE	Not listed
<i>Verbascum songaricum</i>	Biennial herb	1	NE	Not listed
<i>Androsace septentrionalis</i>	Perennial herb	1	NE	Not listed
<i>Artemisia santolinifolia</i>	Perennial herb	1	NE	Not listed
<i>Artemisia tianschanica</i>	Perennial herb	1	NE	Not listed
<i>Centaurea squarrosa</i>	Annual or biennial herb	+		Not listed
<i>Achillea millefolium</i>	Perennial herb	+	LC	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Chondrilla juncea</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG24_K_P26

Vegetation community: *Salix gmelinii* + *Hippophae rhamnoides* + *Rosa* sp.

Coordinates: N42.701539 E75.828773

TPC: 80%

The P_KG24_K_P26 site, located in a riparian zone and used as spring and autumn pasture, is characterized by dense, multi-layered vegetation dominated by shrubs, trees, and tall herbs. Dominant species include *Salix gmelinii* (20% projective cover), *Halimodendron halodendron* (15%), and *Hippophae rhamnoides* (10%). The understory and field layers comprise perennial grasses such as *Poa bulbosa*, *Achnatherum splendens*, and *Stipa caucasica*, along with annual grasses like *Setaria viridis* and *Eragrostis minor*. The floristic diversity is enhanced by several medicinal species (*Peganum harmala*, *Elaeagnus angustifolia*, *Glycyrrhiza soongorica*, *Berberis sphaerocarpa*), climbers like *Clematis orientalis*, and various shrubs (*Rosa* sp., *Cotoneaster* sp., *Lonicera microcarpa*). One species of conservation concern was recorded: *Malus sieversii*, listed as **Vulnerable (VU)** on the IUCN Red List, although it is not currently included in the Red Data Book of Kyrgyzstan. No plant species endemic to Kyrgyzstan were identified. This riparian thicket represents a high-diversity habitat with valuable ecosystem services, including erosion control, fodder supply, and ethnobotanical resources, but also requires monitoring due to the presence of a threatened species.



Figure 60: *Salix gmelinii* + *Hippophae rhamnoides* + *Rosa* sp. Community

Table 29: Results of survey point P_KG24_K_P26

Species	Life form	PC	IUCN	Red list KG
<i>Salix gmelinii</i>	Tree	20	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	15	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	10	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	5	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (reed)	5	NE	Not listed
<i>Asparagus neglectus</i>	Perennial herb	5	NE	Not listed
<i>Salix sp.</i>	Tree	5	NE	Not listed
<i>Crataegus korolkowii</i>	Shrub	5	NE	Not listed
<i>Glycyrrhiza soongorica</i>	Perennial herb	5	NE	Not listed
<i>Elaeagnus angustifolia</i>	Tree	5	LC	Not listed
<i>Setaria viridis</i>	Annual grass	1	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed
<i>Stipa caucasica</i>	Perennial grass	1	NE	Not listed
<i>Calamagrostis sp.</i>	Perennial grass	1	NE	Not listed
<i>Atriplex sp.</i>	Perennial herb	+	NE	Not listed
<i>Clematis orientalis</i>	Woody vine (climber)	1	NE	Not listed
<i>Berberis sphaerocarpa</i>	Shrub	+	NE	Not listed
<i>Rosa sp.</i>	Shrub	1	NE	Not listed
<i>Malus sieversii</i>	Tree	1	VU	LC-Least Concern
<i>Cotoneaster sp.</i>	Shrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Lonicera microcarpa</i>	Shrub	+	NE	Not listed
<i>Impatiens parviflora</i>	Annual herb	+	NE	Not listed
<i>Artemisia compacta</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed
<i>Chondrilla sp.</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P1**Vegetation community:** *Ephemeral herbs***Coordinates:** N42.697838 E75.810434**TPC:** 30%

This high-altitude grassland site, used as spring and autumn pasture, represents a typical alpine steppe community dominated by perennial grasses and herbaceous species. The dominant taxa include *Festuca valesiaca* and *Achillea wilhelmsii* (each with 10% projective cover), followed by *Aeluropus litoralis* (5%) and sedge species such as *Carex turkestanica* (2%). The graminoid layer also includes *Poa bulbosa*, *Phleum alpinum*, *Achnatherum splendens*, and the annual grass *Hordeum leporinum*, contributing to soil stabilization and forage quality. The herbaceous component is composed of steppe-adapted perennials such as *Potentilla orientalis*, *Tussilago farfara*, *Pilosella procera*, *Cirsium esculentum*, and *Alyssum desertorum*. The presence of *Euphorbia ferganensis* and *Zygophyllum rosowii*

adds ecological diversity and reflects adaptation to the dry, nutrient-poor soils common in subalpine zones. No species listed as threatened in the IUCN Red List or the Red Data Book of Kyrgyzstan were identified, and no endemic taxa were observed. The vegetation reflects a resilient mountain pasture ecosystem, exhibiting good ground cover and species richness under current grazing regimes.



Figure 61: Ephemeral herbs community

Table 30: Results of survey point P_KG25_K_P1

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	10	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	10	NE	Not listed
<i>Aeluropus littoralis</i>	Perennial grass	5	LC	Not listed
<i>Carex turkestanica</i>	Perennial sedge	2	NE	Not listed
<i>Potentilla orientalis</i>	Perennial herb	2	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	2	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	1	NE	Not listed
<i>Alyssum desertorum</i>	Annual herb	1	NE	Not listed
<i>Zygophyllum rosowii</i>	Perennial	+	NE	Not listed
<i>Phleum alpinum</i>	Perennial grass	+	NE	Not listed
<i>Tussilago farfara</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Pilosella procera</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed
<i>Hordeum leporinum</i>	Annual grass	+	NE	Not listed

Survey point name: P_KG25_K_P2

Vegetation community: *Ephemeral herbs*

Coordinates: N42.694195 E75.80199

TPC: 25%

This high-elevation pasture site is situated in a montane steppe zone and is used for spring and autumn grazing. The vegetation is characterized by a low, continuous herbaceous cover dominated by perennial grasses, herbs, and subshrubs. The most abundant species include *Festuca valesiaca* (10% projective cover) and *Achillea wilhelmsii* (5%), with other important graminoids such as *Aeluropus littoralis*, *Carex turkestanica*, and *Poa bulbosa* contributing to the ground layer. The herbaceous layer also features drought- and grazing-tolerant species including *Peganum harmala*, *Cirsium esculentum*, *Salvia aethiopis*, *Taraxacum erythrospermum*, and *Erodium cicutarium*. Subshrubs like *Artemisia santolinifolia* and *Artemisia tenuisecta* are scattered across the site, indicating adaptation to cold, dry steppe conditions. *Draba altaica*, a high-mountain specialist, further reflects the site's alpine influence. *Rosa beggeriana* is occasionally present, adding to the floristic diversity. No species listed in the IUCN Red List or in the Red Data Book of Kyrgyzstan were identified during the survey, and no endemic plant species to Kyrgyzstan were recorded. The vegetation represents a resilient, well-adapted alpine pasture community with good ecological stability under moderate grazing pressure.



Figure 62: *Ephemeral herbs community*

Table 31: Results of survey point P_KG25_K_P2

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	10	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Aeluropus littoralis</i>	Perennial grass	2	LC	Not listed

<i>Carex turkestanica</i>	Perennial sedge	2	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	1	NE	Not listed
<i>Salvia aethiopis</i>	Perennial herb	+	NE	Not listed
<i>Erodium cicutarium</i>	Annual herb	+	NE	Not listed
<i>Taraxacum erythrospermum</i>	Perennial herb	+	NE	Not listed
<i>Rosa beggeriana</i>	Perennial shrub	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	1	NE	Not listed
<i>Artemisia tenuisecta</i>	Subshrub	1	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	1	NE	Not listed

Survey point name: P_KG25_K_P3

Vegetation community: *Ephemeral herbs*

Coordinates: N42.688276 E75.792508

TPC: 20%

This high-elevation pasture site is situated in a montane steppe zone and is used for spring and autumn grazing. The vegetation is characterized by a low, continuous herbaceous cover dominated by perennial grasses, herbs, and subshrubs. The most abundant species include *Festuca valesiaca* (10% projective cover) and *Achillea wilhelmsii* (5%), with other important graminoids such as *Aeluropus littoralis*, *Carex turkestanica*, and *Poa bulbosa* contributing to the ground layer. The herbaceous layer also features drought- and grazing-tolerant species including *Peganum harmala*, *Cirsium esculentum*, *Salvia aethiopis*, *Taraxacum erythrospermum*, and *Erodium cicutarium*. Subshrubs like *Artemisia santolinifolia* and *Artemisia tenuisecta* are scattered across the site, indicating adaptation to cold, dry steppe conditions. *Draba altaica*, a high-mountain specialist, further reflects the site's alpine influence. *Rosa beggeriana* is occasionally present, adding to the floristic diversity. No species listed in the IUCN Red List or in the Red Data Book of Kyrgyzstan were identified during the survey, and no endemic plant species to Kyrgyzstan were recorded. The vegetation represents a resilient, well-adapted alpine pasture community with good ecological stability under moderate grazing pressure.



Figure 63: Ephemeral herbs community

Table 32: Results of survey point P_KG25_K_P3

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	10	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Aeluropus littoralis</i>	Perennial grass	2	LC	Not listed
<i>Carex turkestanica</i>	Perennial sedge	2	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	1	NE	Not listed
<i>Erodium cicutarium</i>	Annual herb	+	NE	Not listed
<i>Taraxacum erythrospermum</i>	Perennial herb	+	NE	Not listed
<i>Amygdalus petunnikowii</i>	Deciduous shrub	+	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Hordeum leporinum</i>	Annual grass		NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	1	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub		NE	Not listed
<i>Carex chordorrhiza</i>	Perennial sedge	1	LC	Not listed
<i>Scorzonera circumflexa</i>	Perennial herb	+	NE	Not listed
<i>Scorzonera inconspicua</i>	Perennial herb	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed

Survey point name: P_KG25_K_P4

Vegetation community: *Ephemeral herbs*

Coordinates: N42.677875 E75.782769

TPC: 25%

This mountain slope site, used as spring and autumn pasture, is situated in a montane steppe zone with a predominance of perennial grasses and scattered shrubs. The dominant species is *Festuca valesiaca* (10% projective cover), forming a dense turf layer, followed by *Achillea wilhelmsii* (5%). Sedge species such as *Carex turkestanica* and *Carex chordorrhiza* are present in small quantities (1–2%), often in micro-depressions or moist pockets. Shrubs including *Crataegus pontica*, *Rosa alberti*, and *Amygdalus petunnikowii* are scattered across the slope, contributing to structural heterogeneity. The herbaceous layer includes *Taraxacum erythrospermum*, *Cirsium esculentum*, *Draba huetii*, and *Euphorbia ferganensis*, with additional ground cover provided by annuals such as *Erodium cicutarium* and *Eragrostis minor*. The subshrub *Artemisia santolinifolia* was also recorded. No species listed in the IUCN Red List as globally threatened or in the Red Data Book of Kyrgyzstan were found, and no endemic species to Kyrgyzstan were recorded. The site supports a typical montane steppe flora, with a well-preserved community structure and moderate species richness, indicative of relatively low grazing pressure and stable ecological conditions.



Figure 64: *Ephemeral herbs community*

Table 33: Results of survey point P_KG25_K_P4

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	10	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Crataegus pontica</i>	Shrub	5	LC	Not listed

<i>Carex turkestanica</i>	Perennial sedge	2	NE	Not listed
<i>Rosa alberti</i>	Shrub	+	NE	Not listed
<i>Draba huetii</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	1	NE	Not listed
<i>Erodium cicutarium</i>	Annual herb	1	NE	Not listed
<i>Taraxacum erythrospermum</i>	Perennial herb	+	NE	Not listed
<i>Amygdalus petunnikowii</i>	Shrub	+	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	1	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub		NE	Not listed
<i>Carex chordorrhiza</i>	Perennial sedge	1	LC	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed

Survey point name: P_KG25_K_P5

Vegetation community: *Ephemeral herbs*

Coordinates: N42.671899 E75.764108

TPC: 20%

The P_KG25_K_P5 site, located in a montane steppe zone and used intensively as spring and autumn pasture, is dominated by perennial grasses with scattered shrubs and forbs. The dominant species is *Festuca valesiaca* (10% projective cover), with co-dominants including *Achillea wilhelmsii* (5%), *Aeluropus litoralis*, and *Carex turkestanica* (2% each). Herbaceous diversity includes a mixture of grazing-tolerant taxa such as *Erodium cicutarium*, *Taraxacum erythrospermum*, *Cirsium esculentum*, and *Euphorbia ferganensis*, along with rare alpine elements like *Draba altaica* and *Eritrichium villosum*. Shrub components such as *Amygdalus petunnikowii* are present at low cover. Notably, the site supports *Tulipa ostrowskiana*, a species listed as **Near Threatened (NT)** by the IUCN and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan, indicating the presence of conservation value within a heavily grazed matrix. Other indicator species such as *Carex chordorrhiza* (LC) and *Scorzonera* spp. further highlight the ecological richness of the site. Despite the pastoral use and infrastructure presence, the vegetation shows signs of ecological integrity but would benefit from monitoring due to the presence of a nationally vulnerable species.



Figure 65: Ephemeral herbs community

Table 34: Results of survey point P_KG25_K_P5

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	10	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Aeluropus littoralis</i>	Perennial grass	2	LC	Not listed
<i>Carex turkestanica</i>	Perennial sedge	2	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	1	NE	Not listed
<i>Erodium cicutarium</i>	Annual herb	+	NE	Not listed
<i>Taraxacum erythrospermum</i>	Perennial herb	+	NE	Not listed
<i>Amygdalus petunnikowii</i>	Shrub	+	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	1	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub		NE	Not listed
<i>Carex chordorrhiza</i>	Perennial sedge	1	LC	Not listed
<i>Scorzonera circumflexa</i>	Perennial herb	+	NE	Not listed
<i>Scorzonera inconspicua</i>	Perennial herb	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	+	NT	VU-Vulnerable
<i>Eritrichium villosum</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P6

Vegetation community: *Rosa alberti*+ *Crataegus pontica*+ *Caragana laeta*

Coordinates: N42.649936 E75.756582

TPC: 40%

This hillside site, characterized by dense shrubland and patchy ground cover, is used as a spring and autumn pasture. The vegetation is dominated by spiny and drought-tolerant shrubs such as *Rosa alberti* (20% projective cover), *Crataegus pontica* (10%), and *Caragana laeta* (10%), forming a dense, scattered upper layer. The herbaceous component includes resilient species like *Inula caspica*, *Euphorbia ferganensis*, and *Scorzonera inconspicua*, along with sedges (*Carex chordorrhiza*) and geophytes such as *Tulipa ostrowskiana* (2%) and *Tulipa tarda* (trace). The presence of *Tulipa ostrowskiana*, listed as **Near Threatened (NT)** by the IUCN and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan, adds notable conservation importance to this site. Subshrubs including *Artemisia tenuisecta*, *Artemisia santolinifolia*, and *Artemisia sieversiana* reflect adaptation to grazing and dry conditions. Annuals such as *Sinapis arvensis* and *Carduus acanthoides* appear sporadically, likely favored by disturbances. Although no endemic species to Kyrgyzstan were recorded, the site holds significant botanical value due to its diverse semi-shrubland flora and the presence of a nationally threatened species. Active monitoring is recommended to ensure long-term viability of sensitive geophyte populations under ongoing grazing pressure and slope erosion.



Figure 66: *Rosa alberti*+ *Crataegus pontica*+ *Caragana laeta* community

Table 35: Results of survey point P_KG25_K_P6

Species	Life form	PC	IUCN	Red list KG
<i>Rosa alberti</i>	Perennial shrub	20	NE	Not listed
<i>Crataegus pontica</i>	Shrub	10	LC	Not listed
<i>Caragana laeta</i>	Shrub	10	NE	Not listed
<i>Inula caspica</i>	Perennial herb	2	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	2	NT	VU- Vulnerable
<i>Artemisia tenuisecta</i>	Subshrub	1	NE	Not listed
<i>Carex chordorrhiza</i>	Perennial sedge	1	LC	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed
<i>Tulipa tarda</i>	Perennial geophyte (bulb)	+	NE	Not listed
<i>Onosma dichroantha</i>	Perennial herb	+	NE	Not listed
<i>Scorzonera inconspicua</i>	Perennial herb	+	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	+	NE	Not listed
<i>Sinapis arvensis</i>	Annual herb	+	LC	Not listed
<i>Artemisia santolinifolia</i>	Perennial subshrub	+	NE	Not listed
<i>Carduus acanthoides</i>	Annual herb	+	NE	Not listed
<i>Artemisia sieversiana</i>	Subshrub	+	NE	Not listed
<i>Astragalus sieversianus</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P7

Vegetation community: *Rosa alberti*+ *Crataegus pontica*+ *Caragana laeta*

Coordinates: N42.644238 E75.75233

TPC: 40%

This steep mountainous slope is dominated by shrub vegetation and scattered herbaceous species, forming a structurally diverse but erosion-sensitive community. The most abundant species include *Rosa alberti* (15% projective cover), a spiny shrub forming the upper layer, and *Filipendula vulgaris* (15%), contributing significantly to ground vegetation. Other shrubs such as *Caragana laeta* (5%) and *Juniperus sabina* (1%) are present at lower densities. The site supports several early-flowering geophytes, including *Gagea lutea*, *Crocus alatavicus*, and *Tulipa ostrowskiana*—the latter being a species of conservation concern, listed as **Near Threatened (NT)** by IUCN and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan. The herbaceous flora includes *Taraxacum serotinum*, *Cirsium esculentum*, *Achillea wilhelmsii*, and the annual *Erodium cicutarium*. Grasses such as *Festuca valesiaca* and *Eragrostis minor* are scattered and form a minimal turf layer, which combined with visible soil exposure, suggests

moderate to high erosion risk. No endemic plant species were identified. The site has **moderate floristic diversity and significant conservation importance** due to the presence of *T. ostrowskiana*, yet remains vulnerable to slope instability, grazing, and construction disturbance (e.g., powerline infrastructure). Protective measures and monitoring of rare geophytes are recommended.



Figure 67: *Rosa alberti*+ *Crataegus pontica*+ *Caragana laeta* community

Table 36: Results of survey point P_KG25_K_P7

Species	Life form	PC	IUCN	Red list KG
<i>Rosa alberti</i>	Shrub	15	NE	Not listed
<i>Filipendula vulgaris</i>	Perennial herb	15	NE	Not listed
<i>Caragana laeta</i>	Shrub	5	NE	Not listed
<i>Gagea lutea</i>	Perennial geophyte (bulb)	5	NE	Not listed
<i>Juniperus sabina</i>	Evergreen shrub	1	LC	Not listed
<i>Crocus alatavicus</i>	Perennial geophyte (corm)	1	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	+	NT	VU-Vulnerable
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed
<i>Erodium cicutarium</i>	Annual herb	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P8

Vegetation community: *Rosa alberti*+ ephemeral herbs

Coordinates: N42.638145 E75.761305

TPC: 30%

This sloping pastureland, used for spring and autumn grazing, is dominated by herbaceous species with scattered shrub elements and signs of active erosion along the lower slope. The dominant shrub species is *Rosa alberti* (10% projective cover), accompanied by geophytes such as *Gagea lutea* and the conservation-priority species *Tulipa ostrowskiana* (1%), which is listed as **Near Threatened (NT)** on the IUCN Red List and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan. Perennial grasses (*Hordeum brevisubulatum*, *Koeleria gracilis*, *Festuca valesiaca*) and herbs like *Polygonum viviparum*, *Alfredia nivea*, and *Achillea wilhelmsii* make up the bulk of the herbaceous layer, indicating a steppe-meadow community typical of mid-elevation mountain slopes. Additional species such as *Cirsium esculentum*, *Euphorbia ferganensis*, *Scorzonera circumflexa*, and *Potentilla asiatica* contribute to floristic diversity and forage value. Isolated individuals of *Ephedra intermedia*, *Caragana laeta*, and *Hippophae turkestanica* are also present. No endemic species to Kyrgyzstan were recorded in this plot. While species richness is moderate to high, the presence of erosion channels and the threatened *T. ostrowskiana* indicates the need for habitat protection, sustainable grazing regulation, and periodic monitoring of conservation status.



Figure 68: *Rosa alberti*+ ephemeral herbs community

Table 37: Results of survey point P_KG25_K_P8

Species	Life form	PC	IUCN	Red list KG
<i>Rosa alberti</i>	Shrub	10	NE	Not listed
<i>Gagea lutea</i>	Perennial geophyte (bulb)	5	NE	Not listed
<i>Polygonum viviparum</i>	Perennial herb	5	NE	Not listed
<i>Alfredia nivea</i>	Perennial herb	5	NE	Not listed
<i>Hordeum brevisubulatum</i>	Perennial grass	5	NE	Not listed
<i>Ephedra intermedia</i>	Perennial shrub	1	LC	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	1	NT	VU-Vulnerable
<i>Koeleria gracilis</i>	Perennial grass	+	NE	Not listed
<i>Aegilops squarrosa</i>	Annual grass	+	NE	Not listed
<i>Gentiana turkestanorum</i>	Perennial herb	+	NE	Not listed
<i>Potentilla orientalis</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Bupleurum falcatum</i>	Perennial herb	1	NE	Not listed
<i>Euphorbia alata</i>	Perennial herb	+	NE	Not listed
<i>Hordeum brevisubulatum</i>	Perennial herb	1	NE	Not listed
<i>Ranunculus natans</i>	Perennial aquatic herb	+	NE	Not listed
<i>Rhodiola linearifolia</i>	Perennial herb (succulent)	+	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	1	NE	Not listed
<i>Scorzonera circumflexa</i>	Perennial herb	1	NE	Not listed
<i>Hippophae turkestanica</i>	Shrub	+	NE	Not listed
<i>Potentilla asiatica</i>	Perennial herb	1	NE	Not listed

Survey point name: P_KG25_K_P9

Vegetation community: *Rosa alberti*+ ephemeral herbs

Coordinates: N42.629105 E75.778422

TPC: 30%

This subalpine meadow community, located on a gently sloping rocky hillside, is characterized by a high diversity of perennial herbs and grasses with scattered geophytes and subshrubs. The dominant species include *Artemisia santolinifolia* (10% projective cover), *Festuca valesiaca*, *Achillea wilhelmsii*, and *Poa bulbosa* (5% each), forming a resilient herbaceous matrix. Notably, *Tulipa ostrowskiana* occurs with a relatively high local density (5%), contributing to the site's ecological significance. This species is listed as **Near Threatened (NT)** on the IUCN Red List and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan, indicating conservation priority.

Other important taxa include sedges (*Carex turkestanica*), alpine grasses (*Phleum alpinum*, *Achnatherum splendens*), and moisture-indicating herbs like *Tussilago farfara*, *Cirsium esculentum*, and *Draba altaica*. Early-successional or disturbance-associated species such as *Alyssum desertorum* and *Hordeum leporinum* are present but sparse. The community also contains indicator species for mid-altitude mesic pastures, such as *Pilosella procera*, *Taraxacum serotinum*, and *Potentilla orientalis*.

Although no endemic species to Kyrgyzstan were recorded, the site exhibits moderate to high conservation value due to its species richness, structural diversity, and the presence of *T. ostrowskiana*. Grazing pressure appears moderate, and the vegetation cover is continuous and healthy.



Figure 69: *Artemisia santolinifolia*+ ephemeral herbs community

Table 38: Results of survey point P_KG25_K_P9

Species	Life form	PC	IUCN	Red list KG
<i>Artemisia santolinifolia</i>	Subshrub	10	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	5	NT	VU- Vulnerable

<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	5	NE	Not listed
<i>Carex turkestanica</i>	Perennial sedge	1	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	1	LC	Not listed
<i>Potentilla orientalis</i>	Perennial herb	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	1	NE	Not listed
<i>Alyssum desertorum</i>	Annual herb	1	NE	Not listed
<i>Zygophyllum rosowii</i>	Perennial herb	+	NE	Not listed
<i>Phleum alpinum</i>	Perennial grass	+	NE	Not listed
<i>Tussilago farfara</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Pilosella procera</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed
<i>Hordeum leporinum</i>	Annual grass	+	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P10

Vegetation community: *Artemisia santolinifolia* + *Tulipa ostrowskiana*

Coordinates: N42.627486 E75.772491

TPC: 30%

This montane meadow ecosystem, located along a narrow valley corridor beneath overhead transmission lines, exhibits floristic richness and high conservation significance. The dominant species is *Tulipa ostrowskiana* (10% projective cover), which is particularly prominent during the early growing season. This species is listed as **Near Threatened (NT)** on the IUCN Red List and **Vulnerable (VU)** in the Red Data Book of Kyrgyzstan, underscoring the ecological value of this habitat for rare geophytes. Subdominant taxa include *Artemisia santolinifolia* (10%), *Festuca valesiaca* and *Achillea wilhelmsii* (5% each), forming a mixed mat of subshrubs, grasses, and perennials. A variety of mesophilous and steppe-indicator species such as *Potentilla orientalis*, *Poa bulbosa*, *Carex turkestanica*, and *Achnatherum splendens* occupy the mid-stratum. The herbaceous layer includes ecologically diagnostic taxa like *Cirsium esculentum*, *Tussilago farfara*, *Zygophyllum rosowii*, and *Pilosella procera*. Annuals and early successional species such as *Alyssum desertorum* and *Hordeum leporinum* are present but not dominant, suggesting a relatively undisturbed condition despite the proximity to utility infrastructure. Of particular interest is the co-occurrence of montane elements (*Draba altaica*, *Phleum alpinum*, *Verbascum virgatum*) and moisture-adapted herbs (*Plantago depressa*, *Hymenolaena nana*), indicating microtopographic and hydrological heterogeneity. No endemic species to Kyrgyzstan were recorded in the current list, but the presence of *T. ostrowskiana* alone merits conservation attention.



Figure 70: *Artemisia santolinifolia* + *Tulipa ostrowskiana* community

Table 39: Results of survey point P_KG25_K_P10

Species	Life form	PC	IUCN	Red list KG
<i>Artemisia santolinifolia</i>	Subshrub	10	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	10	NT	VU-Vulnerable
<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Achillea wilhelmsii</i>	Perennial herb	5	NE	Not listed
<i>Carex turkestanica</i>	Perennial sedge	1	NE	Not listed
<i>Potentilla orientalis</i>	Perennial herb	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	1	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	1	NE	Not listed
<i>Alyssum desertorum</i>	Annual herb	1	NE	Not listed
<i>Zygophyllum rosowii</i>	Perennial herb	+	NE	Not listed
<i>Phleum alpinum</i>	Perennial grass	+	NE	Not listed
<i>Tussilago farfara</i>	Perennial herb	+	NE	Not listed
<i>Cirsium esculentum</i>	Perennial herb	+	NE	Not listed
<i>Pilosella procera</i>	Perennial herb	+	NE	Not listed
<i>Aster canescens</i>	Perennial herb	+	NE	Not listed
<i>Hordeum leporinum</i>	Annual grass	+	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed

<i>Verbascum virgatum</i>	Perennial herb	+	NE	Not listed
<i>Astragalus sieversianus</i>	Perennial herb	+	NE	Not listed
<i>Hymenolaena nana</i>	Perennial herb	+	NE	Not listed
<i>Plantago depressa</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P11

Vegetation community: *Rosa alberti* + *Rosa beggeriana*+ *Hippophae turkestanica*+ *Artemisia santolinifolia*

Coordinates: N42.625386 E75.768328

TPC: 40%

This montane ravine shrubland represents a structurally complex and floristically valuable plant community, occupying a narrow, mesic valley likely influenced by snowmelt and seasonal runoff. The dominant woody species include *Rosa alberti* (10%), *Rosa beggeriana* (5%), and *Hippophae turkestanica* (5%), forming a dense, multi-layered thicket. These species, typical of mid-elevation riparian scrub, contribute significantly to habitat heterogeneity and wildlife shelter.

Among herbaceous dominants, *Achnatherum splendens*, *Artemisia santolinifolia*, and *Ptilagrostis mongolica* (5% each) establish a diverse understory with high ecological resilience. Biennial herbs such as *Onopordum illyricum* and geophytes like *Tulipa ostrowskiana*—a species listed as **Near Threatened (NT)** globally and **Vulnerable (VU)** in the Kyrgyz Red List—are of particular conservation concern, though the latter occurs with low cover (1%).

Scattered within the ravine are individuals of *Malus sieversii*, the wild apple and a **globally vulnerable** species (IUCN VU). Its presence further enhances the conservation significance of the site, especially due to its genetic importance as a progenitor of domestic apples (*Malus domestica*). Other notable perennial forbs include *Onosma dichroantha*, *Taraxacum serotinum*, *Eremostachys isochila*, and *Oxytropis macrocarpa*, contributing to species richness and ecological functionality.

No Kyrgyz endemics were detected in the current species list. However, the presence of two Red List species (*Malus sieversii* and *Tulipa ostrowskiana*) and the structural diversity of shrubs and grasses indicate this habitat is of **high conservation value**.



Figure 71: *Rosa alberti* + *Rosa beggeriana*+ *Hippophae turkestanica*+ *Artemisia santolinifolia* community

Table 40: Results of survey point P_KG25_K_P11

Species	Life form	PC	IUCN	Red list KG
<i>Rosa alberti</i>	shrub	10	NE	Not listed
<i>Rosa beggeriana</i>	shrub	5	NE	Not listed
<i>Hippophae turkestanica</i>	shrub	5	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	5	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed
<i>Onopordum illyricum</i>	Biennial herb	5	NE	Not listed
<i>Ptilagrostis mongolica</i>	Perennial grass	5	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	1	NT	VU-Vulnerable
<i>Malus sieversii</i>	Deciduous tree	+	VU	LC-Least Concern
<i>Onosma dichroantha</i>	Perennial herb	+	NE	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed
<i>Eremostachys isochila</i>	Perennial herb	+	NE	Not listed
<i>Oxytropis macrocarpa</i>	Perennial herb	+	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	+	LC	Not listed
<i>Polygonum rupestre</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P12

Vegetation community: *Artemisia santolinifolia* + ephemeral herbs

Coordinates: N42.62213 E75.771283

TPC: 25%

This high-altitude open grassland occupies a gently sloping plateau at the base of steep ridges, characterized by sparse but stable vegetation cover typical of subalpine zones. The community is dominated by drought-tolerant perennial grasses and sedges, including *Carex stenophylloides*, *Carex stenocarpa*, and *Festuca valesiaca*, each contributing modestly (5–1%) to overall cover. The presence of *Cynodon dactylon*, a stoloniferous grass, suggests localized areas of surface moisture or seasonal melt influence. Subshrubs such as *Artemisia santolinifolia* and *Ephedra intermedia* (both 5–1% cover) add structural variability and increase habitat resilience to grazing and climatic stress. The annual *Hordeum leporinum* and forbs like *Taraxacum serotinum* and *Iris loczyi* enhance floristic diversity in the herbaceous layer.

Of particular conservation significance is the occurrence of *Tulipa ostrowskiana* (2% cover), a Near Threatened species globally and listed as Vulnerable in the Kyrgyz Red List. Its presence indicates the site's role as a refuge for geophyte diversity and underlines the need for seasonal grazing control during its blooming period.

No Kyrgyz endemics were identified. However, the floristic composition, including one Red List species and a mix of grasses, sedges, and forbs, points to moderate conservation value. The area is potentially vulnerable to overgrazing and erosion, particularly near livestock paths, and should be monitored for trampling effects and bulbous plant viability.



Figure: *Artemisia santolinifolia* + ephemeral herbs community

Table 41: Results of survey point P_KG25_K_P12

Species	Life form	PC	IUCN	Red list KG
<i>Carex stenophylloides</i>	Perennial sedge	5	NE	Not listed

<i>Carex stenocarpa</i>	Perennial sedge	5	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed
<i>Cynodon dactylon</i>	Perennial grass (stoloniferous)	5	LC	Not listed
<i>Hordeum leporinum</i>	Annual grass	+	NE	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	2	NT	VU-Vulnerable
<i>Iris loczyi</i>	Perennial geophyte herb	+	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	+	LC	Not listed
<i>Festuca valesiaca</i>	Perennial grass	1	NE	Not listed

Survey point name: P_KG25_K_P13

Vegetation community: *Ephedra intermedia*+ *Rosa beggeriana*+ ephemeral grass

Coordinates: N42.609877 E75.774801

TPC: 30%

This dry ravine system harbors a stress-tolerant plant assemblage adapted to rocky soils, steep slopes, and episodic moisture from seasonal runoff. Dominant woody species include *Ephedra intermedia* (10%) and *Rosa beggeriana* (5%), which, together with scattered *Lycium ruthenicum*, *Lycium ferocissimum*, and *Halimodendron halodendron*, form a drought-adapted shrub layer with high ecological resilience. *Juniperus semiglobosa* occurs occasionally, indicating long-term site persistence and microhabitat stability.

The herbaceous-sedge layer is formed by *Carex stenophylloides* and *Carex stenocarpa* (5% each), supported by perennial grasses such as *Achnatherum splendens* and subshrubs like *Artemisia santolinifolia* and *Artemisia rhodatha*. Geophytes (*Allium montanum*) and annual herbs (*Chorispora sibirica*) enrich seasonal diversity. Species like *Eremostachys isochila*, *Astragalus mollissimus*, and *Euphorbia alata* add functional depth and signal adaptation to shallow soils and erosion-prone conditions.

Although no species listed in the Kyrgyz Red Book or as globally threatened are currently present, the structural and floristic diversity of this habitat—especially the mix of shrubs, sedges, and perennials—confers medium conservation significance. The presence of xerophytic shrubs and semidesert grasses suggests this community plays an important role in soil stabilization and biodiversity connectivity across dry mountain zones.



Figure 72: *Ephedra intermedia*+ *Rosa beggeriana*+ ephemeral grass community

Table 42: Results of survey point P_KG25_K_P13

Species	Life form	PC	IUCN	Red list KG
<i>Rosa beggeriana</i>	Shrub	5	NE	Not listed
<i>Carex stenophylloides</i>	Perennial sedge	5	NE	Not listed
<i>Carex stenocarpa</i>	Perennial sedge	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed
<i>Juniperus semiglobosa</i>	Evergreen tree	+	LC	Not listed
<i>Chorispora sibirica</i>	Annual herb	+	NE	Not listed
<i>Eremostachys isochila</i>	Perennial herb	+	NE	Not listed
<i>Lycium ruthenicum</i>	Deciduous shrub	+	NE	Not listed
<i>Allium montanum</i>	Perennial geophyte (bulb)	+	NE	Not listed
<i>Lycium ferocissimum</i>	Shrub	+	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Artemisia rhodatha</i>	Subshrub	+	NE	Not listed
<i>Euphorbia alata</i>	Perennial herb	1	NE	Not listed
<i>Astragalus mollissimus</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P14

Vegetation community: *Ptilagrostis mongholica* + *Festuca valesiaca* + *Artemisia santolinifolia*

Coordinates: N42.604774 E75.781356

TPC: 25%

This narrow ravine community occupies a transitional ecological niche between arid slopes and intermittently moist gullies. The structure is shaped by steep terrain, episodic runoff, and localized groundwater presence, supporting a mixed assemblage of drought- and moisture-tolerant species.

The herbaceous layer is dominated by *Festuca valesiaca* and *Ptilagrostis mongholica* (5% each), both indicative of relatively stable soils and cold-adapted steppe dynamics. The sedge-like *Achnatherum splendens* and the helophytic *Phragmites australis* occur sporadically along microdepressions, pointing to occasional water accumulation or shallow groundwater influence.

The shrub layer features scattered individuals of *Ephedra intermedia*, *Ephedra equisetina* (1% each), and *Rosa beggeriana*, contributing to structural complexity in otherwise open, eroded terrain. These species are well-adapted to xeric conditions and shallow soils. Subshrubs like *Artemisia santolinifolia* provide additional ground cover and soil stabilization on erodible slopes.

The presence of *Astragalus borodinii*, a perennial herb typical of dry stony habitats, adds to the forbland diversity. No endemic or globally threatened species were identified, but the site holds **moderate conservation value** due to its floristic variety and role in erosion control.



Figure 73: *Ptilagrostis mongholica* + *Festuca valesiaca* + *Artemisia santolinifolia* community

Table 43: Results of survey point P_KG25_K_P14

Species	Life form	PC	IUCN	Red list KG
<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Ptilagrostis mongholica</i>	Perennial grass	10	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed

<i>Ephedra intermedia</i>	Shrub	1	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	1	Not Evaluated	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (helophyte, reed)	+	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	+	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P15

Vegetation community: *Artemisia santolinifolia*+*Ephedra intermedia*

Coordinates: N42.598347 E75.786262

TPC: 25%

This habitat occupies degraded foothill terrain with sparse vegetation cover and visibly active erosion processes. The community structure is open and dominated by xerophytic shrubs and subshrubs adapted to shallow soils and prolonged aridity.

The dominant species include *Artemisia santolinifolia* and *Ephedra intermedia* (5% each), which form the primary structural matrix in the subshrub and shrub layers. These species are drought-tolerant and provide minimal canopy closure, contributing to the habitat's low ground cover.

Scattered individuals of *Ephedra equisetina* and *Caragana kirghisorum* (1% each) indicate patchy establishment of shrubs, likely limited by poor soil depth and slope instability. *Rosa beggeriana* occurs sporadically, further diversifying the shrub layer.

Eremostachys isochila, a perennial herb with low coverage, adds to the floristic heterogeneity but plays a minor role in overall structure. The herb layer is poorly developed, reflecting the dry microclimate and likely overgrazing or trampling. No rare or endemic species were identified in this site.



Figure 74: *Artemisia santolinifolia*+*Ephedra intermedia* community

Table 44: Results of survey point P_KG25_K_P15

Species	Life form	PC	IUCN	Red list KG
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	1	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	+	NE	Not listed
<i>Eremostachys isochila</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P16

Vegetation community: *Ephedra intermedia* + *Tulipa ostrowskiana*

Coordinates: N42.593136 E75.785602

TPC: 30%

The site supports a structurally simple yet ecologically significant plant assemblage dominated by drought-adapted shrubs and geophytes. The dominant species is *Ephedra intermedia* (10%), forming scattered shrub cover across the slopes. Co-dominants include *Tulipa ostrowskiana* (10%), a geophyte of global conservation concern (IUCN Near Threatened, VU in the Kyrgyz Red List), and *Ephedra distachya* (5%). Their presence indicates seasonal moisture availability, likely from snowmelt runoff or slope seepage.

Shrub associates such as *Rosa beggeriana* and *Anabasis tianschanica* occur at low cover, reflecting the harsh edaphic conditions. Subshrubs like *Artemisia santolinifolia* and *A. tianschanica* (1% or less) are patchily distributed, contributing to floristic diversity without forming dense canopies.

Among herbaceous taxa, *Astragalus borodinii*, *Draba cana*, *Artemisia dracunculus*, and *Polygonum rupestre* add ecological value as forbs adapted to shallow soils and seasonal temperature extremes. *Achnatherum splendens* and *Phragmites australis* (1%) are rare on-site, indicating limited wet microsites or ephemeral drainage lines.

The occurrence of *Tulipa ostrowskiana*, a rare and vulnerable bulbous species, confers conservation significance to the site despite overall vegetation sparseness. No Kyrgyz endemics are listed.



Figure 75: *Ephedra intermedia* + *Tulipa ostrowskiana* community

Table 45: Results of survey point P_KG25_K_P16

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	10	NT	VU-Vulnerable
<i>Ephedra distachya</i>	Shrub	5	LC	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	1	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	1	NE	Not listed
<i>Anabasis tianschanica</i>	Subshrub (xerophyte)	1	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed
<i>Draba cana</i>	Perennial herb	+	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (helophyte)	1	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed
<i>Artemisia dracunculus</i>	Perennial herb	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Polygonum rupestre</i>	Perennial herb	1	NE	Not listed

Survey point name: P_KG25_K_P17

Vegetation community: *Ephedra intermedia* + *Ephedra distachya*+ *Artemisia tianschanica*

Coordinates: N42.588584 E75.784936

TPC: 30%

This plant assemblage is characteristic of semi-desert rocky slopes with edaphically constrained vegetation. The dominant shrub layer is represented by *Ephedra intermedia* (10%), accompanied by *Ephedra distachya* and *Ephedra equisetina* (5% each), which are xerophytic gymnosperms adapted to dry, skeletal soils and intense insolation. These taxa exhibit jointed photosynthetic stems and reduced leaves, enabling them to thrive in harsh montane arid environments.

The herbaceous-stratum is sparse but taxonomically diverse. The subshrub component includes *Artemisia tianschanica* (5%), *Artemisia santolinifolia*, and *Anabasis tianschanica* (~1%), which are chamaephytes with fine dissected foliage and drought-adapted morphologies. *Caragana kirghisorum*, a xerophytic leguminous shrub, occurs sporadically on upper slope niches.

Among the graminoids, *Kobresia stenocarpa* and *Achnatherum splendens* (1%) form low, clumped tussocks on compacted soils or ephemeral run-off depressions. Their presence suggests moderate edaphic moisture heterogeneity and tolerance to mechanical disturbance.

Floristic interest is increased by the presence of *Tulipa ostrowskiana*, a geophytic monocot with early-spring phenology and conservation status of *NT* (IUCN) and *VU* in the Kyrgyz Red List. This species occurs at low abundance but is ecologically significant. Other notable taxa include *Astragalus borodinii* and *Pseudosophora alopecuroides* (*Fabaceae*), *Orostachys thyrsiflora* (*Crassulaceae*), and the lithophilous *Berberis sphaerocarpa*. Lichens and mosses are locally abundant on exposed rocks, especially in the shaded northern aspects, contributing to microhabitat stabilization. The overall vegetation structure is open, with high representation of xerophytic, cushion-forming, and dwarf-shrub life forms, reflecting the site's aridity, shallow soil profile, and altitudinal position.



Figure 76: *Ephedra intermedia* + *Ephedra distachya*+ *Artemisia tianschanica* community

Table 46: Results of survey point P_KG25_K_P17

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Ephedra distachya</i>	Shrub	5	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	5	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	5	NE	Not listed
<i>Kobresia stenocarpa</i>	Perennial sedge (turf-forming)	1	NE	Not listed
<i>Glaucium fimbrilligerum</i>	Biennial herb	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	1	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	1	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed
<i>Lactuca saligna</i>	Annual herb	+	NE	Not listed
<i>Anabasis tianschanica</i>	Subshrub (xerophyte)	1	NE	Not listed
<i>Berberis sphaerocarpa</i>	Shrub	1	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed
<i>Pseudosophora alopecuroides</i>	Deciduous shrub	+	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	+	NT	VU-Vulnerable
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P18

Vegetation community: *Ephedra intermedia* + *Achnatherum caragana*

Coordinates: N42.583241 E75.782292

TPC: 20%

This semi-desert foothill plant community is distributed across gently undulating slopes with eroded substrates and sparse vegetation typical of arid piedmont zones. The community is dominated by drought-tolerant shrubs and perennial grasses, with *Ephedra intermedia* (10%) forming the primary structural element. This species, along with scattered individuals of *Caragana aurantiaca* and *Lycium dasystemum*, reflects strong xeromorphic adaptations to prolonged dry periods and high insolation. Perennial grasses such as *Achnatherum caragana* (10%) and *Achnatherum splendens* (1%) contribute to the herbaceous matrix, with *Kobresia stenocarpa* and *Kobresia capilliformis* appearing locally on compacted soils and shallow depressions. Subshrubs, including *Artemisia santolinifolia*, *Artemisia tianschanica*, and *Anabasis tianschanica*, are widespread but low in cover (1–2%), providing structural complexity and moderate resistance to erosion on upper slopes. Perennial forbs such as *Astragalus borodinii*, *Draba cana*, and *Polygonum rupestre* are scattered throughout the area, indicating a floristically diverse understory adapted to fine-scale microhabitat variation. These species are accompanied by sedges and turf-forming elements that enhance the ecological stability of the site, particularly under light to moderate grazing pressure. No species listed in the Red Book of Kyrgyzstan were recorded. However, the presence of xerophytic legumes, cushion-forming sedges, and structurally important shrubs suggests this plant assemblage has moderate botanical value in terms of community resilience and habitat representativeness. While floristic endemism appears low, the site contributes to regional vegetation heterogeneity and should be monitored for shrub expansion, erosion dynamics, and livestock-related degradation.



Figure 77: *Ephedra intermedia* + *Achnatherum caragana* community

Table 47: Results of survey point P_KG25_K_P18

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Achnatherum caragana</i>	Perennial grass	10	NE	Not listed
<i>Caragana aurantiaca</i>	Shrub	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed
<i>Draba cana</i>	Perennial herb	+	NE	Not listed
<i>Lycium dasystemum</i>	Shrub	+	NE	Not listed
<i>Kobresia stenocarpa</i>	Perennial sedge (turf-forming)	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	1	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	+	NE	Not listed
<i>Anabasis tianschanica</i>	Subshrub (xerophyte)	+	NE	Not listed
<i>Kobresia capilliformis</i>	Perennial sedge (turf-forming)	+	NE	Not listed
<i>Polygonum rupestre</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P19

Vegetation community: *Achnatherum caragana*+ *Ephedra intermedia*

Coordinates: N42.577142 E75.777351

TPC: 25%

This gently sloping dry grassland occupies an intermontane basin with patchy vegetation cover indicative of arid steppe conditions. The dominant grass is *Achnatherum caragana* (10%), forming tight tufts that stabilize loose soil and signal adaptation to drought and grazing pressure. *Ephedra intermedia* (10%), a woody xerophyte, occurs as scattered shrubs providing vertical structure and contributing to the area's semi-desert physiognomy. Among the subshrubs, *Convolvulus tragacanthoides* (5%) is locally abundant and morphologically specialized for dry, eroded slopes. Minor species include *Artemisia tianschanica*, *Spiraea hypericifolia*, and *Orostachys thyrsiflora*, the latter indicating rocky microhabitats with shallow soils. Herbaceous diversity is increased by small annuals such as *Strigosella stenopetala* and *Neotorularia korolkowii*, which appear transiently after spring rains. A species of particular conservation significance is *Tulipa zenaidae*, a geophyte listed as Vulnerable both globally (IUCN) and nationally (Red List of Kyrgyzstan). Although its current cover is low (+), its presence highlights the floristic uniqueness of the site and the need to regulate early spring grazing and off-road access during the flowering season.

No Kyrgyz endemics were recorded, but the assemblage contains a balanced mix of shrubs, perennial herbs, and rare geophytes, making this grassland of moderate conservation importance.



Figure 78: *Achnatherum caragana*+ *Ephedra intermedia* community

Table 48: Results of survey point P_KG25_K_P19

Species	Life form	PC	IUCN	Red list KG
<i>Achnatherum caragana</i>	Perennial grass	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	5	NE	Not listed
<i>Strigosella stenopetala</i>	Annual herb	1	NE	Not listed

<i>Spiraea hypericifolia</i>	Shrub	+	NE	Not listed
<i>Tulipa zenaidae</i>	Perennial geophyte (bulb)	+	VU	VU-Vulnerable
<i>Artemisia tianschanica</i>	Subshrub	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Perennial succulent herb	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed
<i>Neotorularia korolkowii</i>	Annual herb	+	NE	Not listed
<i>Goniolimon cuspidatum</i>	Perennial herb		NE	Not listed

Survey point name: P_KG25_K_P20

Vegetation community: *Halimodendron halodendron*+ *Salix blakii*+*Ephedra intermedia*

Coordinates: N42.468721 E75.868775

TPC: 60%

This riparian shrubland develops along a seasonally moist floodplain, where woody and herbaceous species form a structurally heterogeneous and ecologically resilient assemblage. The dominant species, *Halimodendron halodendron* (30% cover), forms dense, spiny thickets, likely contributing to soil stabilization and creating microhabitats for herbaceous flora. Tree-layer vegetation is represented by *Salix blakii* (10%), a flood-tolerant willow species typical of alluvial deposits, suggesting periodic water availability. Woody shrubs including *Ephedra intermedia* (10%), *Hippophae rhamnoides* (5%), and *Nitraria sibirica* (1%) are characteristic xerohalophytes, adapted to salinity and seasonal water stress. Climbing species such as *Clematis songorica* and *Clematis orientalis* occur with low frequency but add vertical layering and floristic variety to the mid-story. The herbaceous layer includes the perennial grasses *Achnatherum splendens* (5%) and *Phragmites australis* (1%), which stabilize wet margins and contribute to biomass production. Scattered annual grasses like *Setaria viridis* and *Eragrostis minor* are indicative of disturbed micro-sites. Wetland-adapted species such as *Juncus articulatus* and *Rumex pamaricus* further support the inference of temporary soil saturation. Species of ethnobotanical and ecological interest include *Peganum harmala*, known for its medicinal properties, and *Atraphaxis virgata*, a drought-adapted shrub contributing to canopy density. No Red List species or Kyrgyz endemics were recorded.



Figure 79: *Halimodendron halodendron*+ *Salix blakii*+*Ephedra intermedia* community

Table 49: Results of survey point P_KG25_K_P20

Species	Life form	PC	IUCN	Red list KG
<i>Salix blakii</i>	Tree	10	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	30	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Achnatherum splendens</i>	Perennial grass	5	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	5	NE	Not listed
<i>Phragmites australis</i>	Perennial grass (helophyte)	1	NE	Not listed
<i>Setaria viridis</i>	Annual grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Juncus articulatus</i>	Perennial rush (wetland herb)	+	LC	Not listed
<i>Rumex pamiricus</i>	Perennial herb	+	NE	Not listed
<i>Atraphaxis virgata</i>	Perennial shrub	+	NE	Not listed
<i>Clematis songorica</i>	Perennial climbing herb	+	NE	Not listed
<i>Clematis orientalis</i>	Perennial climbing herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub (halophyte)	1	NE	Not listed

Survey point name: P_KG25_K_P21

Vegetation community: *Caragana kirghisorum*+ *Ephedra intermedia*+ *Achnatherum splendens*

Coordinates: N42.466189 E75.85221

TPC: 25%

This semi-desert plant assemblage occupies an arid piedmont zone characterized by gravelly-sandy soils and sparse, low-stature vegetation adapted to extreme drought, high insolation, and shallow soil substrates. The community is dominated by xerophytic shrubs and subshrubs, notably *Caragana kirghisorum* (10%) and *Ephedra intermedia* (5%), both of which exhibit specialized morpho-anatomical adaptations to water stress, such as reduced leaf area and photosynthetic stems.

Other common subshrubs include *Artemisia compacta*, *Krascheninnikovia ceratoides*, and *Perovskia abrotanoides*, forming a patchy but stable woody layer that contributes to microhabitat partitioning. Shrubs like *Nitraria sibirica* (1%) indicate localized soil salinity tolerance, often forming peripheral clumps near ephemeral drainage lines.

The herbaceous stratum is represented by drought-adapted perennial grasses such as *Achnatherum splendens*, *Stipa glareosa*, and *Festuca valesiaca*, each occurring at low cover, and playing a key role in soil retention and early spring productivity. *Eragrostis minor* and *Ceratocephala testiculata* are opportunistic annuals exploiting brief moisture windows after winter snowmelt or spring rain.

Succulent herbaceous taxa like *Orostachys thyrsiflora* and *Rosularia glabra* contribute to floristic diversity and are physiologically adapted to extreme moisture fluctuations. The presence of *Clematis songarica*, a perennial climber, adds to the vertical complexity of the community, albeit at low abundance. Medicinal species such as *Peganum harmala* are locally significant, and their scattered presence suggests minimal anthropogenic disturbance. No Red List or endemic species to Kyrgyzstan were recorded in the current inventory. This vegetation type represents a stable arid-steppe ecotone with low to moderate conservation significance.



Figure 80: *Caragana kirghisorum*+ *Ephedra intermedia*+ *Achnatherum splendens* community

Table 50: Results of survey point P_KG25_K_P21

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Achnatherum splendens</i>	Perennial grass	5	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	5	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed
<i>Eragrostis minor</i>	Annual grass	+	NE	Not listed
<i>Clematis songarica</i>	Perennial herb (climber)	+	NE	Not listed
<i>Ceratocephala testiculata</i>	Annual herb	+	NE	Not listed
<i>Orostachys thyrsiflora</i>	Succulent perennial herb	+	NE	Not listed
<i>Rosularia glabra</i>	Succulent perennial herb	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub	1	NE	Not listed
<i>Perovskia abrotanoides</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG25_K_P22

Vegetation community: *Ephedra intermedia*+ *Caragana kirghisorum*

Coordinates: N42.471816 E75.831386

TPC: 15%

This desert steppe plant community occupies a broad, gently sloping gravelly plateau in the lowland foothills, indicative of a hyperarid climate regime with minimal vegetative cover and strong exposure to wind and solar radiation. Vegetation is sparse and primarily composed of drought-tolerant, xerophytic shrubs and subshrubs, exhibiting adaptations such as reduced foliage, deep root systems, and salt tolerance. Dominant woody species include *Ephedra intermedia* (10%), a photosynthetic-stemmed shrub with high drought resilience, and *Caragana kirghisorum* (5%), a leguminous shrub contributing to soil stabilization and nitrogen enrichment. Both species form widely spaced, low-stature shrub clumps on degraded, gravelly soils. Herbaceous cover is minimal, with *Stipa glareosa* (1%) forming scattered tussocks indicative of relict steppe conditions. *Peganum harmala*, a perennial herb of ethnobotanical and medicinal relevance, occurs at very low cover (1%), typically occupying microhabitats with slightly increased moisture or shelter. Additional minor elements include halophytic and semi-succulent species such as *Nitraria sibirica* and *Zygophyllum rosowii*, indicating localized edaphic salinity and further reflecting the site's severe ecological constraints. No Red List or endemic species were recorded. The low species richness and extremely open structure reflect an advanced aridification gradient, where vegetation plays a key role in preventing erosion.



Figure 81: *Ephedra intermedia*+ *Caragana kirghisorum* community

Table 51: Results of survey point P_KG25_K_P22

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Zygophyllum rosowii</i>	Subshrub	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub (halophyte)	+	NE	Not listed

Survey point name: P_KG25_K_P23

Vegetation community: *Ephedra intermedia*+ *Caragana kirghisorum*

Coordinates: N42.477068 E75.832604

TPC: 15%

This desertic shrub-steppe community occupies a rocky, arid plain at the foot of a mountainous range, characterized by sparse vegetative cover and coarse, gravelly soils. The dominant woody taxa are *Ephedra intermedia* (10%) and *Caragana kirghisorum* (5%), both well-adapted to xerothermic conditions. These species form widely spaced shrublets with deep root systems, playing a crucial role in stabilizing the soil and withstanding prolonged drought. Herbaceous representation is minimal, with *Stipa glareosa* forming isolated tussocks (1%), indicating relic steppe elements within an increasingly aridized landscape. The low-statured subshrub *Zygophyllum rosowii* and ephemeral annual *Plantago minuta* contribute insignificantly to cover, yet enhance temporal diversity during brief moist periods. No threatened or endemic species were noted. However, the pronounced dominance

of drought-resistant shrubs and the near-absence of mesic forbs underscore the extreme aridity and environmental filtering shaping this flora. The site represents a typical desert steppe formation.



Figure 82: *Ephedra intermedia*+ *Caragana kirghisorum* community

Table 52: Results of survey point P_KG25_K_P23

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Zygophyllum rosowii</i>	Subshrub	+	NE	Not listed
<i>Plantago minuta</i>	Annual herb	+	NE	Not listed

Survey point name: P_KG25_K_P24

Vegetation community: *Ephedra intermedia*+ *Caragana kirghisorum*

Coordinates: N42.485925 E75.829775

TPC: 15%

This sparse desert-slope vegetation community is distributed across steep, rocky inclines with poor, skeletal soils. The vegetation structure is open and discontinuous, dominated by xerophytic shrubs and grasses capable of withstanding high solar radiation and limited moisture availability.

The most prominent species is *Ephedra intermedia* (10% cover), a deep-rooted, drought-resistant gymnosperm, forming dispersed, low thickets across the slope. *Caragana kirghisorum* (5%) is also frequent, contributing to the leguminous shrub layer and enhancing soil stability through nitrogen fixation. The herbaceous layer is extremely limited. *Stipa glareosa* (1%) appears as isolated clumps, characteristic of degraded or edaphically constrained steppes. Scattered individuals of *Plantago*

minuta, a small ephemeral annual, indicate brief growth response during short spring moisture pulses. No endemic or Red List species were recorded, and the vegetation is heavily controlled by abiotic factors, particularly slope gradient, soil texture, and precipitation deficit. The floristic composition reflects a classic desertified montane steppe, with high resilience to climatic extremes but low biodiversity and regeneration potential under continued grazing pressure or erosion.



Figure 83: *Ephedra intermedia*+ *Caragana kirghisorum* community

Table 53: Results of survey point P_KG25_K_P24

Species	Life form	PC	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Plantago minuta</i>	Annual herb	+	NE	Not listed

Survey point name: P_KG25_K_P25

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.468109 E75.845864

TPC: 15%

This arid foothill shrub-steppe is characterized by extremely sparse vegetation cover on gravelly, skeletal soils with poor moisture retention. The plant assemblage is dominated by xerophytic shrubs and subshrubs adapted to extreme drought and temperature fluctuations. *Caragana kirghisorum* (10% cover) is the principal species, forming scattered, hemispherical shrubs across the slope. As a nitrogen-fixing legume, it plays a key role in soil nutrient dynamics in this otherwise nutrient-poor environment. *Ephedra intermedia* (5%) is also prominent and well-adapted to these harsh edaphic

conditions through its photosynthetic stems and deep-rooted system. The herbaceous layer is nearly absent, with *Stipa glareosa* and *Krascheninnikovia ceratoides* each contributing about 1% cover. These species represent a degraded relic of steppe vegetation and occur mostly in microhabitats protected from wind and surface runoff. *Artemisia compacta* is present sporadically, enhancing low-canopy diversity, but remains inconspicuous. This vegetation type represents a strongly degraded desert steppe, with low structural and floristic diversity. The dominance of woody xerophytes over grasses and forbs reflects long-term grazing pressure and aridification trends. No species listed as threatened in the IUCN Red List, included in the Red Data Book of Kyrgyzstan, or endemic to Kyrgyzstan were identified during the survey.



Figure 84: *Caragana kirghisorum*+*Ephedra intermedia* community

Table 54: Results of survey point P_KG25_K_P25

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed

Survey point name: P_KG25_K_P26

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.470716 E76.054401

TPC: 20%

This community represents an extremely arid desert vegetation type occupying a broad gravelly-alluvial plain at the foot of montane systems. The surface is dominated by rocky substrates and fine alluvium, with vegetation highly dispersed and limited in biomass. The dominant taxa are *Caragana kirghisorum* (10%) and *Ephedra intermedia* (5%), which form scattered low shrubs. Both species are drought-tolerant and play structural and soil-stabilizing roles in this xeromorphic assemblage. *Ephedra equisetina*, also present at ~5% cover, adds to the phreatophytic component, adapted to deep water access and high insolation. Herbaceous cover is minimal, with *Stipa glareosa* (1%) being the only perennial grass recorded. This species typically anchors the lower herb layer in degraded steppe-desert transitions. *Reaumuria songarica*, a haloxerophytic subshrub, occurs sparsely and indicates soil salinity or high mineral content. The presence of *Salsola australis* (annual) and *Salsola montana* (perennial subshrub) suggests recent disturbance and colonization by salt-tolerant *Chenopodiaceae*. No endemic or Red List species were recorded. These communities are valuable for studying desert plant adaptations and soil-plant feedback in hyper-arid zones.



Figure 85: *Caragana kirghisorum*+*Ephedra intermedia* community

Table 55: Results of survey point P_KG25_K_P26

Species	Life form	PC	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	5	NE	Not listed

Species	Life form	PC	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Reaumuria songarica</i>	Subshrub	+	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Salsola montana</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG25_K_P27

Vegetation community: *Kochia prostrata* + *Ephedra intermedia*

Coordinates: N42.46996 E76.046063

TPC: 25%

This vegetation type represents a semi-desert shrub-grass formation occupying a dry piedmont plain with coarse alluvial-gravelly substrate. The vegetation is sparse, with dominant species exhibiting clear xeromorphic adaptations to arid and wind-exposed conditions. The most abundant species is *Kochia prostrata* (10% cover), a dwarf subshrub indicative of stabilized desert-steppe systems and efficient in soil binding. *Ephedra intermedia* (10%) is co-dominant, contributing to vertical structure and ecological resilience, especially under conditions of prolonged drought. The presence of *Caragana kirghisorum* (5%) further reinforces the shrub layer, with scattered individuals of *Caragana leucophloea* adding taxonomic diversity within Fabaceae. The herbaceous stratum is underdeveloped. *Stipa glareosa* (~1%) is the only representative of perennial grasses and marks the boundary between steppe and semi-desert vegetation. *Peganum harmala*, though sparse, is ecologically significant as a ruderal nitrophilous species that often colonizes degraded or compacted soils. *Artemisia schrenkiana*, found in low cover, typically forms part of transitional Artemisia-ephemeral complexes in foothill drylands. No endemic or Red List species were recorded. However, the dominance of arid-adapted shrubs and the physiognomy of the plant cover suggest a relatively stable but low-productivity vegetation type.



Figure 86: *Kochia prostrata* + *Ephedra intermedia* community

Table 56: Results of survey point P_KG25_K_P27

Species	Life form	PC	IUCN	Red list KG
<i>Kochia prostrata</i>	Subshrub (xerophyte)	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Caragana leucophloea</i>	Shrub	+	NE	Not listed
<i>Artemisia schrenkiana</i>	Subshrub	+	NE	Not listed

Survey point name: P_KG25_K_P28

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.470108 E76.017484

TPC: 25%

This community represents a low-diversity semi-desert shrub assemblage developed on rocky, gravelly pediments at the interface of mountain foothills and arid plains. The substrate is composed of coarse colluvial and alluvial materials, offering minimal soil development and low water retention, favoring xerophytic plant strategies. The dominant species is *Ephedra intermedia* (10% cover), a

drought-resistant gymnosperm shrub forming the structural backbone of the community. It is accompanied by *Caragana kirghisorum* (5%), a nitrogen-fixing shrub that improves edaphic conditions in microsites. *Zygophyllum obliquum*, *Krascheninnikovia ceratoides*, and *Convolvulus tragacanthoides* occur as sparse subshrubs, together contributing to horizontal patchiness in the vegetation matrix. The herbaceous layer is extremely sparse, limited to *Stipa glareosa* and *Achnatherum splendens*, both of which are deep-rooted perennial grasses adapted to coarse substrates and episodic moisture availability. Occasional herbs such as *Peganum harmala* reflect ruderal tendencies and are often associated with compacted, disturbed zones. *Nitraria sibirica*, although occurring in low cover, may indicate micro-salinization or runoff accumulation zones given its halophytic nature. No endemic or Red List species were recorded in this plot. The floristic composition is typical of Central Asian desert-steppe ecotones, with a dominance of woody xerophytes and a suppressed herbaceous stratum.



Figure 87: *Caragana kirghisorum*+*Ephedra intermedia* community

Table 57: Results of survey point P_KG25_K_P28

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Nitraria sibirica</i>	Shrub (halophyte)	+	NE	Not listed

Survey point name: P_KG25_K_P29

Vegetation community: *Phragmites australis* +*Ephedra intermedia*+*Salix* sp.

Coordinates: N42.469058 E75.980534

TPC: 25%

This community represents a riparian reed-shrub formation established along a seasonally active lowland river channel with shallow overbank zones. The floristic structure is dominated by *Phragmites australis* (30% cover), a widespread helophyte forming dense stands in permanently or seasonally wet soils, indicative of high groundwater levels and silt-rich substrates. Accompanying species include *Salix* sp. (5%), forming a sparse arboreal canopy typical of alluvial floodplains. Shrub-layer diversity is modest, with *Ephedra intermedia* and *Caragana kirghisorum* occurring in elevated microhabitats (5% and 1% respectively), while *Tamarix ramosissima*, a facultative phreatophyte, colonizes intermittently flooded margins. The presence of *Nitraria sibirica* suggests slight soil salinization or alluvial fan influence in drier lateral zones. The herbaceous layer is poorly developed beyond reed dominance, with *Peganum harmala*, *Stipa glareosa*, and *Zygophyllum obliquum* as scattered components of transitional ecotones between marsh edge and desert slope vegetation. These species represent disturbance-tolerant elements that colonize trampled, compacted, or seasonally dry sites. No endemic or Red List species were recorded, but the community is structurally complex and ecologically important, serving as a corridor for water flow, sediment filtration, and faunal movement.



Figure 88: *Phragmites australis* +*Ephedra intermedia*+*Salix* sp. community

Table 58: Results of survey point P_KG25_K_P29

Species	Life form	PC	IUCN	Red list KG
<i>Phragmites australis</i>	Perennial grass (helophyte/reed)	30	NE	Not listed
<i>Salix sp.</i>	Tree	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Caragana kirghisorum</i>	Shrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	1	NE	Not listed
<i>Nitraria sibirica</i>	Shrub (halophyte)	+	NE	Not listed
<i>Tamarix ramosissima</i>	Shrub	+	NE	Not listed

Survey point name: P_KG25_K_P30

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.460794 E75.86019

TPC: 30%

This vegetation community represents a semi-desert shrubland established on gravelly piedmont slopes and dry intermontane basins, typical of arid to semi-arid zones of Central Asia. The flora is dominated by xerophytic shrubs and subshrubs with adaptations to drought, poor soils, and high solar exposure.

The primary dominant species include *Caragana kirghisorum* and *Ephedra intermedia* (each 10% cover), forming the upper layer of the shrub stratum. These species are key structural and functional elements of desert foothill vegetation, offering windbreak and soil stabilization. *Ephedra equisetina* (5%) and *Convolvulus tragacanthoides* (5%) further contribute to the woody component, occupying inter-shrub spaces and rocky outcrops.

Subshrubs such as *Krascheninnikovia ceratoides*, *Kochia prostrata*, and *Zygophyllum obliquum* are scattered but ecologically significant, stabilizing the loose stony soils and indicating a *Chenopodiaceae-Artemisia* type alliance. The presence of *Artemisia dracunculus* and *Peganum harmala*, though with minimal cover, enriches the phytochemical and seasonal diversity of the herbaceous layer. *Stipa glareosa*, a drought-tolerant perennial grass, appears sparsely (1%) and likely plays a minor role in biomass contribution but supports early-season forage availability.

This floristic assemblage lacks rare or endemic elements but reflects a stable, well-adapted vegetation unit shaped by strong edaphic (soil-related) and climatic constraints. The dominance of nitrogen-fixing and salt-tolerant taxa highlights its resilience to degradation but also its vulnerability to overgrazing, which could reduce plant cover and accelerate erosion.



Figure 89: *Caragana kirghisorum*+*Ephedra intermedia* community

Table 59: Results of survey point P_KG25_K_P30

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	5	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Ssubshrub	5	NE	Not listed
<i>Artemisia dracunculus</i>	Perennial herb	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub (xerophyte)	+	NE	Not listed

Survey point name: P_KG25_K_P31

Vegetation community: *Clematis songorica*+*Krascheninnikovia ceratoides*

Coordinates: N42.493287 E75.830966

TPC: 40%

This plant assemblage represents a xerophytic shrub-subshrub community developed along a dry canyon bottom and its adjacent stony slopes. The vegetation structure reflects strong aridity, shallow soils, and high thermal radiation, typical of the arid foothills and dry ravine systems of Central Asia. The dominant species are *Krascheninnikovia ceratoides* and *Clematis songorica* (each 10% cover), the latter unusually prominent for a climber in such dry habitats—suggesting protected niches within rock crevices or temporary water channels. *Caragana kirghisorum*, *Ephedra intermedia*, and *Convolvulus*

tragacanthoides (each ~5%) reinforce the shrub stratum, contributing to cover continuity and microhabitat variation. These taxa are characteristic of Central Asian semideserts and contribute to soil stabilization under erosive conditions. Among the herbaceous and subshrub elements, *Artemisia schrenkiana*, *Peganum harmala*, *Anabasis tianschanica*, and *Achnatherum splendens* are sparsely present (1% or less), adding to the floristic diversity but playing a minor structural role. *Stipa glareosa*, though with low cover, marks the presence of perennial grass specialists adapted to poor, stony substrates. Notably, *Spiraea hypericifolia*, though scarce, may indicate localized pockets of deeper soil moisture or runoff accumulation in shaded microsites. Overall, this community is adapted to extreme edaphic and climatic stress, with many species exhibiting drought tolerance, deep root systems, or specialized morphologies (e.g., spinescence, small leaves). While no globally threatened species are recorded, the structural complexity and presence of diverse drought-adapted taxa suggest moderate botanical significance.



Figure 90: *Clematis songorica*+*Krascheninnikovia ceratoides* community

Table 60: Results of survey point P_KG25_K_P31

Species	Life form	PC	IUCN	Red list KG
<i>Clematis songorica</i>	Perennial climbing herb	10	NE	Not listed
<i>Krascheninnikovia ceratoides</i>	Subshrub	10	NE	Not listed
<i>Caragana kirghisorum</i>	Shrub	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	5	NE	Not listed
<i>Artemisia schrenkiana</i>	Subshrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	1	NE	Not listed
<i>Spiraea hypericifolia</i>	Shrub	+	NE	Not listed

<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Anabasis tianschanica</i>	Subshrub (xerophyte)	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	1	NE	Not listed

Survey point name: P_KG25_K_P33

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.500032 E75.821305

TPC: 20%

This arid foothill shrubland is dominated by drought-tolerant xerophytic shrubs and subshrubs characteristic of rocky, gravel-strewn substrates typical of Central Asian semi-desert slopes. The most abundant species include *Caragana kirghisorum* and *Ephedra intermedia* (each ~10% cover), forming the main framework of the shrub layer. These species are highly adapted to water scarcity, with features such as deep roots and reduced leaves, contributing to erosion control and slope stabilization. Among the minor shrubs and subshrubs, *Lycium ferocissimum*, *Convolvulus tragacanthoides*, and *Zygophyllum obliquum* are scattered throughout the area, enhancing the structural heterogeneity and reflecting the site's mixed halophytic and xerophytic influences. The herbaceous layer is represented by sparse perennials such as *Astragalus borodinii*, *Klasea procumbens*, and *Salsola australis*, contributing to floristic richness but with minimal biomass.

Grasses such as *Achnatherum splendens* and *Stipa glareosa* are present in low densities, indicating a dry steppe influence within the shrub-dominated matrix. These grasses play a secondary role in cover but are ecologically important for soil retention and potential forage. The floristic composition suggests a stable but low-productivity plant community adapted to shallow, coarse soils and intense solar radiation. No Red List species are present, and the community lacks endemic taxa.



Figure 91: *Caragana kirghisorum*+*Ephedra intermedia* community

Table 61: Results of survey point P_KG25_K_P33

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Salsola australis</i>	Annual herb	+	NE	Not listed
<i>Klasea procumbens</i>	Perennial herb	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Lycium ferocissimum</i>	Shrub	+	NE	Not listed

Survey point name: P_KG25_K_P34

Vegetation community: *Caragana kirghisorum*+*Ephedra intermedia*

Coordinates: N42.51796 E75.812134

TPC: 20%

This semi-desert shrub-grass assemblage occupies a gravelly piedmont plain at the foot of the mountain front, with sparse but ecologically resilient vegetation. The dominant woody species are *Caragana kirghisorum* and *Ephedra intermedia* (10% each), forming the structural foundation of this dry shrubland. Both are well adapted to arid conditions and shallow, rocky soils, with deep roots and drought-tolerant physiology. The herbaceous and subshrub components are floristically diverse, although individually sparse. These include *Zygophyllum obliquum*, *Convolvulus tragacanthoides*, and

Kochia prostrata, species known for their role in xeromorphic ecosystems with poor moisture retention. Subdominants like *Artemisia compacta* and *Stipa glareosa* reflect steppe elements blending into the desert flora, particularly on slightly finer soils or along micro-drainages. The presence of *Peganum harmala*, a stress-tolerant forb, contributes to the resilience and ethnobotanical relevance of the flora. Although no endemic or Red List species were identified, the composition indicates a well-adapted xerophytic plant community with moderate botanical interest, particularly for its soil stabilization role in fragile pediments and desert margins.



Figure 92. *Caragana kirghisorum*+*Ephedra intermedia* community

Table 62. Results of survey point P_KG25_K_P34

Species	Life form	PC	IUCN	Red list KG
<i>Caragana kirghisorum</i>	Shrub	10	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Peganum harmala</i>	Perennial herb	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Artemisia compacta</i>	Subshrub	+	NE	Not listed
<i>Kochia prostrata</i>	Subshrub (xerophyte)	+	NE	Not listed

Survey point name: P_KG25_K_P35

Vegetation community: *Ephedra intermedia*+ *Artemisia compacta*

Coordinates: N42.516707 E75.807322

TPC: 15%

This sparse xeromorphic shrub-steppe community develops on rocky piedmont terrain with minimal soil accumulation, dominated by highly drought-resistant species adapted to extreme edaphic and climatic conditions. The prevailing species is *Ephedra intermedia* (10% cover), a woody gymnosperm well known for its resilience to aridity and role in stabilizing gravelly soils.

Associated dominants include *Artemisia compacta* (5%), a subshrub with high drought tolerance and allelopathic potential, and minor yet ecologically important perennial grasses such as *Stipa glareosa* and *Achnatherum splendens* (each <1%). These grasses contribute to the fine root matrix, enabling minimal erosion control and indicating the beginning of grass invasion or reestablishment in desertified areas. Subordinate forbs and subshrubs include *Convolvulus tragacanthoides* and *Zygophyllum obliquum*, both typical elements of arid floras. These taxa exploit microhabitats with slightly higher moisture or finer soil texture between rocky outcrops. No species of conservation concern or endemics were recorded. However, the dominance of xerophytic shrubs and the extremely low herbaceous cover indicate a highly stress-adapted flora, likely reflecting long-term overgrazing or climatic desiccation.



Figure 93. *Ephedra intermedia*+ *Artemisia compacta* community

Table 63. Results of survey point P_KG25_K_P35

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Artemisia compacta</i>	Subshrub	5	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Perennial herb	1	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed

Survey point name: P_KG25_K_P36

Vegetation community: *Salix* sp+ *Rosa beggeriana*+ *Hippophae rhamnoides*

Coordinates: N42.531867 E75.799392

TPC: 50%

This riparian shrub-meadow complex occupies a moist, rocky canyon floor and lower slopes, forming a structurally diverse plant community with both mesophytic and xerophytic elements. The overstory is dominated by *Salix* sp. (20% cover), forming a loose canopy in wetter microsites, accompanied by co-dominant shrubs such as *Rosa beggeriana* (10%), *Hippophae rhamnoides*, and *Atraphaxis virgata* (5% each), which contribute to habitat heterogeneity and moisture buffering.

The mid-layer includes widespread xerophytic species such as *Ephedra intermedia* and *Spiraea hypericifolia*, which together with *Artemisia santolinifolia* form a transition between riparian and slope flora. The presence of *Ephedra equisetina* and *Caragana kirghisorum* in minor cover (1%) reflects the intrusion of drier slope species into the ravine. The herbaceous and graminoid layer is rich in perennial grasses such as *Achnatherum splendens*, *Phragmites australis*, and *Festuca valesiaca*, supported by *Poa bulbosa* and *Achnatherum caragana*, reflecting a mixed-mesic and semi-xeric grassland base. Annual herbs like *Alyssum desertorum*, *Strigosella stenopetala*, and *Hordeum leporinum* contribute to early spring cover, while forbs such as *Draba altaica*, *Taraxacum serotinum*, and *Potentilla orientalis* increase floristic richness and ecological amplitude. No rare or threatened species were recorded in this assemblage. However, the floristic structure suggests moderate to high botanical diversity with a complex ecological gradient from mesic riparian to rocky dry slopes. The presence of *Phragmites australis* and *Salix* sp. also indicates periodic water flow or residual moisture, which may support amphibians and pollinators seasonally.



Figure 94. *Sailx* sp+ *Rosa beggeriana*+ *Hippophae rhamnoides* community

Table 64. Results of survey point P_KG25_K_P36

Species	Life form	PC	IUCN	Red list KG
<i>Sailx</i> sp	Tree	20	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	10	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	5	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	5	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	5	NE	Not listed
<i>Atraphaxis virgata</i>	Shrub	5	NE	Not listed
<i>Phragmites australis</i>	Perennial grass	5	NE	Not listed
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Spiraea hypericifolia</i>	Shrub	5	NE	Not listed
<i>Silybum marianum</i>	Annual herb	+	LC	Not listed
<i>Ephedra equisetina</i>	Shrub	1	NE	Not listed
<i>Caragana kirgisorum</i>	Shrub	1	NE	Not listed
<i>Halimodendron halodendron</i>	Shrub	+	NE	Not listed

<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Achnatherum caragana</i>	Perennial grass	+	NE	Not listed
<i>Strigosella stenopetala</i>	Annual herb	1	NE	Not listed
<i>Potentilla orientalis</i>	Perennial herb	+	NE	Not listed
<i>Poa bulbosa</i>	Perennial grass	+	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	1	NE	Not listed
<i>Alyssum desertorum</i>	Annual herb	1	NE	Not listed
<i>Hordeum leporinum</i>	Annual grass	+	NE	Not listed
<i>Draba altaica</i>	Perennial herb	+	NE	Not listed
<i>Taraxacum serotinum</i>	Perennial herb	+	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed

Survey point name: P_KG25_K_P37

Vegetation community: *Ephedra intermedia*+ *Artemisia tianschanica*+ *Tulipa ostrowskiana*

Coordinates: N42.551437 E75.782662

TPC: 20%

This mid-montane grassland community occupies a gently undulating slope within a wide intermontane valley, reflecting a floristic transition between semi-dry subalpine steppe and rocky shrubland. The vegetation is moderately dense and herbaceous in structure, co-dominated by *Stipa glareosa*, *Ephedra intermedia*, and *Artemisia tianschanica* (each with 5% cover), which provide stability in the dry, skeletal soil and confer drought resilience. The presence of *Tulipa ostrowskiana*—a Near Threatened (NT) species globally and classified as Vulnerable (VU) in the Kyrgyz Red List—is of significant conservation interest. Its relatively high projective cover (5%) indicates that this location may serve as a reproductive core area for this geophyte, likely benefiting from favorable soil moisture and snow retention during early spring.

Supporting taxa such as *Convolvulus tragacanthoides*, *Artemisia santolinifolia*, and *Achnatherum splendens* are widely distributed but sparse, while *Hippophae rhamnoides* and *Astragalus borodini* represent scattered shrub and forb elements contributing to floristic diversity and pollinator support. The geophyte *Allium oreoprasum* and localized herb *Euphorbia alata* further increase species richness within microhabitats. Although no endemic taxa were identified, the coexistence of meso-xerophytic perennials and a Kyrgyz Red List species underscores the moderate conservation value of this community. Management should consider regulating grazing intensity in the early growing season to safeguard bulbous species such as *Tulipa ostrowskiana* during flowering and seed-setting phases.



Figure 95. *Ephedra intermedia*+ *Artemisia tianschanica*+ *Tulipa ostrowskiana* community

Table 65. Results of survey point P_KG25_K_P37

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	5	LC	Not listed
<i>Artemisia tianschanica</i>	Subshrub	5	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	5	NT	VU- Vulnerable
<i>Stipa glareosa</i>	Perennial grass	5	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	+	NE	Not listed
<i>Achnatherum splendens</i>	Subshrub	+	NE	Not listed
<i>Artemisia santolinifolia</i>	Subshrub	+	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed
<i>Euphorbia alata</i>	Perennial herb	+	NE	Not listed
<i>Allium oreoprasum</i>	Perennial geophyte (bulb)	+	NE	Not listed

Survey point name: P_KG25_K_P38

Vegetation community: *Ephedra intermedia*+ *Artemisia tianschanica*+ *Tulipa ostrowskiana*

Coordinates: N42.547201 E75.788043

TPC: 20%

This subalpine slope grassland forms a sparsely vegetated mosaic across rocky and shallow soils, indicative of cold, wind-exposed ridges in the upper montane to subnival transition zone. The vegetation structure is predominantly herbaceous with scattered dwarf shrubs. The community is anchored by *Ephedra intermedia* (10% cover) and *Artemisia tianschanica* (5%), both of which exhibit traits suited to harsh, xeric conditions and contribute significantly to slope stabilization and microhabitat complexity. The geophyte *Tulipa ostrowskiana*, a species of international conservation concern (Near Threatened globally, Vulnerable in Kyrgyzstan), occurs with notable frequency (5%), forming bright seasonal patches during its blooming period. Its distribution here suggests the site supports adequate spring moisture and limited disturbance, offering suitable refuge for bulb regeneration. Accompanying species such as *Stipa glareosa*, *Achnatherum splendens*, and *Carex pseudofetida* comprise the sparse grass-sedge matrix, while forbs like *Astragalus borodinii* and *Androsace ovczinnikovii* enhance the alpine floristic character. These species reflect a mix of cold-tolerant and stress-adapted taxa, contributing to biodiversity under resource-limited conditions. The absence of endemics is offset by the presence of a Red List species (*Tulipa ostrowskiana*) and the site's potential as a key phenological zone for alpine geophytes. Continued monitoring is recommended, especially for grazing impacts and climate-induced phenological shifts that may affect bulbous species' viability.



Figure 96. *Ephedra intermedia*+ *Artemisia tianschanica*+ *Tulipa ostrowskiana* community

Table 66: Results of survey point P_KG25_K_P38

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Artemisia tianschanica</i>	Subshrub	5	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	5	Near Threatened	VU-Vulnerable
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Androsace ovczinnikovii</i>	Perennial herb	+	NE	Not listed
<i>Carex pseudofoetida</i>	Perennial sedge	1	NE	Not listed
<i>Achnatherum splendens</i>	Perennial grass	+	NE	Not listed
<i>Astragalus borodinii</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P39

Vegetation community: *Ephedra intermedia*+ *Caragana kirgisorum*

Coordinates: N42.562848 E75.779994

TPC: 25%

This rocky, red-soil slope supports a structurally diverse montane shrub-steppe community dominated by woody and semi-woody elements. The shrub *Ephedra intermedia* (15% cover) is ecologically dominant, forming a dense xerophytic matrix across exposed ridgelines. Secondary shrubs include *Caragana kirgisorum* and *Rosa beggeriana* (5% and +, respectively), contributing to habitat heterogeneity and resilience under arid slope conditions. Subshrubs such as *Convolvulus tragacanthoides*, *Artemisia tenuisecta*, and *Spiraea hypericifolia* (1–5%) form a mid-layer adapted to shallow, stony soils, with *Hippophae rhamnoides* occurring sporadically along moisture-retaining microsites. The grass layer is represented by *Stipa glareosa* and *Stipa caucasica*, which form clumps on rock ledges and assist with soil stabilization and seed retention. Of particular botanical interest is the occurrence of *Tulipa ostrowskiana*, a geophyte listed as *Near Threatened* globally and *Vulnerable* on the Kyrgyz Red List. Though scattered (+% cover), its presence highlights the site's seasonal conservation value, particularly during spring flowering. Overall, this community represents a mid-elevation shrub-grass mosaic on eroded lithosols, with a high proportion of drought-adapted species and floristic indicators of spring moisture pulses.



Figure 97. *Ephedra intermedia*+ *Caragana kirgisorum* community

Table 67: Results of survey point P_KG25_K_P39

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	15	LC	Not listed
<i>Caragana kirgisorum</i>	Shrub	5	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	5	NE	Not listed
<i>Stipa caucasica</i>	Perennial grass	+	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	1	NE	Not listed
<i>Rosa beggeriana</i>	Shrub	+	NE	Not listed
<i>Hippophae rhamnoides</i>	Shrub	+	NE	Not listed
<i>Spiraea hypericifolia</i>	Shrub	1	NE	Not listed
<i>Artemisia tenuisecta</i>	Subshrub	1	NE	Not listed
<i>Tulipa ostrowskiana</i>	Perennial geophyte (bulb)	+	Near Threatened	VU-Vulnerable

Survey point name: P_KG25_K_P40

Vegetation community: *Ephedra intermedia*+ *Caragana kirgisorum*

Coordinates: N42.558146 E75.780598

TPC: 25%

This steep montane slope supports a resilient grass-dominated community characteristic of mesic upper catchments and cool north-facing exposures. The herbaceous layer is strongly represented by perennial grasses, including *Festuca polesica*, *Stipa glareosa*, and *Festuca valesiaca* (5–1% cover), forming a dense sod that plays a crucial role in slope stabilization and soil protection. The presence of *Nassella trichotoma*, although minor in cover (1%), may suggest early successional processes or disturbance influence. The subshrub layer includes *Artemisia tenuisecta* and *Convolvulus tragacanthoides*, both adapted to rocky, shallow soils and dry seasonal conditions. The shrub *Ephedra intermedia* (10%) provides a xerophytic canopy element and contributes significantly to the physiognomy of the site, particularly in wind-exposed or rocky patches. Geophytes such as *Allium oreoprasum* and sedges like *Carex pseudofetida* occur with low cover but add ecological diversity and indicate cooler microhabitats or transient moisture availability in spring. This plant community represents a moderately species-rich highland grass-shrub association with no Red List or endemic species recorded. The floristic composition reflects seasonal snowmelt influence and high grazing tolerance.



Figure 98. *Ephedra intermedia*+ *Caragana kirgisorum* community

Table 68: Results of survey point P_KG25_K_P40

Species	Life form	PC	IUCN	Red list KG
<i>Ephedra intermedia</i>	Shrub	10	LC	Not listed
<i>Festuca polesic</i>	Perennial grass	5	NE	Not listed
<i>Stipa glareosa</i>	Perennial grass	5	NE	Not listed
<i>Artemisia tenuisecta</i>	Subshrub	5	NE	Not listed
<i>Allium oreoprasum</i>	Perennial geophyte (bulb)	+	NE	Not listed
<i>Convolvulus tragacanthoides</i>	Subshrub	1	NE	Not listed
<i>Nassella trichotoma</i>	Perennial grass	1	NE	Not listed
<i>Carex pseudofoetida</i>	Perennial sedge	1	NE	Not listed
<i>Festuca valesiaca</i>	Perennial grass	+	NE	Not listed

Survey point name: P_KG25_K_P41

Vegetation community: *Ephemeral herbs*

Coordinates: N42.691869 E75.827064

TPC: 20%

This high-altitude mesic grassland is located on a wide alpine saddle, where gradual slopes and seasonal moisture accumulation favor a productive and floristically balanced vegetation cover. The herbaceous layer is dominated by *Poa pratensis*, *Festuca valesiaca*, and *Carex stenophylloides* (each with 5% cover), forming a dense turf adapted to short growing seasons and cool soil conditions. These species are indicative of stable, long-established subalpine grassland ecosystems. Subshrubs such as *Artemisia tianschanica* and *Zygophyllum obliquum* contribute to structural heterogeneity, particularly in drier microsites and rocky patches. The perennial forbs *Achillea millefolium*, *Convolvulus arvensis*, and *Draba cana* enhance the site's botanical diversity and phenological dynamics during the spring bloom. The presence of *Bothriochloa ischaemum*, although sparse, suggests some tolerance to moderate disturbance or edge influence. No Red List or endemic species were observed, but the vegetation composition reflects high resilience and ecological value due to its turf-forming perennial grasses and seasonally diverse forb component.

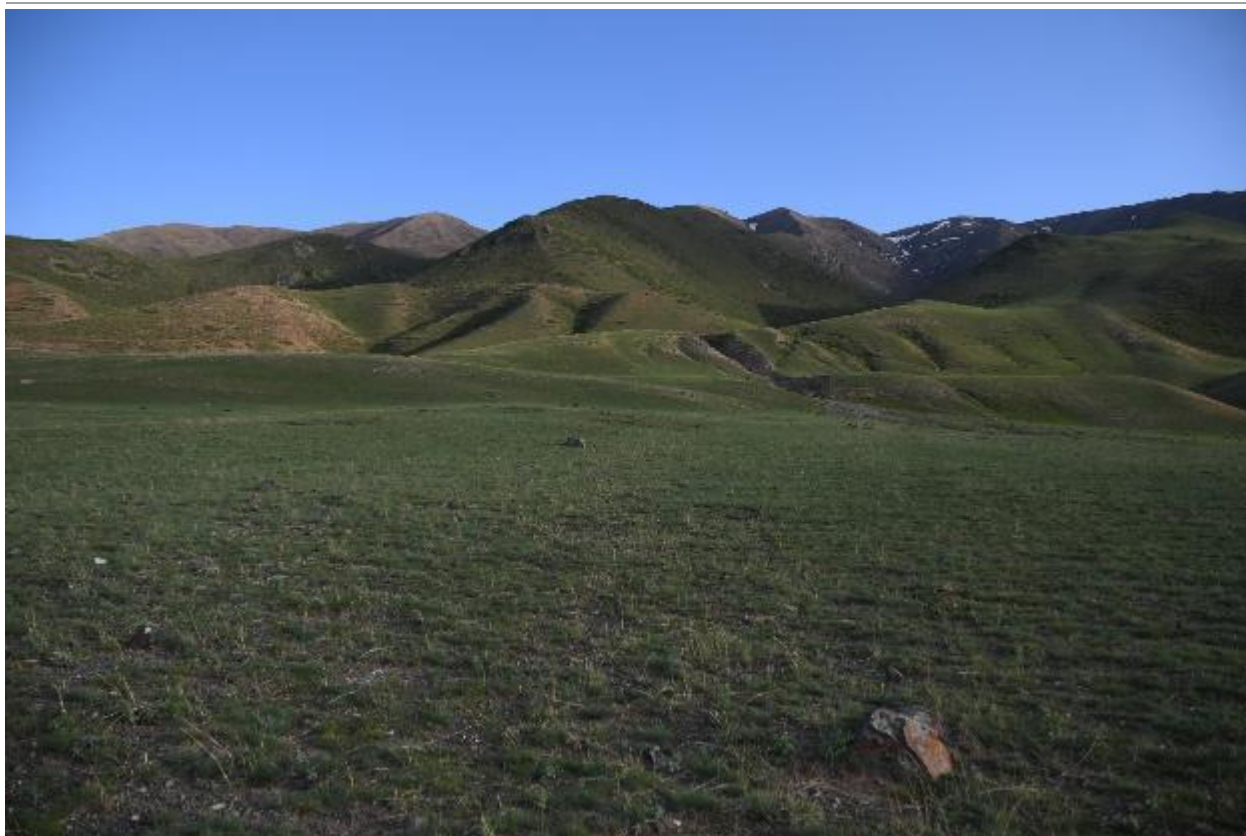


Figure 99. Ephemeral herbs community

Table 69: Results of survey point P_KG25_K_P41

Species	Life form	PC	IUCN	Red list KG
<i>Poa pratensis</i>	Perennial grass	5	LC	Not listed
<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Carex stenophylloides</i>	Perennial sedge	5	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	5	NE	Not listed
<i>Convolvulus arvensis</i>	Perennial herb (climbing)	+	LC	Not listed
<i>Bothriochloa ischaemum</i>	Perennial grass	+	NE	Not listed
<i>Achillea millefolium</i>	Perennial herb	+	LC	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Draba cana</i>	Perennial herb	+	NE	Not listed

Survey point name: P_KG25_K_P42

Vegetation community: Ephemeral herbs

Coordinates: N42.688536 E75.817317

TPC: 20%

This well-developed mesophytic grassland occurs on a gently sloping upper terrace, characterized by uniform topography and moderate moisture retention from spring melt. The community structure is dominated by a dense matrix of perennial grasses including *Poa pratensis*, *Festuca valesiaca*, and *Carex stenophylloides* (each 5% cover), reflecting a stable and resilient subalpine turf. These species are indicative of high pasture quality and are commonly associated with well-managed seasonal grazing zones. The subshrub *Artemisia tianschanica* provides additional structure and ecological function,

enhancing resistance to wind erosion and drought. Scattered individuals of *Bothriochloa ischaemum*, *Stipa glareosa*, and *Zygophyllum obliquum* signal transitions to drier microhabitats on adjacent slopes. The herbaceous layer is enriched by a diverse array of forbs and geophytes such as *Draba cana*, *Astragalus mollissimus*, *Euphorbia ferganensis*, and *Gagea lutea*, which add seasonal color and play a role in pollinator support. The presence of *Neotorularia korolkowii*, a short-lived annual or biennial crucifer, suggests some ecological openness and recent surface disturbance, possibly from light trampling or seasonal soil movement. No Kyrgyz endemic or IUCN-listed threatened species were recorded at the site, but the floristic richness and dominance of productive turf-forming grasses imply good conservation value.



Figure 100: Ephemeral herbs community

Table 70: Results of survey point P_KG25_K_P42

Species	Life form	PC	IUCN	Red list KG
<i>Poa pratensis</i>	Perennial grass	5	LC	Not listed
<i>Festuca valesiaca</i>	Perennial grass	5	NE	Not listed
<i>Carex stenophylloides</i>	Perennial sedge	5	NE	Not listed
<i>Artemisia tianschanica</i>	Subshrub	5	NE	Not listed
<i>Bothriochloa ischaemum</i>	Perennial grass	+	NE	Not listed
<i>Zygophyllum obliquum</i>	Subshrub	+	NE	Not listed
<i>Draba cana</i>	Perennial herb	+	NE	Not listed
<i>Euphorbia ferganensis</i>	Perennial herb	+	NE	Not listed
<i>Gagea lutea</i>	Perennial geophyte (bulb)	+	NE	Not listed
<i>Astragalus mollissimus</i>	Perennial herb	+	NE	Not listed

Species	Life form	PC	IUCN	Red list KG
<i>Stipa glareosa</i>	Perennial grass	+	NE	Not listed
<i>Neotorularia korolkowii</i>	Annual or biennial herb	+	NE	Not listed

4 Discussion: Human Disturbance and Grazing Pressure in the OHTL Corridor Buffer Zones

The vegetation survey conducted within the 500 m buffer of the Overhead Transmission Line (OHTL) corridor reveals a landscape that, while ecologically diverse, is significantly shaped by human land use, particularly domestic livestock grazing. The most pronounced signs of disturbance were observed in Montane Steppe Grasslands and Rangeland (Mountain) habitats, which together cover over 35% of the study area. These areas exhibited clear indicators of intensive and repeated grazing by sheep and cattle, supported by direct photographic evidence of livestock presence and grazing activity.

Field observations documented vegetation degradation in many of these zones, including trampling, soil compaction, and selective removal of palatable species. Plant species such as *Stipa capillata*, *Festuca valesiaca*, and *Poa bulbosa*—all known to be preferred by livestock—were often observed in grazed or partially consumed states. In contrast, disturbance-tolerant and grazing-resistant taxa, including *Artemisia terrae-albae*, *Acantholimon alatavicum*, and *Cousinia* spp., were frequently dominant in sites exhibiting chronic grazing pressure, indicating a shift in community composition favoring resilient forms over sensitive perennials and palatable forbs.

In Rangeland and Stony Foothill Arid Steppe zones, grazing impact was further evidenced by the presence of patchy vegetation cover, exposed soil, and a relative increase in unpalatable or secondary colonizer species such as *Anabasis brachiata* and *Haloxylon persicum*. These patterns suggest that vegetation structure and productivity have been moderately to heavily altered in several areas of the corridor, particularly near settlements or traditional livestock routes. While some habitats—such as Rocky Outcrop Shrubland and Scree Slopes—remain relatively intact due to their inaccessibility, even these zones occasionally show signs of edge disturbance, such as livestock trails or nutrient enrichment from dung deposition.

Notably, alien or invasive species were not a dominant component of the surveyed flora, suggesting that while grazing-induced alteration is significant, it has not yet crossed thresholds that would lead to widespread biotic homogenization. However, the increasing pressure, particularly in more accessible montane grasslands, could degrade native plant communities further if unmanaged.

In summary, the overall level of human disturbance across the OHTL buffer zone can be characterized as moderate to high, with clear spatial variation driven by topography, accessibility, and land use intensity. The vegetation communities reflect a gradient from relatively undisturbed semi-natural habitats (e.g., riparian forests, cliffs) to heavily modified rangelands, with composition increasingly dominated by resilient or unpalatable taxa. These findings underscore the need for targeted grazing management and restoration measures to maintain ecological integrity in this sensitive infrastructure corridor.

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Appendix A. Species pictures



Figure 101. *Neotrinia splendens* (Trin.) M. Nobis, P. Gudkova et A. Nowak (*Achnatherum splendens* (Trin.) Nevski) N42.697838 E75.810434 (**P_KG25_K_P1**)



Figure 102. *Euphorbia ferganensis* B. Fedtsch.
N42.697838 E75.810434 (**P_KG25_K_P1**)



Figure 103. *Erodium cicutarium* (L.) L'Hér.
N42.694195 E75.80199 (**P_KG25_K_P2**)



Figure 104. *Taraxacum erythrospermum* Andr. ex Besser
N42.694195 E75.80199 (**P_KG25_K_P2**)



Figure 105. *Rosa beggeriana* Schrenk
N42.694195 E75.80199 (P_KG25_K_P2)



Figure 106. *Artemisia tenuisecta* Nevski
N42.694195 E75.80199 (P_KG25_K_P2)



Figure 107. *Amygdalus petunnikowii* Litv.
N42.694195 E75.80199 (**P_KG25_K_P2**)



Figure 108. *Draba altaica* (C.A. Mey.) Bunge
N42.694195 E75.80199 (**P_KG25_K_P2**)



Figure 109. *Scorzonera circumflexa* Krasch. & Lipsch.
N42.688276 E75.792508 (**P_KG25_K_P3**)



Figure 110. *Tulipa ostrowskiana* Regel
N42.683572 E75.790994 (Near the **P_KG25_K_P3**)



Figure 111. *Rosa alberti* Regel
N42.677875 E75.782769 (P_KG25_K_P4)



Figure 112. *Draba huetii* Boiss.
N42.677875 E75.782769 (P_KG25_K_P4)



Figure 113. *Eritrichium villosum* (Ledeb.) Bunge
N42.671899 E75.764108 (P_KG25_K_P5)



Figure 114. *Eremostachys isochila* Pazij & Vved.
N42.649936 E75.756582 (P_KG25_K_P6)



Figure 115. *Taraxacum serotinum* (Waldst. & Kit.) Poir.
N42.649936 E75.756582 (P_KG25_K_P6)



Figure 116. *Tulipa tarda* Stapf
N42.649936 E75.756582 (P_KG25_K_P6)



Figure 117. *Onosma dichroantha* Boiss.
N42.649936 E75.756582 (P_KG25_K_P6)



Figure 118. *Artemisia tenuisecta* Nevski
N42.649936 E75.756582 (P_KG25_K_P6)



Figure 119. *Gagea lutea* (L.) Ker Gawl.
N42.644238 E75.75233 (P_KG25_K_P7)



Figure 120. *Juniperus sabina* L.
N42.644238 E75.75233 (P_KG25_K_P7)



Figure 121. *Rhodiola linearifolia* Boriss.
N42.638145 E75.761305 (P_KG25_K_P8)



Figure 122. *Iris loczyi* Kanitz
N42.62213 E75.771283 (P_KG25_K_P12)



Figure 123. *Chorispora sibirica* (L.) DC.
N42.609877 E75.774801 (P_KG25_K_P13)



Figure 124. *Juniperus semiglobosa* Regel
N42.609877 E75.774801 (P_KG25_K_P13)



Figure 125. *Euphorbia alatavica* Boiss.
N42.609877 E75.774801 (P_KG25_K_P13)



Figure 126. *Astragalus mollissimus* Torr.
N42.609877 E75.774801 (P_KG25_K_P13)



Figure 127. *Astragalus borodinii* Krasn.
N42.604774 E75.781356 (**P_KG25_K_P14**)



Figure 128. *Anabasis tianschanica* Botsch.
N42.593136 E75.785602 (**P_KG25_K_P16**)



Figure 129. *Draba cana* Rydb.
N42.593136 E75.785602 (P_KG25_K_P16)



Figure 130. *Orostachys thyrsiflora* Fisch.
N42.593136 E75.785602 (P_KG25_K_P17)



Figure 131. *Spiraea hypericifolia* L.
N42.577142 E75.777351 (**P_KG25_K_P19**)



Figure 132. *Convolvulus tragacanthoides* Turcz.
N42.583241 E75.782292 (**P_KG25_K_P18**)



Figure 133. *Klasea procumbens* (Regel) Holub
N42.583241 E75.782292 (P_KG25_K_P18)



Figure 134. *Tulipa zenaidae*
N42.577142 E75.777351 (P_KG25_K_P19)



Figure 135. *Neotorularia korolkowii* (Regel & Schmalh.) Hedge & J. Leonard
N42.577142 E75.777351 (P_KG25_K_P19)



Figure 136. *Goniolimon cuspidatum* Gamajun.
N42.577142 E75.777351 (P_KG25_K_P19)



Figure 137. *Caragana kirghisorum* Pojark.
N42.470716 E76.054401 (P_KG25_K_P26)



Figure 138. *Artemisia schrenkiana* Ledeb.
N42.46996 E76.046063(P_KG25_K_P27)



Figure 139. *Allium oreoprasum* Schrenk
N42.551437 E75.782662 (P_KG25_K_P37)



Figure 140. *Androsace ovczinnikovii* Schischk. & Bobrov
N42.547201 E75.788043 (P_KG25_K_P38)

Appendix B Floristic list of the study area

Family	Genus	Species
<i>Amaranthaceae</i>	<i>Anabasis</i>	<i>Anabasis tianschanica</i>
<i>Amaranthaceae</i>	<i>Chenopodium</i>	<i>Chenopodium album</i>
<i>Amaranthaceae</i>	<i>Dysphania</i>	<i>Chenopodium botrys</i>
<i>Amaranthaceae</i>	<i>Halogeton</i>	<i>Halogeton glomeratus</i>
<i>Amaranthaceae</i>	<i>Kalidium</i>	<i>Kalidium caspicum</i>
<i>Amaranthaceae</i>	<i>Bassia</i>	<i>Kochia prostrata</i>
<i>Amaranthaceae</i>	<i>Krascheninnikovia</i>	<i>Krascheninnikovia ceratoides</i>
<i>Amaranthaceae</i>	<i>Salsola</i>	<i>Salsola australis</i>
<i>Amaranthaceae</i>	<i>Oreosalsola</i>	<i>Salsola montana</i>
<i>Amaranthaceae</i>	<i>Sympegma</i>	<i>Sympegma regelii</i>
<i>Amaryllidaceae</i>	<i>Allium</i>	<i>Allium montanum</i>
<i>Amaryllidaceae</i>	<i>Allium</i>	<i>Allium oreoprasum</i>
<i>Apiaceae</i>	<i>Bupleurum</i>	<i>Bupleurum falcatum</i>
<i>Apiaceae</i>	<i>Hymenidium</i>	<i>Hymenolaena nana</i>
<i>Asparagaceae</i>	<i>Asparagus</i>	<i>Asparagus neglectus</i>
<i>Asteraceae</i>	<i>Achillea</i>	<i>Achillea millefolium</i>
<i>Asteraceae</i>	<i>Achillea</i>	<i>Achillea wilhelmsii</i>
<i>Asteraceae</i>	<i>Leuzea</i>	<i>Acroptilon australe</i>
<i>Asteraceae</i>	<i>Alfredia</i>	<i>Alfredia nivea</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia compacta</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia dracunculus</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia rhodatha</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia santolinifolia</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia schrenkiana</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia sieversiana</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia tenuisecta</i>
<i>Asteraceae</i>	<i>Artemisia</i>	<i>Artemisia tianschanica</i>
<i>Asteraceae</i>	<i>Aster</i>	<i>Aster canescens</i>
<i>Asteraceae</i>	<i>Carduus</i>	<i>Carduus acanthoides</i>
<i>Asteraceae</i>	<i>Centaurea</i>	<i>Centaurea depressa</i>
<i>Asteraceae</i>	<i>Centaurea</i>	<i>Centaurea squarrosa</i>
<i>Asteraceae</i>	<i>Chondrilla</i>	<i>Chondrilla juncea</i>
<i>Asteraceae</i>	<i>Cirsium</i>	<i>Cirsium esculentum</i>
<i>Asteraceae</i>	<i>Cirsium</i>	<i>Cirsium incanum</i>
<i>Asteraceae</i>	<i>Galatella</i>	<i>Galatella coriacea</i>

Family	Genus	Species
Asteraceae	<i>Pentanema</i>	<i>Inula caspica</i>
Asteraceae	<i>Klasea</i>	<i>Klasea procumbens</i>
Asteraceae	<i>Lactuca</i>	<i>Lactuca saligna</i>
Asteraceae	<i>Lactuca</i>	<i>Lactuca tatarica</i>
Asteraceae	<i>Onopordum</i>	<i>Onopordum acanthium</i>
Asteraceae	<i>Onopordum</i>	<i>Onopordum illyricum</i>
Asteraceae	<i>Pilosella</i>	<i>Pilosella procera</i>
Asteraceae	<i>Gelasia</i>	<i>Scorzonera circumflexa</i>
Asteraceae	<i>Scorzonera</i>	<i>Scorzonera inconspicua</i>
Asteraceae	<i>Silybum</i>	<i>Silybum marianum</i>
Asteraceae	<i>Sonchus</i>	<i>Sonchus paluster</i>
Asteraceae	<i>Taraxacum</i>	<i>Taraxacum erythrospermum</i>
Asteraceae	<i>Taraxacum</i>	<i>Taraxacum officinale</i>
Asteraceae	<i>Taraxacum</i>	<i>Taraxacum serotinum</i>
Asteraceae	<i>Tussilago</i>	<i>Tussilago farfara</i>
Balsaminaceae	<i>Impatiens</i>	<i>Impatiens parviflora</i>
Berberidaceae	<i>Berberis</i>	<i>Berberis sphaerocarpa</i>
Boraginaceae	<i>Eritrichium</i>	<i>Eritrichium villosum</i>
Boraginaceae	<i>Onosma</i>	<i>Onosma dichroantha</i>
Boraginaceae	<i>Rochelia</i>	<i>Rochelia retorta</i>
Brassicaceae	<i>Alyssum</i>	<i>Alyssum desertorum</i>
Brassicaceae	<i>Chorisporea</i>	<i>Chorisporea sibirica</i>
Brassicaceae	<i>Draba</i>	<i>Draba altaica</i>
Brassicaceae	<i>Draba</i>	<i>Draba cana</i>
Brassicaceae	<i>Draba</i>	<i>Draba huetii</i>
Brassicaceae	<i>Rudolf-kamelinia</i>	<i>Neotorularia korolkowii</i>
Brassicaceae	<i>Sinapis</i>	<i>Sinapis arvensis</i>
Brassicaceae	<i>Strigosella</i>	<i>Strigosella stenopetala</i>
Convolvulaceae	<i>Convolvulus</i>	<i>Convolvulus arvensis</i>
Convolvulaceae	<i>Convolvulus</i>	<i>Convolvulus tragacanthoides</i>
Crassulaceae	<i>Orostachys</i>	<i>Orostachys thyrsoiflora</i>
Crassulaceae	<i>Rhodiola</i>	<i>Rhodiola linearifolia</i>
Crassulaceae	<i>Rosularia</i>	<i>Rosularia glabra</i>
Crassulaceae	<i>Rosularia</i>	<i>Rosularia sp.</i>
Cupressaceae	<i>Juniperus</i>	<i>Juniperus sabina</i>
Cupressaceae	<i>Juniperus</i>	<i>Juniperus semiglobosa</i>
Cyperaceae	<i>Carex</i>	<i>Carex chordorrhiza</i>

Family	Genus	Species
Cyperaceae	Carex	Carex pachystylis
Cyperaceae	Carex	Carex pseudofoetida
Cyperaceae	Carex	Carex stenocarpa
Cyperaceae	Carex	Carex stenophylloides
Cyperaceae	Carex	Carex turkestanica
Cyperaceae	Carex	Kobresia capilliformis
Cyperaceae	Carex	Kobresia stenocarpa
Elaeagnaceae	Elaeagnus	Elaeagnus angustifolia
Elaeagnaceae	Hippophae	Hippophae rhamnoides
Elaeagnaceae	Hippophae	Hippophae turkestanica
Ephedraceae	Ephedra	Ephedra distachya
Ephedraceae	Ephedra	Ephedra equisetina
Ephedraceae	Ephedra	Ephedra intermedia
Euphorbiaceae	Euphorbia	Euphorbia alataavica
Euphorbiaceae	Euphorbia	Euphorbia ferganensis
Fabaceae	Astragalus	Astragalus borodini
Fabaceae	Astragalus	Astragalus mollissimus
Fabaceae	Astragalus	Astragalus sieversianus
Fabaceae	Caragana	Caragana aurantiaca
Fabaceae	Caragana	Caragana kirghisorum
Fabaceae	Caragana	Caragana laeta
Fabaceae	Caragana	Caragana leucophloea
Fabaceae	Glycyrrhiza	Glycyrrhiza soongorica
Fabaceae	Caragana	Halimodendron halodendron
Fabaceae	Oxytropis	Oxytropis macrocarpa
Fabaceae	Sophora	Pseudosophora alopecuroides
Fabaceae	Thermopsis	Thermopsis turkestanica
Gentianaceae	Gentianella	Gentiana turkestanorum
Geraniaceae	Erodium	Erodium cicutarium
Iridaceae	Crocus	Crocus alataavicus
Iridaceae	Iris	Iris loczyi
Juncaceae	Juncus	Juncus articulatus
Lamiaceae	Phlomis	Eremostachys isochila
Lamiaceae	Lagochilus	Lagochilus platyacanthus
Lamiaceae	Mentha	Mentha asiatica
Lamiaceae	Salvia	Perovskia abrotanoides
Lamiaceae	Salvia	Salvia aethiopis

Family	Genus	Species
Lamiaceae	Scutellaria	Scutellaria przewalskii
Lamiaceae	Sideritis	Sideritis montana
Liliaceae	Gagea	Gagea lutea
Liliaceae	Tulipa	Tulipa zenaidae
Liliaceae	Tulipa	Tulipa ostrowskiana
Liliaceae	Tulipa	Tulipa tarda
Nitrariaceae	Nitraria	Nitraria sibirica
Papaveraceae	Glaucium	Glaucium fimbrilligerum
Papaveraceae	Glaucium	Glaucium squamigerum
Plantaginaceae	Plantago	Plantago depressa
Plantaginaceae	Plantago	Plantago lanceolata
Plantaginaceae	Plantago	Plantago minuta
Plantaginaceae	Veronica	Veronica longifolia
Plumbaginaceae	Gonolimon	Gonolimon cuspidatum
Poaceae	Stipa	Achnatherum caragana
Poaceae	Neotrinia	Achnatherum splendens
Poaceae	Aegilops	Aegilops squarrosa
Poaceae	Aeluropus	Aeluropus littoralis
Poaceae	Bothriochloa	Bothriochloa ischaemum
Poaceae	Cynodon	Cynodon dactylon
Poaceae	Enneapogon	Enneapogon borealis
Poaceae	Festuca	Festuca polesic
Poaceae	Festuca	Festuca valesiaca
Poaceae	Hordeum	Hordeum brevisubulatum
Poaceae	Hordeum	Hordeum leporinum
Poaceae	Koeleria	Koeleria gracilis
Poaceae	Nassella	Nassella trichotoma
Poaceae	Phleum	Phleum alpinum
Poaceae	Phragmites	Phragmites australis
Poaceae	Poa	Poa bulbosa
Poaceae	Poa	Poa pratensis
Poaceae	Ptilagrostis	Ptilagrostis mongholica
Poaceae	Setaria	Setaria viridis
Poaceae	Stipa	Stipa capillata
Poaceae	Stipa	Stipa caucasica
Poaceae	Stipa	Stipa glareosa
Poaceae	Stipa	Stipa orientalis

Family	Genus	Species
<i>Polygonaceae</i>	<i>Atraphaxis</i>	<i>Atraphaxis virgata</i>
<i>Polygonaceae</i>	<i>Polygonum</i>	<i>Polygonum rupestre</i>
<i>Polygonaceae</i>	<i>Bistorta</i>	<i>Polygonum viviparum</i>
<i>Polygonaceae</i>	<i>Rumex</i>	<i>Rumex pamiricus</i>
<i>Primulaceae</i>	<i>Androsace</i>	<i>Androsace ovczinnikovii</i>
<i>Primulaceae</i>	<i>Androsace</i>	<i>Androsace septentrionalis</i>
<i>Ranunculaceae</i>	<i>Ceratocephala</i>	<i>Ceratocephala testiculata</i>
<i>Ranunculaceae</i>	<i>Clematis</i>	<i>Clematis orientalis</i>
<i>Ranunculaceae</i>	<i>Clematis</i>	<i>Clematis songorica</i>
<i>Ranunculaceae</i>	<i>Ranunculus</i>	<i>Ranunculus natans</i>
<i>Rosaceae</i>	<i>Prunus</i>	<i>Cerasus tianschanica</i>
<i>Rosaceae</i>	<i>Crataegus</i>	<i>Crataegus pontica</i>
<i>Rosaceae</i>	<i>Crataegus</i>	<i>Crataegus korolkowii</i>
<i>Rosaceae</i>	<i>Filipendula</i>	<i>Filipendula vulgaris</i>
<i>Rosaceae</i>	<i>Malus</i>	<i>Malus sieversii</i>
<i>Rosaceae</i>	<i>Potentilla</i>	<i>Potentilla arenaria</i>
<i>Rosaceae</i>	<i>Sibbaldianthe</i>	<i>Potentilla orientalis</i>
<i>Rosaceae</i>	<i>Rosa</i>	<i>Rosa alberti</i>
<i>Rosaceae</i>	<i>Rosa</i>	<i>Rosa beggeriana</i>
<i>Rosaceae</i>	<i>Spiraea</i>	<i>Spiraea hypericifolia</i>
<i>Salicaceae</i>	<i>Salix</i>	<i>Salix blakii</i>
<i>Salicaceae</i>	<i>Salix</i>	<i>Salix gmelinii</i>
<i>Sapindaceae</i>	<i>Acer</i>	<i>Acer semenovii</i>
<i>Scrophulariaceae</i>	<i>Verbascum</i>	<i>Verbascum songaricum</i>
<i>Scrophulariaceae</i>	<i>Verbascum</i>	<i>Verbascum virgatum</i>
<i>Solanaceae</i>	<i>Lycium</i>	<i>Lycium dasystemum</i>
<i>Solanaceae</i>	<i>Lycium</i>	<i>Lycium ferocissimum</i>
<i>Solanaceae</i>	<i>Lycium</i>	<i>Lycium ruthenicum</i>
<i>Tamaricaceae</i>	<i>Myricaria</i>	<i>Myricaria bracteata</i>
<i>Tamaricaceae</i>	<i>Reaumuria</i>	<i>Reaumuria songarica</i>
<i>Tamaricaceae</i>	<i>Tamarix</i>	<i>Tamarix ramosissima</i>
<i>Tetradiclidaceae</i>	<i>Peganum</i>	<i>Peganum harmala</i>
<i>Zygophyllaceae</i>	<i>Zygophyllum</i>	<i>Zygophyllum obliquum</i>
<i>Zygophyllaceae</i>	<i>Zygophyllum</i>	<i>Zygophyllum rosowii</i>

Appendix C

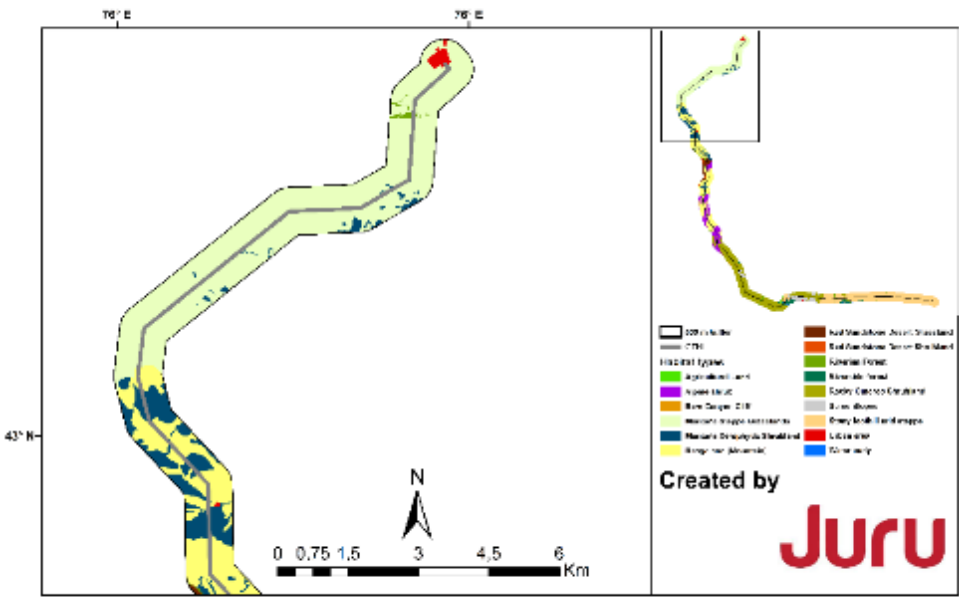


Figure 141. Habitat types of the 500 m Buffer Zone along the OHTL Corridor (1-17 km of OHTL line)

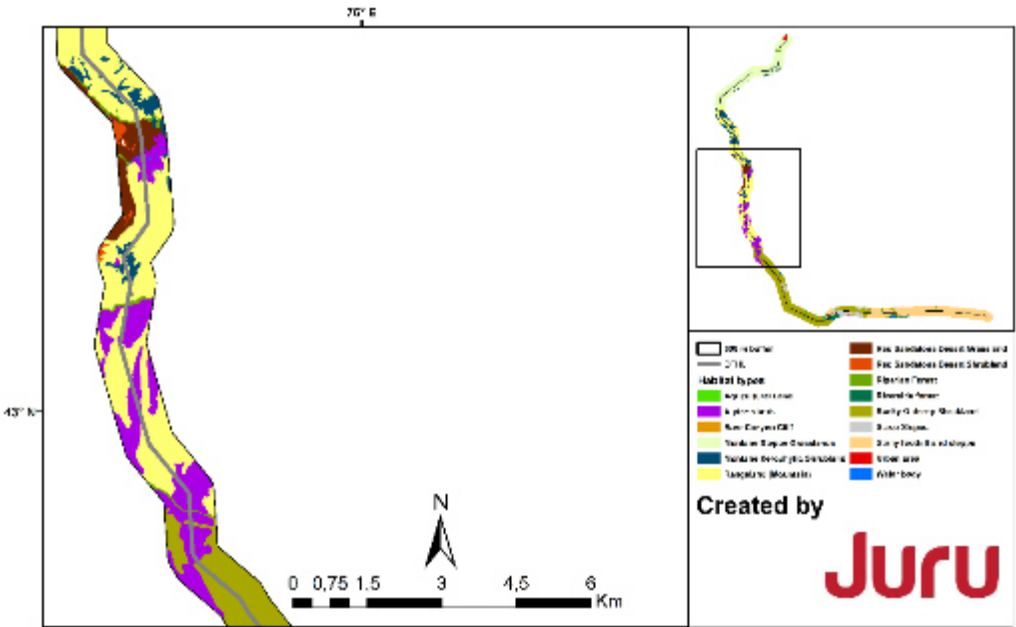


Figure 142. Habitat types of the 500 m Buffer Zone along the OHTL Corridor (17-30 km of OHTL line)

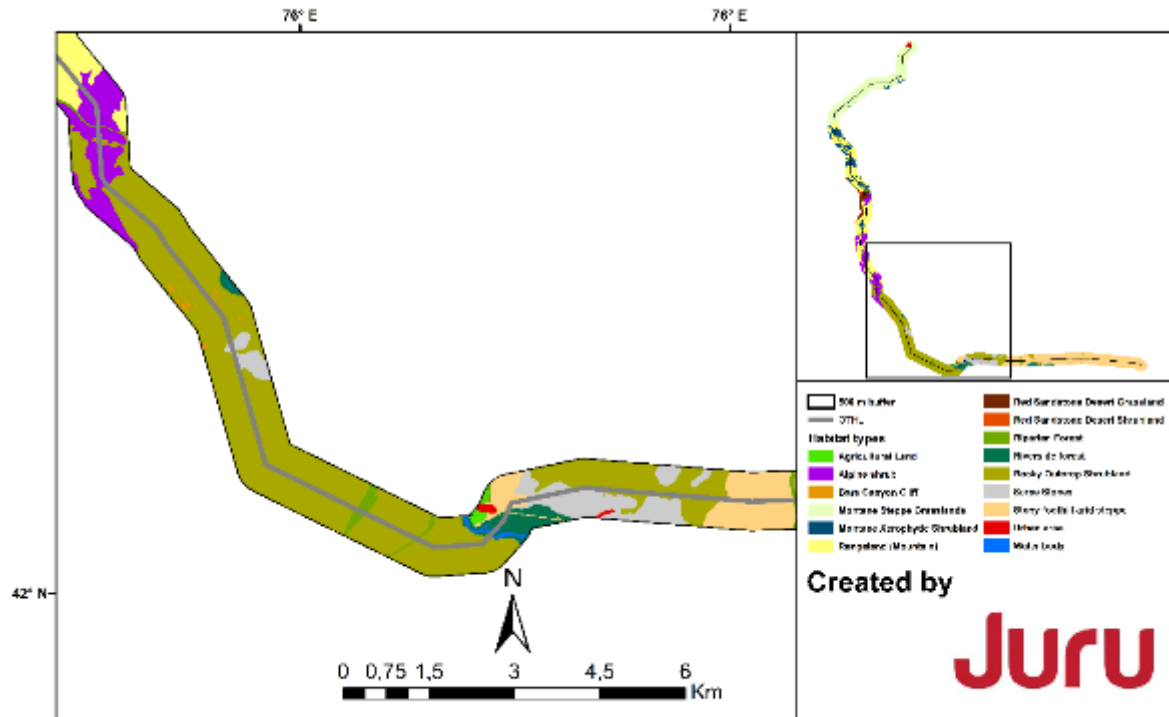


Figure 143. Habitat types of the 500 m Buffer Zone along the OHTL Corridor (30-48 km of OHTL line)

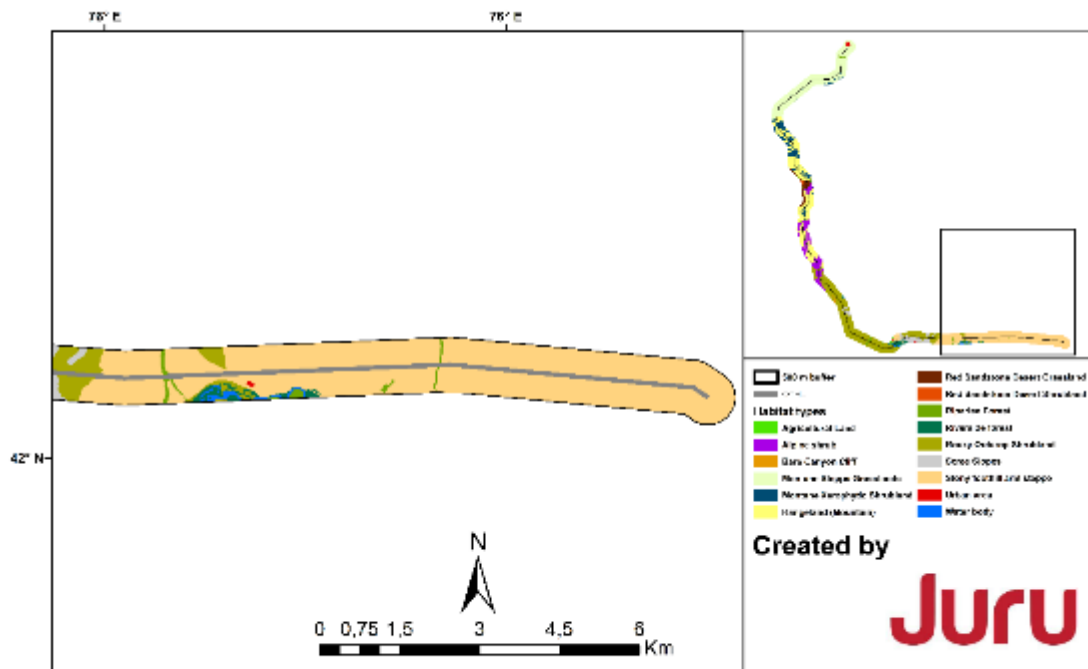
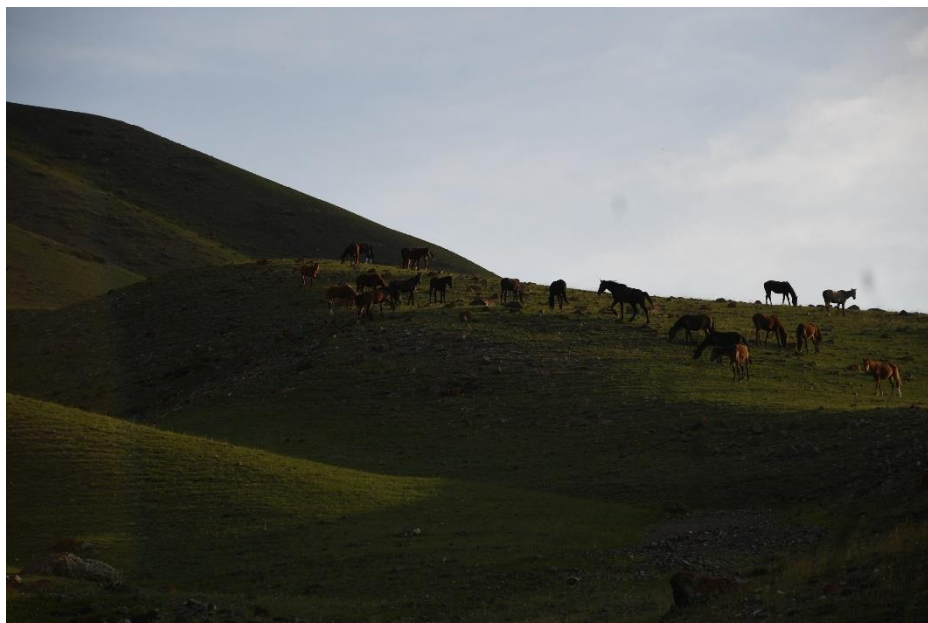


Figure 144. Habitat types of the 500 m Buffer Zone along the OHTL Corridor (48-60 km of OHTL line)

Appendix D



111-Figure. Montane Steppe Grasslands in the study area are utilized as grazing land for horses (Point: P_KG25_K_P42)



222-Figure. Montane Steppe Grasslands in the study area are utilized as grazing land for livestock (Point: P_KG25_K_P5)



333-Figure. Montane Steppe Grasslands in the study area are utilized as grazing land for livestock (Point: P_KG25_K_P3)



333-Figure. Montane Steppe Grasslands in the study area are utilized as grazing land for livestock (Point: P_KG25_K_P4)

Technical appendix 16:

Breeding bird survey near Issyk Kul report Spring 2024

Breeding bird survey near Issyk Kul Spring 2024

48 km Kemin — Balykchy
Interconnection (500 kV) Project



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Table of Content

1. 4

2. 9

3. 10

4. 17

Table of Figures

Figure 1: 500 kV Kemin — Balynkchi OHTL 5

Figure 2: 500 kV Kemin — Balynkchi OHTL (zoom in around the substation area) 5

Figure 3. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site 6

Figure 4. “Eastern Issyk-Kul Lake” IBA 6

Figure 5. IBA "Western shore of Issyk-Kul Lake" 6

Figure 6. The key area of the bird's nest survey 7

Figure 7. Preliminary habitat map of the bird survey area 8

Figure 8. Fires on Issyk-Kul shore 9

Figure 9. GPS tracks recorded during the field survey. 10

Figure 10. Location of nests on the survey area 11

Figure 11. *Charadrius mongolus* 11

Figure 12. *Cuculus canorus* 11

Figure 13. *Charadrius alexandrinus* 11

Figure 14. *Aythya nyroca* 11

Table of Tables

Table 1. Bird species observed in the project territory and a summary of nests noted in the project area based on experts' observations from previous years. 12

1. Introduction

Overhead transmission lines (OHTL) can cause fatal collisions for birds, especially for bustards, cranes, and large bodied waterbirds. These structures are also associated with bird electrocutions, primarily affecting raptors, vultures, and other large birds that tend to perch and/or nest on towers. The risk of electrocution is particularly high when pylons are constructed with hazardous designs and situated in high-risk areas.

The proposed XXX km 500 kV Kemin — Balynkchi OHTL will be constructed between the settlements of Kemin and Balykchy in Kyrgyz Republic, with a substation to be built in Balykchy in Kyrgyz Republic, (Figure 1, Figure 2).

This line is located close to Issyk-Kul Lake, which is designated Ramsar site (Figure 3) and the eastern part of Issyk-Kul Lake was designated as IBA “Eastern Issyk-Kul Lake” in 2006 (Figure 4).

The western plain area along Lake Issyk-Kul (in the vicinity of the Issyk-Kul substation) can serve as nesting site for multiple bird species. Recognising this ecological importance, we conducted a survey of nesting birds in this area.

The IBA hosts 267 bird species and is important as breeding territory of Pallas’s sandgrouse (*Syrrhaptes paradoxus*), Saker falcon (*Falco cherrug*), and wintering waterbird species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*)¹.

Our research was carried out in the framework of the (500 kV), in Spring 2024. The primary objective of this survey was to conduct systematic field studies focusing on bird nesting activities near the western shore of Issyk-Kul Lake.

¹ BirdLife International (2024) Important Bird Area factsheet: Western Issyk Kul Lake. Downloaded from <https://datazone.birdlife.org/site/factsheet/western-issyk-kul-lake-iba-kyrgyzstan> on 23/07/2024.

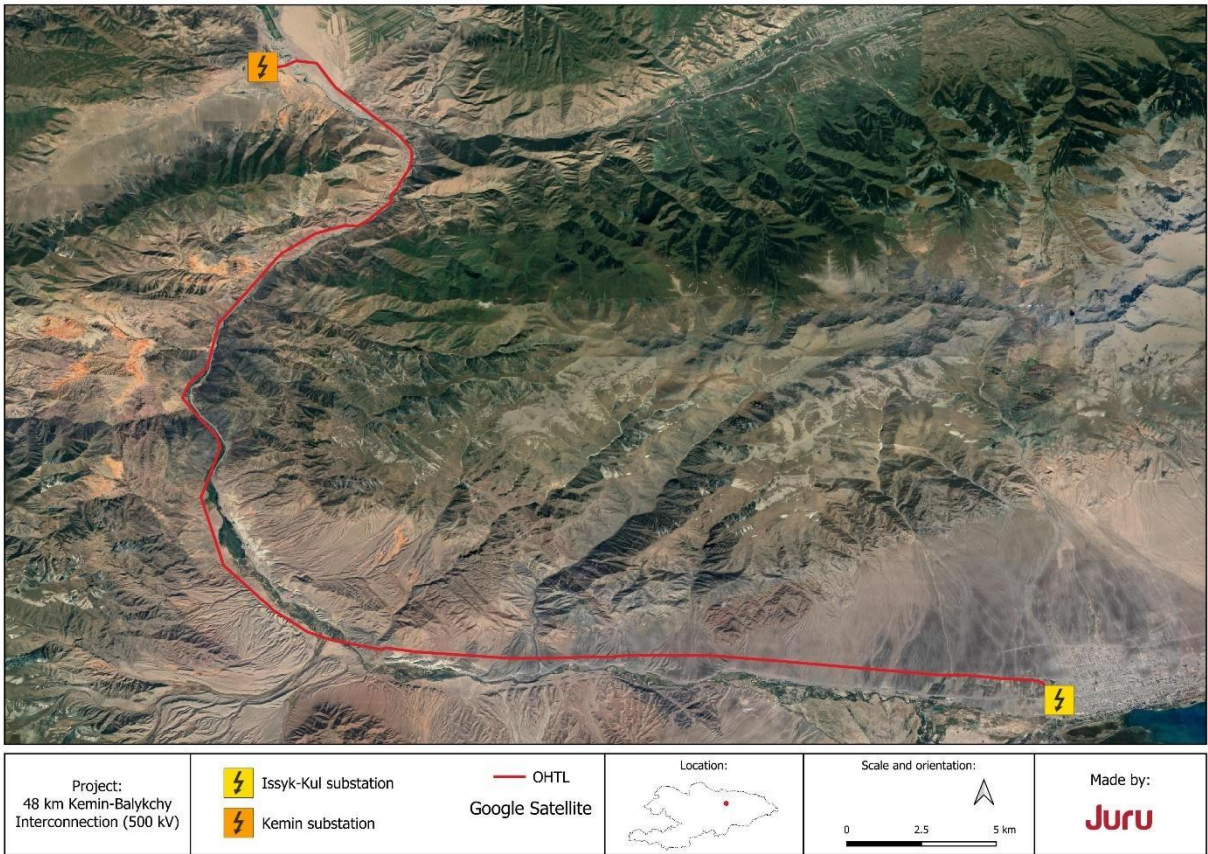


Figure 1. 500 kV Kemin — Balynkchi OHTL

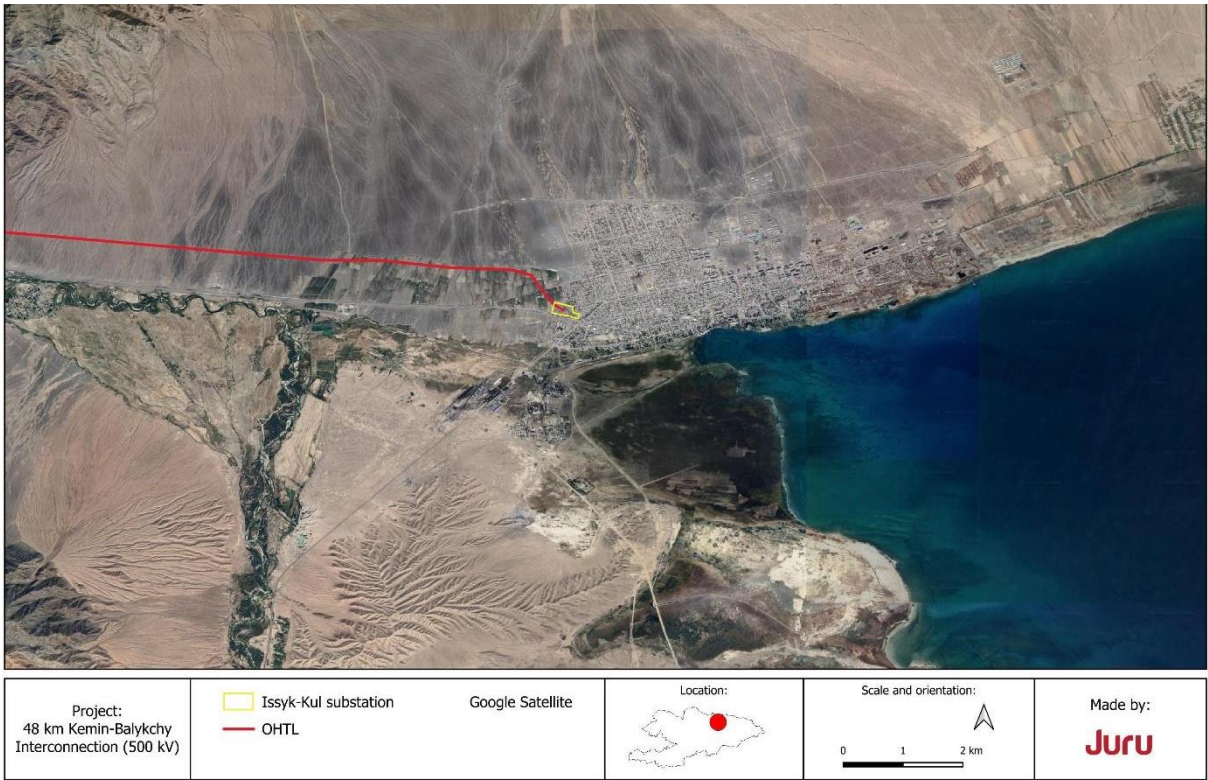


Figure 2. 500 kV Kemin — Balynkchi OHTL (zoom in around the substation area)

Figure 3. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site



Figure 4. "Eastern Issyk-Kul Lake" IBA

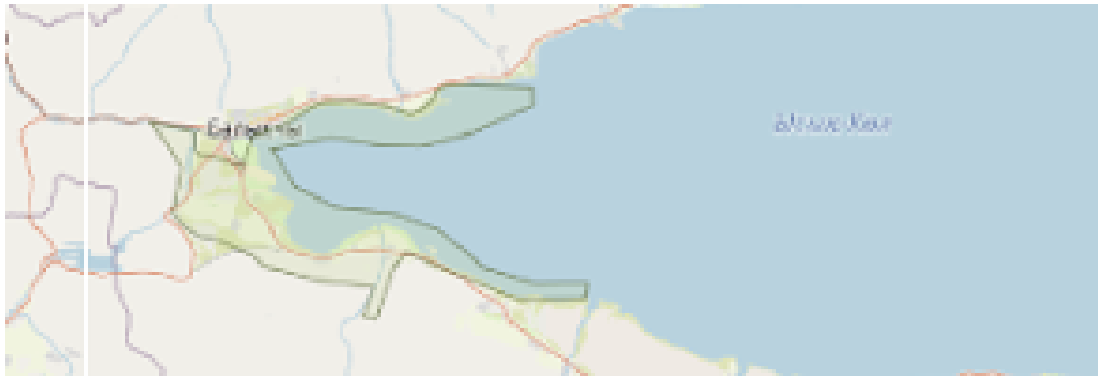


Figure 5. IBA "Western shore of Issyk-Kul Lake"

The survey was conducted on the western shore of Lake Issyk-Kul and the adjacent territories due to its potential suitability for nesting site for steppe and water bird species, including Pallas's sandgrouse (*Syrrhaptes paradoxus*), Asian short-toed lark (*Calandrella cheleensis*), and Mute swan (*Cygnus olor*). This area is characterized by an arid, moderately continental climate, as well as semi-desert and desert landscapes. The soil is sandy loam, and the vegetation is quite sparse. Usually, this region receives no more than 200 mm of precipitation per year. However, this year had an unusually cold and rainy spring. The atypical weather and temperatures affected both the composition of the birds inhabiting the area and the timing of their nesting.

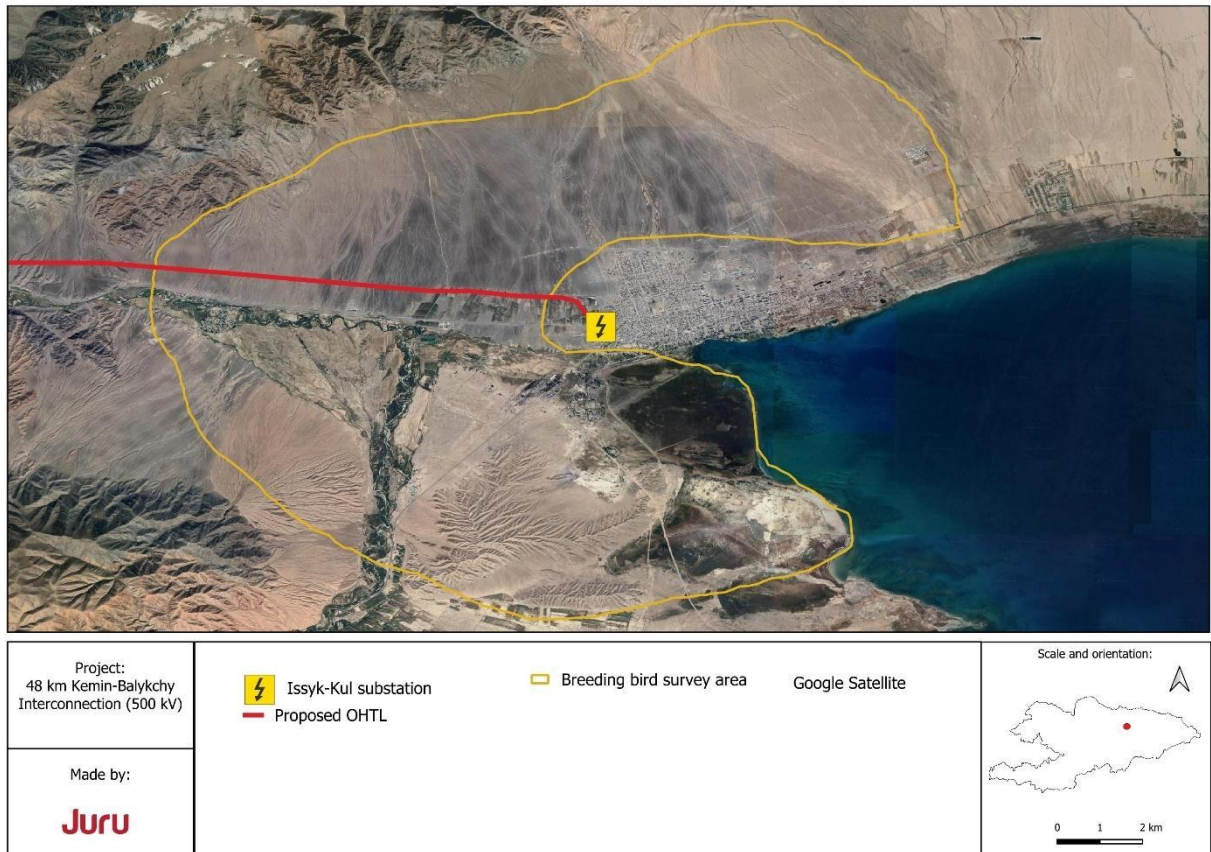


Figure 6. The key area of the bird's nest survey

The survey areas encompasses several habitats (Figure 7). Semi-desert foothills occupy most of the territory, while a smaller portion consists of the floodplains of Issyk Kul Lake and the Chu River. Riparian shrubs grow along the riverbanks. Agricultural fields and gardens are also present within the project area.

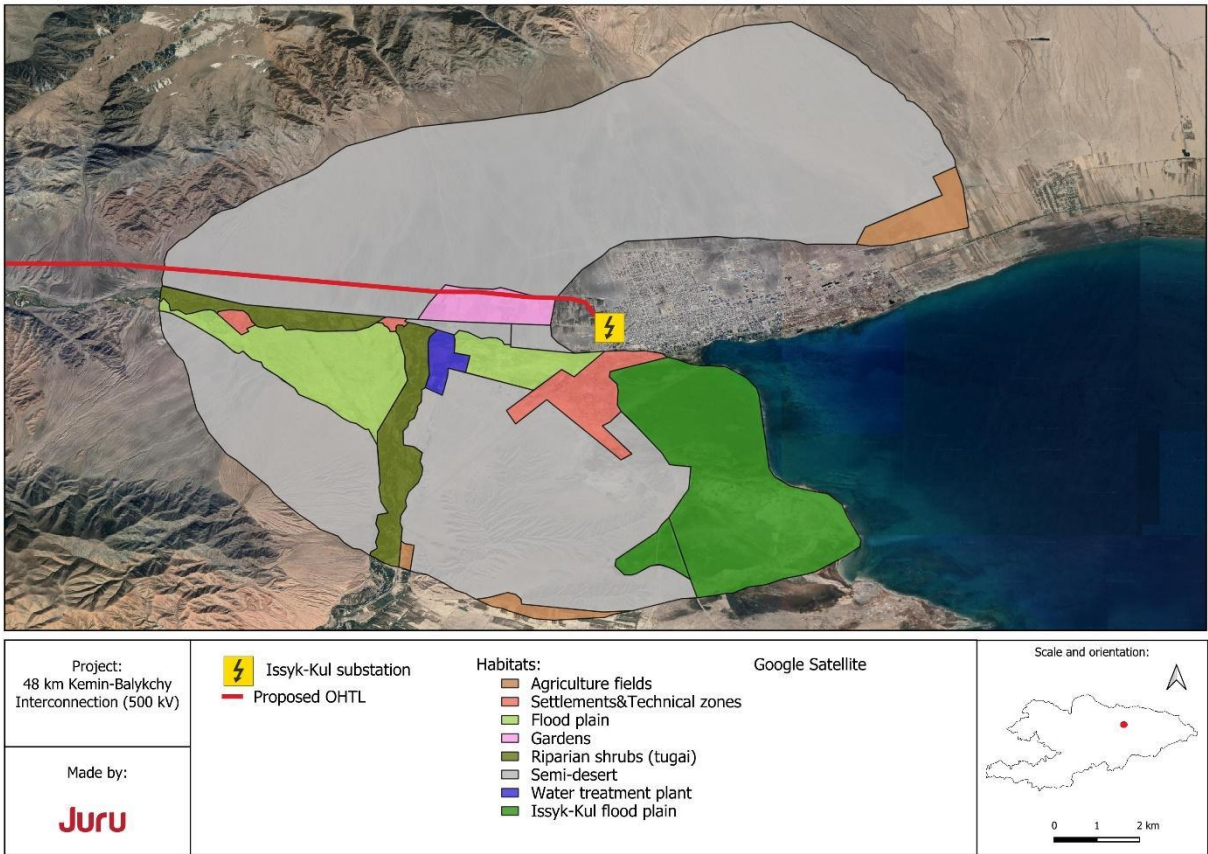


Figure 7. Preliminary habitat map of the bird survey area

A large fire, which occurred about 10 km along the western shore of Lake Issyk-Kul in March this year due to human activity, was among the negative factors that significantly impacted the composition and number of nesting birds. Local shepherds deliberately set fire to the reed beds (*Typha*) growing along the lake's shore, believing that the young shoots that would later appear in place of the burned reeds would provide good fodder for livestock (Figure 5). As a result of the fire, a very suitable nesting and shelter area for several bird species was temporarily destroyed. Consequently, the number and diversity of birds in this area have noticeably decreased this year.



Figure 8. Fires on Issyk-Kul shore

Long-term leakage of diesel fuel and kerosene has also negatively impacted the composition and number of birds in this region. This contamination leads to the degradation of soil and vegetation. Additionally, the use of pesticides in the local agriculture further exacerbates the situation.

2. Materials and methods

The total area of the surveyed territory was 204 square kilometres.

Due to the unstable rainy weather, the survey took six days instead of the planned three days (26.04, 29.04, 07.05, 10.05, 17.05, and 22.05). The research was conducted in the morning and evening hours by two researchers. Morning research took place over 4 hours, from 6 to 10 AM, while evening research was conducted over 3 hours, from 4 to 7 PM. A total of 84 person-hours were spent on the research.

The surveys were conducted using the walkover transect method in suitable habitats. It should be noted that some areas were inaccessible, such as the tank training ground located in the northeastern part of the project area and private dacha areas that were fenced off (Figure 9). The purpose of the study - to find nests in the territory, to mark nest and mating behaviour of birds encountered. Meetings and voices were recorded in the field diary.

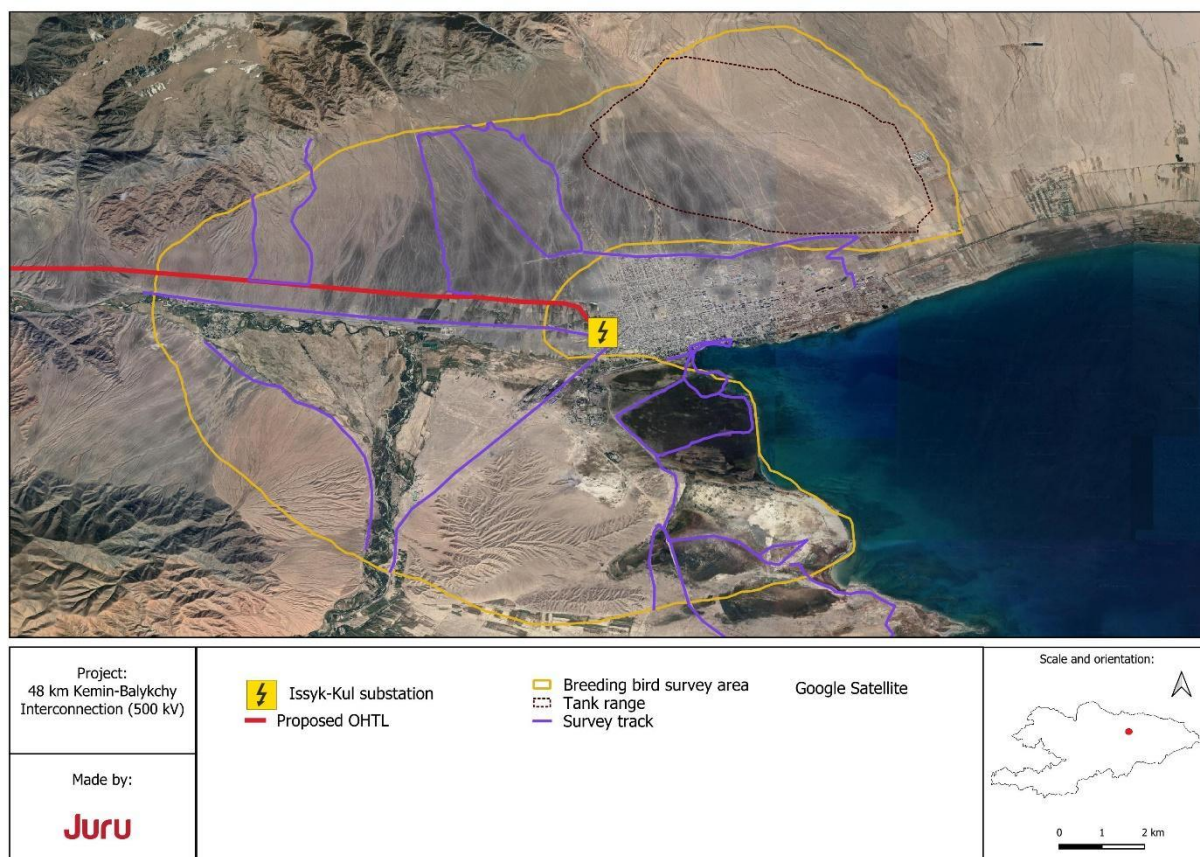


Figure 9. GPS tracks recorded during the field survey.

During the observations, photographs and short video recordings of birds were taken. These visual records were used to confirm accurate species identification and to obtain additional data on the number of individuals present.

The following equipment was used:

- two binoculars (BUSHNELL TROPHY 8x42)
- camera (Canon EOS 5D Mark 4 with lens Canon EF 500mm f4.5 and Canon EF 600mm f4)
- spotting scope (Levenhuk Blaze BASE 60)

3. Findings and Results

During the survey of the area, four nests of three bird species were found: one nest of the *Charadrius alexandrinus*, nest of the *Accipiter nisus* and two nests of the *Charadrius atrifrons* (IUCN: LC). All the plover nests were found on the floodplain, located 100-120 meters apart from each other. The Eurasian sparrowhawk nest was found in a tree near a road in a populated area (Figure 10).

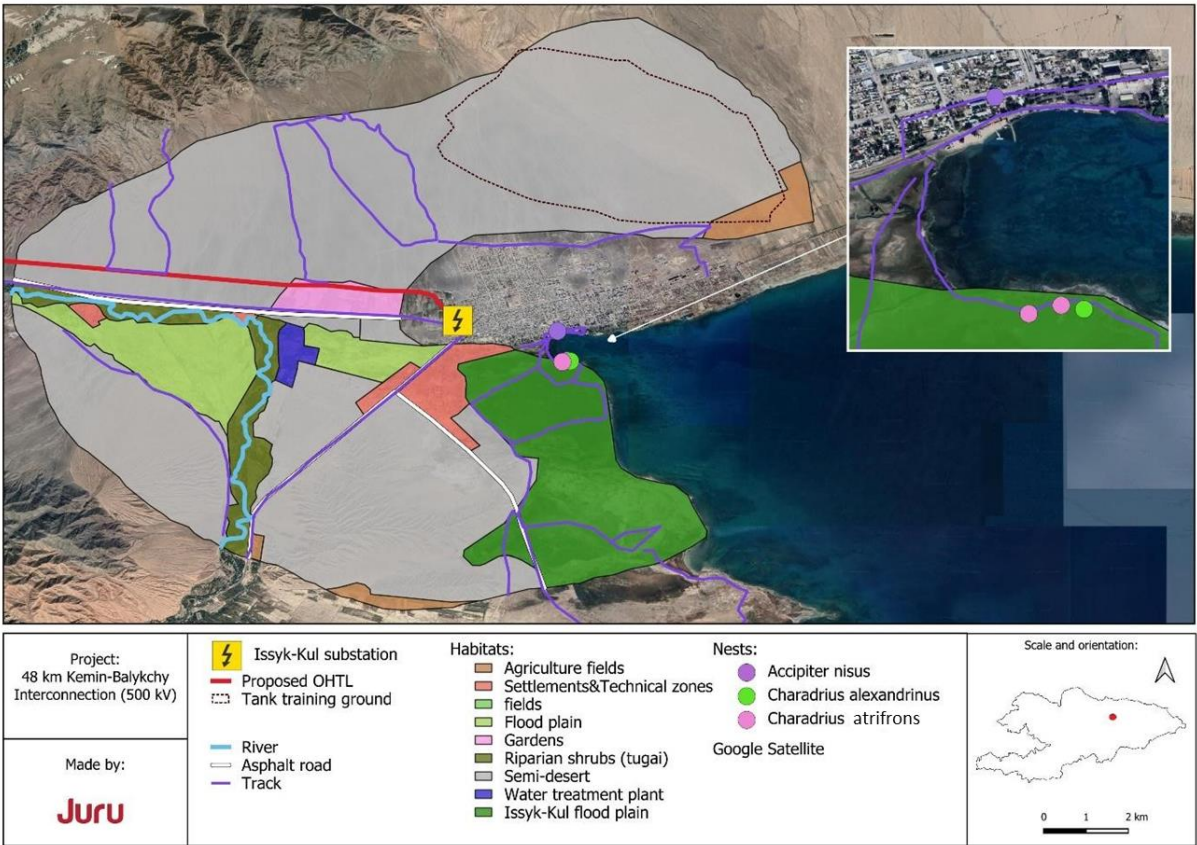


Figure 10. Location of nests on the survey area

During our survey, courtship activity of seven bird species was recorded in the area (Table 1). Overall, 42 bird species were observed during the survey. In previous years, experts found nests of twenty species in the study area, including *Accipiter nisus*, *Falco subbuteo*, and *Aythya nyroca* (RDB: NT; IUCN: NT).



Figure 11. *Charadrius atrifrons*



Figure 12. *Cuculus canorus*



Figure 13. *Charadrius alexandrinus*



Figure 14. *Aythya nyroca*

Table 1. Bird species observed in the project territory and a summary of nests noted in the project area based on experts' observations from previous years.

	Common name	Latin Name	Nests in other years ²	Nests in this year	Displaying	Suitable nesting sites (ecology)	Suitable nesting sites in the area	Nesting time	IUCN status ³	Kyrgyz RDB status ⁴
1	Ruddy shelduck	<i>Tadorna ferruginea</i>	-	-	-	Marmot nests, rock niches	-	May	LC	-
2	Common pochard	<i>Aythya ferina</i>	-	-	-	Reed thickets, cattails	Not this year	May	VU	-
3	Ferruginous duck	<i>Aythya nyroca</i>	+	-	-	Cattail thickets, old stems	Not this year	Mid-May - June	NT	VI (NT)
4	Ring-necked Pheasant	<i>Phasianus colchicus</i>	-	-	-	Dense thickets of bushes	+/-	May-June	LC	-
5	Chukar	<i>Alectoris chukar</i>	-	-	-	Rock niches	+	End of May - June	LC	-
6	Rock dove	<i>Columba livia</i>	-	-	+	Human buildings. Rock niches	+	May	LC	-
7	Pallas's sandgrouse	<i>Syrrhaptes paradoxus</i>	-	-	-	Depression or hole in the ground	+/-	May-July	LC	V (VU)
8	Black-bellied sandgrouse	<i>Pterocles orientalis</i>	-	-	-	Depression or hole in the ground	+	May-July	LC	VI (NT)

² Compiled from secondary data³ The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX).⁴ V – Vulnerable (VU) - The species' vital parameters are not very far from critical levels (or may become not very far from them in the indefinite future with a medium probability), and therefore it faces a medium risk of extinction in the wild.

VI - Near threatened (NT) - A species is considered to be in a near threatened state when its vital parameters are relatively far from the critical level for the survival of the species, but may reach it in the indefinite future with some probability, and therefore it faces a potential risk of extinction in the wild.

	Common name	Latin Name	Nests in other years ²	Nests in this year	Displaying	Suitable nesting sites (ecology)	Suitable nesting sites in the area	Nesting time	IUCN status ³	Kyrgyz RDB status ⁴
9	Common cuckoo	<i>Cuculus canorus</i>	+	-	+	Any vegetation	+	April-May	LC	-
10	Eurasian coot	<i>Fulica atra</i>	-	-	-	Reed thickets, cattails	Not this year	May	LC	-
11	Black-winged stilt	<i>Himantopus himantopus</i>	+	-	-	Depression in the ground on the banks of bodies of water	+	April-May	LC	-
12	Little Ringed Plover	<i>Charadrius dubius</i>	+	-	+	Shallow hole in sand or salt marsh	+	April-May	LC	-
13	Northern lapwing	<i>Vanellus vanellus</i>	-	-	-	Depression in the ground on the banks of bodies of water	+	April-May	NT	-
14	Kentish plover	<i>Charadrius alexandrinus</i>	+	+	+	Shallow hole in sand or salt marsh	+	April-May	LC	-
15	Tibetan Sand-Plover	<i>Charadrius atrifrons</i>	+	+	+	Shallow hole in sand or salt marsh	+	April-May	LC	-
16	Ruddy turnstone	<i>Arenaria interpres</i>	-	-	+	Depression in the ground on the banks of ponds, in the grass	+	End of June	LC	-
17	Black-headed gull	<i>Larus ridibundus</i>	+	-	-	Dry heaps of reeds, cattails	Not this year	April-May	LC	-
18	Caspian gull	<i>Larus cachinnans</i>	-	-	-	Dry heaps of reeds, cattails	Not this year	May	LC	-
19	Common tern	<i>Sterna hirundo</i>	+	-	-	Dry heaps of reeds, cattails, on the ground near the shore	+	May	LC	-

	Common name	Latin Name	Nests in other years ²	Nests in this year	Displaying	Suitable nesting sites (ecology)	Suitable nesting sites in the area	Nesting time	IUCN status ³	Kyrgyz RDB status ⁴
20	Grey heron	<i>Ardea cinerea</i>	+	-	-	Large trees, thickets of cattails, reeds	Not this year	End of April - May	LC	-
21	Western marsh harrier	<i>Circus aeruginosus</i>	-	-	-	Thickets of reeds or cattails, floodplains	Not this year	May	LC	-
22	Eurasian sparrowhawk	<i>Accipiter nisus</i>	+	+	-	Trees, large shrubs	+	Mid-May - June	LC	-
23	Black kite	<i>Milvus migrans</i>	-	-	-	Rock ledges, trees	-	Mid-April-May	LC	-
24	Common buzzard	<i>Buteo buteo</i>	-	-	-	Rocky niches, spreading trees	-	April-May	LC	-
25	Long-legged buzzard	<i>Buteo rufinus</i>	-	-	-	Rocky niches, spreading trees	-	April-May	LC	-
26	Eurasian hoopoe	<i>Upupa epops</i>	+	-	-	People buildings, niches, trees	+	April-May	LC	-
27	Common Kestrel	<i>Falco tinnunculus</i>	-	-	-	Clay cliffs, old nests	+	End of April - early March	LC	-
28	Eurasian hobby	<i>Falco subbuteo</i>	+	-	-	Old corvid nests	+	End of May - June	LC	-
29	Great Gray Shrike	<i>Lanius pallidirostris</i>	-	-	-	Trees, shrubs	+	April-May	LC	-

	Common name	Latin Name	Nests in other years ²	Nests in this year	Displaying	Suitable nesting sites (ecology)	Suitable nesting sites in the area	Nesting time	IUCN status ³	Kyrgyz RDB status ⁴
30	Common magpie	<i>Pica pica</i>	+	-	-	Trees (willow, elm, poplar, etc.), shrubs	+	April	LC	-
31	Rook	<i>Corvus frugilegus</i>	+	-	-	Trees (willow, elm, poplar, etc.)	+	April	LC	-
32	Azure Tit	<i>Parus cyanus</i>	-	-	-	Trees, shrubs	+	April	LC	-
33	Asian short-toed lark	<i>Alauda cheelensis</i>	-	-	-	The nest is built on the ground, under the grass	+	April-May	LC	-
34	Crested lark	<i>Galerida cristata</i>	-	-	-	The nest is built on the ground, under the grass	+	April-May	LC	-
35	Northern wheatear	<i>Oenanthe oenanthe</i>	+	-	-	Rodent holes, depressions in the ground, under bushes	+	May-June	LC	-
36	Isabelline wheatear	<i>Oenanthe isabellina</i>	+	-	-	Rodent holes, depressions in the ground, under bushes	+	April-May	LC	-
37	Eurasian tree sparrow	<i>Passer montanus</i>	+	-	-	Trees, shrubs, human buildings	+	March-May	LC	-
38	Eurasian tree sparrow	<i>Parus major</i>	+	-	+	Trees, shrubs, human buildings	+	March-July	LC	-
39	Citrine wagtail	<i>Motacilla citreola</i>	+	-	-	Rocks, cliffs, between stones, in trees	+	April-May	LC	-
40	White wagtail	<i>Motacilla personata</i>	+	-	-	Rocks, cliffs, between stones, in trees	+	April-May	LC	-

	Common name	Latin Name	Nests in other years ²	Nests in this year	Displaying	Suitable nesting sites (ecology)	Suitable nesting sites in the area	Nesting time	IUCN status ³	Kyrgyz RDB status ⁴
4 1	Water pipit	<i>Anthus spinoletta</i>	-	-	-	Alpine zone, nest on the ground. In the grass, under a stone	+ -	May	LC	-
4 2	Grey-necked bunting	<i>Emberiza buchanani</i>	-	-	-	Rock niches	+	May	LC	-

4. Conclusion

Based on the research results, the following conclusions can be made:

- During the six days of surveying the territory, 42 bird species were found, 38 of which could potentially nest in the area due to habitat suitability.
- The survey revealed only four nests, belonging to three different species in habitats outside the OHLT ROW or the substation
- We note that the spring of 2024 was abnormally cold, and the reed thickets, which were suitable nesting sites for several bird species, were destroyed by fire.
- According to secondary data, at least one species listed in both the Red Book of Kyrgyzstan and the IUCN, identified as *Aythya nyroca* (IUCN: NT, Kyrgyz RDB: NT), has nested in the survey area. This species' nesting habitat is restricted to reed beds along the shore of the Lake which are 2 km from the OHLT ROW.

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Technical appendix 17:

Waterbird winter survey report



Waterbird winter survey report

48 km Kemin — Balykchy Interconnection (500 kV) Project

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Table of Content

1 Introduction	4
2 Materials and methods	7
3 Findings and Results.....	9
3.1 Threatened species description and observation	12
3.1.1 Whooper Swan (<i>Cygnus cygnus</i>) - Category VII; IUCN (LC).....	12
3.1.2 Ferruginous Duck (<i>Aythya nyroca</i>) - Category VI; IUCN: (NT).....	12
3.1.3 Common Pochard (<i>Aythya ferina</i>) - IUCN: (VU).....	13
3.1.4 Horned Grebe (<i>Podiceps auritus</i>) - IUCN: (VU).....	13
4 Conclusion	14
5 Annex 1	15

Table of Figures

Figure 1. 48 km Kemin-Balykchy Interconnection (500kV)	4
Figure 2. Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site.....	5
Figure 3. IBA "Western Issyk-Kul Lake".....	6
Figure 4. Survey tracks.....	8

Table of Tables

Table 1. Results of the survey	10
Table 2. Observations collected during the survey	15

1 Introduction

The Kemin — Balykchi (500kV) Interconnection Project is a 48 km overhead transmission line (OHTL) that has been proposed to enhance Kyrgyzstan's power grid. The transmission line will be constructed between the settlements of Kemin and Balykchy in north-eastern part of Kyrgyz Republic, with a new or expansion of existing substation to be built in the Balykchi area (Figure 1: 48 km Kemin-Balykchy Interconnection (500kV)).

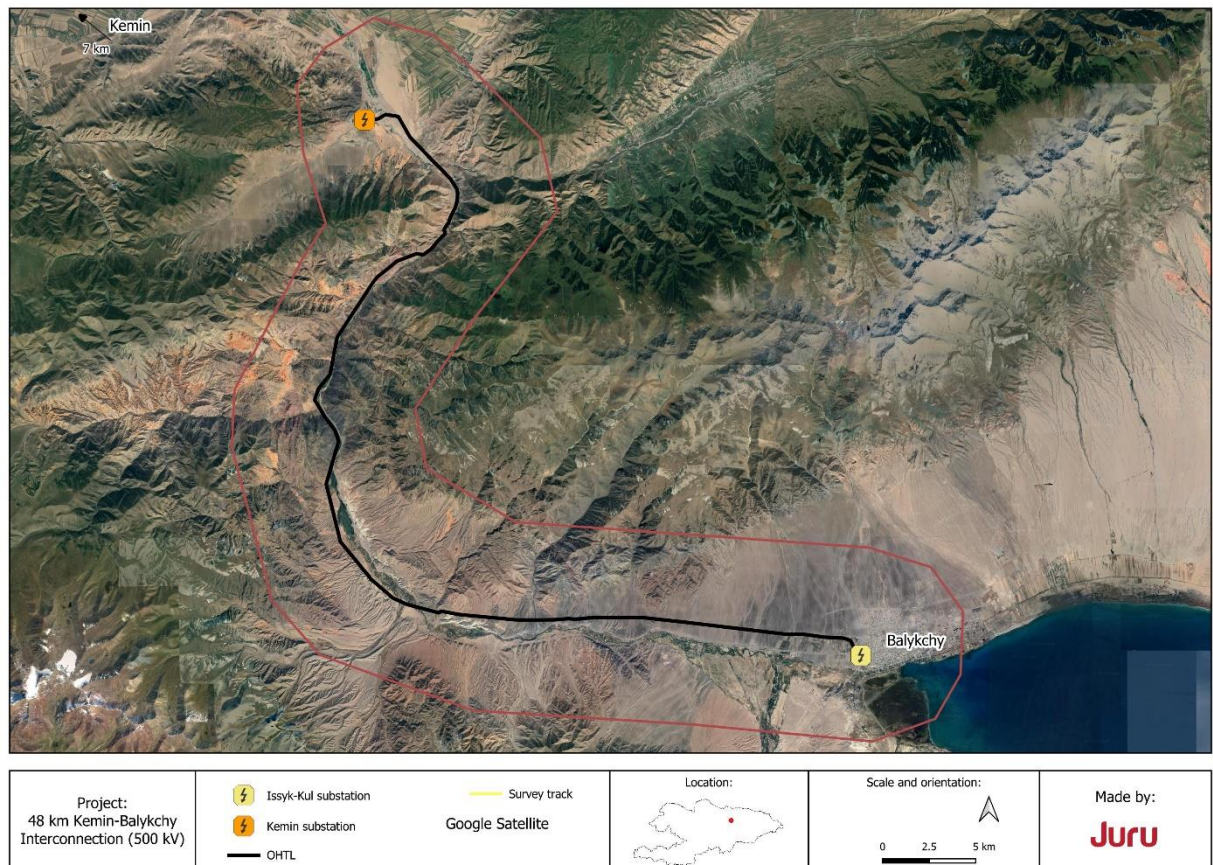


Figure 1: 48 km Kemin-Balykchy Interconnection (500kV)

OHTLs can cause fatal collisions of birds, especially bustards, cranes, and large waterfowl. These structures have also been related to electrocution of birds, which mainly affects raptors, vultures and other large birds that tend to perch on the towers or nest there. For high-voltage OHTL, risks of bird collisions are considered to be high, but bird electrocution risk is generally considered to be low, as industry-standard designs generally have wide spacing of electrified parts and conductors suspended below rather than above support structures. However, the risk of raptors dying from electrocution on high-voltage OHTL structures exists. For instance, this can occur when droppings from a large bird perched on a support structure hit a wire and act as a conductor.

The proposed line is located less than 2 km from Issyk-Kul Lake, which is designated as a Ramsar site¹ (Figure 2). Lake Issyk-Kul has been listed as a Wetland of International Importance under the Ramsar Convention since 1976 due to its importance for waterfowl conservation.

¹Ramsar Sites, 2024

Additionally, the western part of Issyk-Kul Lake was designated as an Important Bird Area (hereinafter IBA), or “Western Issyk-Kul Lake,” in 2006 (Figure 3). This IBA hosts 267 bird species and is important for wintering waterbird species such as Whooper swan (*Cygnus cygnus*) and White-tailed eagle (*Haliaeetus albicilla*). According to historical data, from 25 to 80 thousand individuals of 40 bird species winter in this area every year. Long-term monitoring has shown that the main wintering sites for waterfowl are located in the shallow waters of the western part and in the bays of the eastern part of the lake. On average, approximately 40% of all wintering waterfowl are found in the western region, while 25–30% are in the eastern part, 10–15% in the northern part, and around 5% in the southern part. The total number of wintering birds can vary significantly, primarily influenced by food availability and the extent of shallow water freezing.

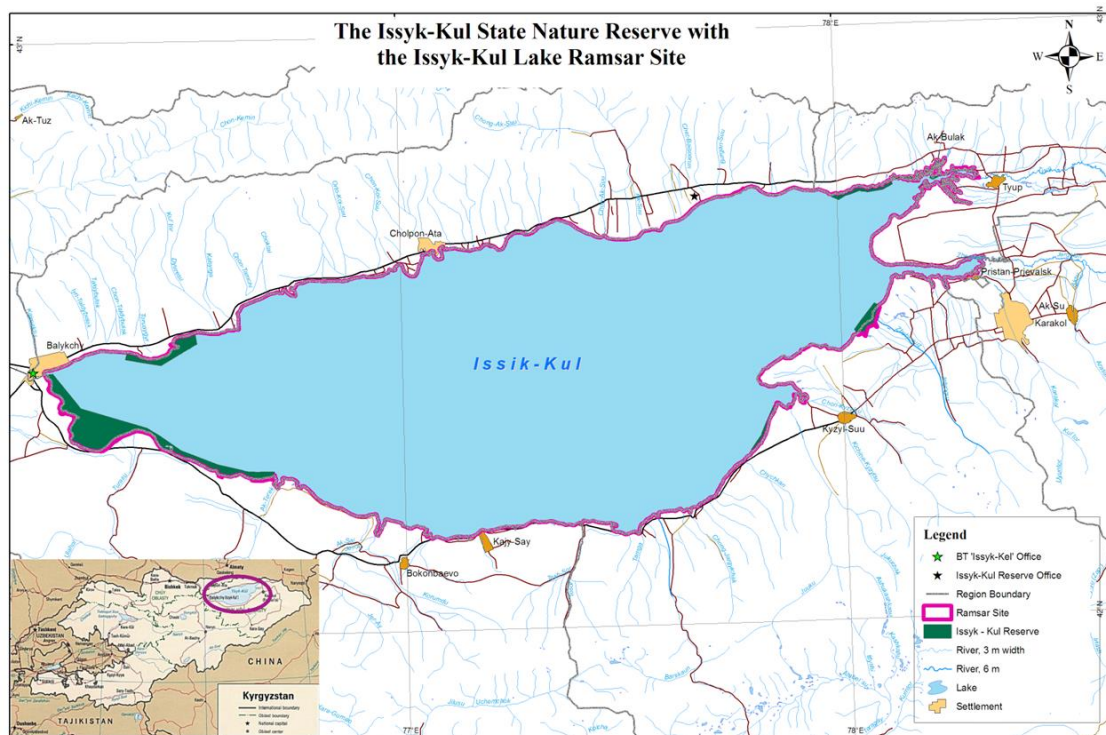


Figure 2: Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site

A waterbird winter survey was conducted from December 2024 to February 2025. The goal of this survey was to count waterbirds along the shores of Issyk Kul during this period, particularly in areas within the 10 km buffer zone of the OHTL.

Country/territory: Kyrgyzstan

Central coordinates: 42° 26' 53" North (42.45°) 76° 15' 17" East (76.26°)

Area: 2,700 ha

Altitude: 1609-1609 m

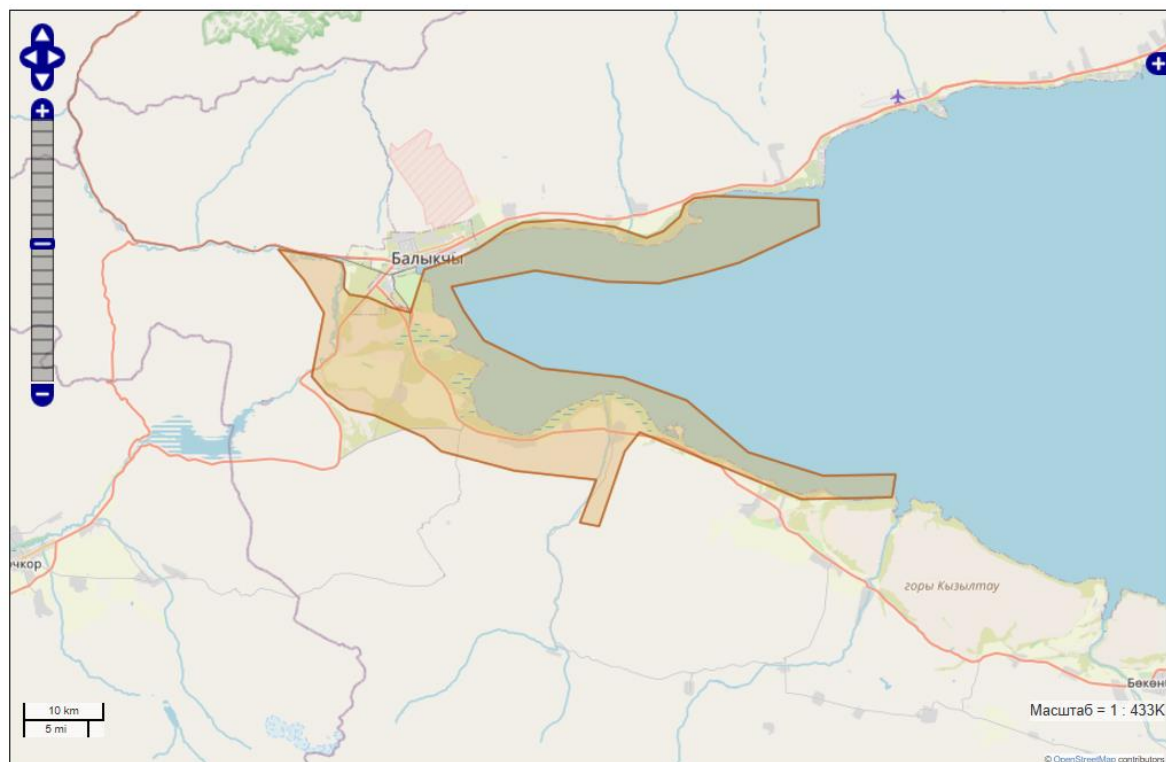


Figure 3: IBA “Western Issyk-Kul Lake”²

² <https://dz.birdlife.org/site/factsheet/western-issyk-kul-lake-iba-kyrgyzstan>

2 Materials and methods

A winter waterfowl survey was conducted from December 2024 to February 2025 along the shores of Lake Issyk-Kul, Kyrgyzstan. The survey was conducted for one day each month and the survey routes are shown in Figure 4.

Field surveys were conducted on the following specific dates:

- December 27, 2024
- January 26, 2025
- February 9, 2025.

The survey focused on areas overlapping with the 10 km buffer zone of the OHTL corridor to assess potential impacts on waterbirds.

A point count methodology was used, with fixed observation points established along the lakeshore.

Data for each observation were the following:

- Species identification
- Number of individuals
- Time of observation
- GPS coordinates
- Weather conditions

All observations were recorded on field datasheets and subsequently transferred to digital databases for analysis.

During the observations, surveyors used the following equipment:

- Binoculars: Two BUSHNELL TROPHY 8x42 binoculars for general scanning and identification of nearby birds.
- Spotting Scope: A Levenhuk Blaze BASE 60 spotting scope for detailed observation and identification of distant birds.
- Camera: A Canon EOS 5D Mark 4 camera equipped with Canon EF 500mm f/4.5 and Canon EF 600mm f/4 telephoto lenses for documenting rare or difficult-to-identify species.

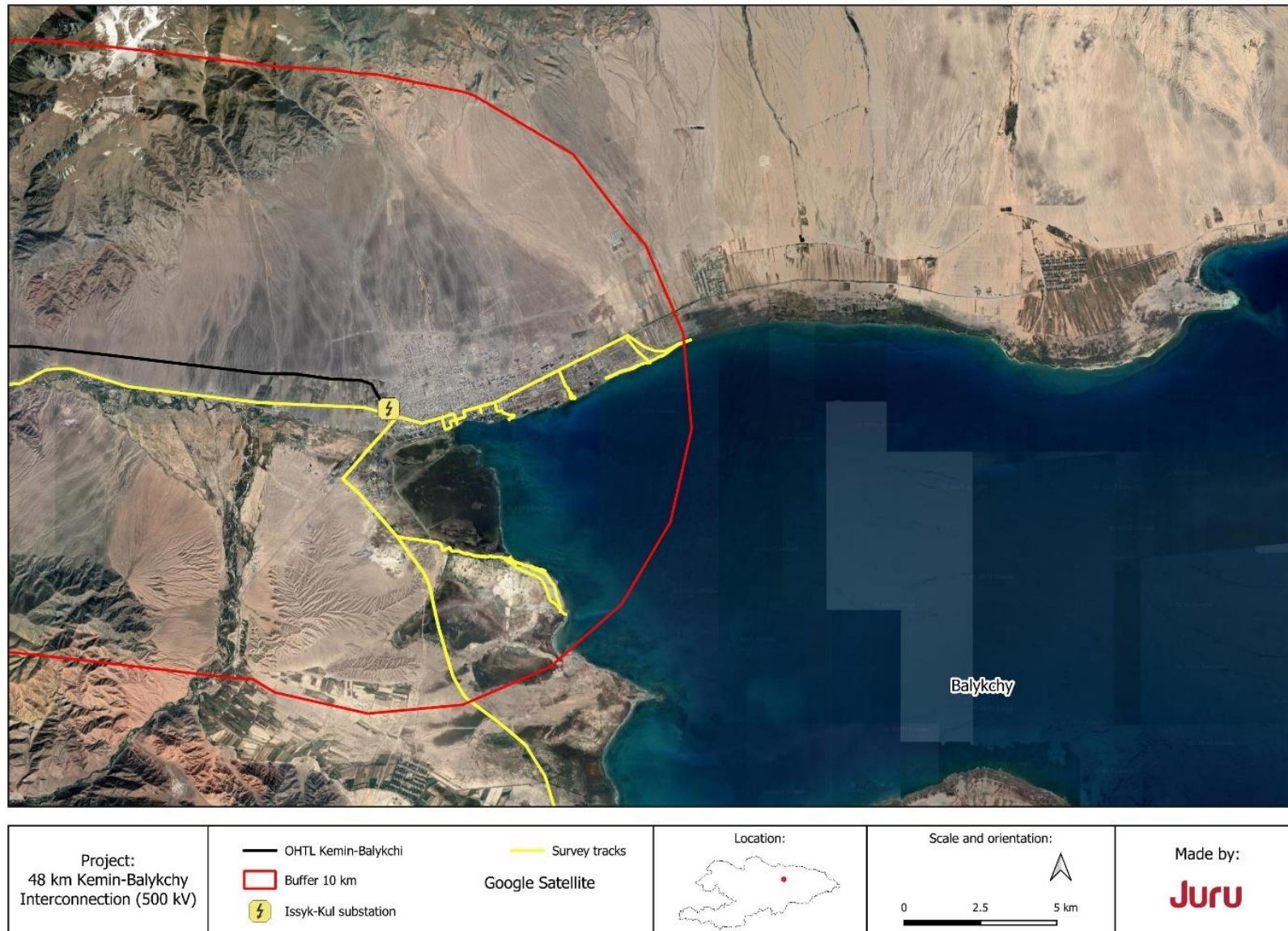


Figure 4: Survey tracks

3 Findings and Results

As a result of the study, 29 bird species were documented over three-monthly surveys conducted in December, January, and February 2025. Two species observed during the study are listed in the Red Data Book of Kyrgyzstan:

- Whooper Swan (*Cygnus cygnus*) - Category VII (LC)
- Ferruginous Duck (*Aythya nyroca*) - Category VI (NT)

Additionally, three species observed have notable conservation statuses on the IUCN Red List:

- Common Pochard (*Aythya ferina*) - Vulnerable (VU)
- Ferruginous Duck (*Aythya nyroca*) - Near Threatened (NT)
- Horned Grebe (*Podiceps auritus*) - Vulnerable (VU)

Despite the conservation importance of the Ferruginous Duck (*Aythya nyroca*) categorized in the Red Book of Kyrgyzstan and IUCN, only one individual was observed during the January survey.

Of the 29 species documented during the survey:

- 2 species (6.9%) have Status II-III susceptibility³
- 26 species (89.7%) have Status II susceptibility to power line collisions
- 1 species (3.4%) has Status I susceptibility

The Eurasian Coot (*Fulica atra*), the most abundant species, accounted for approximately 40% of all observations during the survey period. Although not listed in the Kyrgyz Red Data Book or internationally, it is classified as Status II susceptibility to collisions with OHTL, indicating high regional or local losses but no significant impact on the overall conservation status of the species.

The table below further elaborates the findings, including the conservation statuses according to the Kyrgyz Red Data Book and IUCN Red List, susceptibility to collision and electrocution, and the number of species observed during each monitoring round.

³ Severity of impacts (actual or potential) on bird populations: electrocution mortality and power line collision for different bird families in Eurasia (Martin Martin, 2022).

0 – no reported or likely casualties; I – reported fatalities, but no apparent threat to the bird populations of that family; II – high regional or local losses, but no significant impact on the overall conservation status of the species; III – casualties are a significant mortality factor, threatening an imperilled species regionally or on a larger scale.

Table 1: Results of the survey

№	Latin name	Common name	RDB of Kyrgyzstan ⁴	IUCN Red List ⁵	Susceptibility to electrocution	Susceptibility to collision ^{Error!} Bookmark not defined.	Total number of observed individuals		
							December 2024	January 2025	February 2025
1	<i>Anser anser</i>	Greylag Goose	0	LC	0	II	4	0	0
2	<i>Cygnus olor</i>	Mute Swan	0	LC	0	II	79	111	145
3	<i>Cygnus cygnus</i>	Whooper Swan	VII (LC)	LC	0	II	141	168	142
4	<i>Tadorna ferruginea</i>	Ruddy Shelduck	0	LC	0	II	0	18	0
5	<i>Spatula querquedula</i>	Garganey	0	LC	0	II	4	0	0
6	<i>Spatula clypeata</i>	Northern Shoveler	0	LC	0	II	0	6	0
7	<i>Mareca penelope</i>	Eurasian Wigeon	0	LC	0	II	3	2	0
8	<i>Anas platyrhynchos</i>	Mallard	0	LC	0	II	117	218	231
9	<i>Anas acuta</i>	Northern Pintail	0	LC	0	II	6	9	10
10	<i>Netta rufina</i>	Red-crested Pochard	0	LC	0	II	156	403	865
11	<i>Aythya ferina</i>	Common Pochard	0	VU	0	II	197	857	474
12	<i>Aythya nyroca</i>	Ferruginous Duck	VI (NT)	NT	0	II	0	1	0
13	<i>Aythya fuligula</i>	Tufted Duck	0	LC	0	II	190	377	545
14	<i>Aythya marila</i>	Greater Scaup	0	LC	0	II	0	0	56
15	<i>Bucephala clangula</i>	Common Goldeneye	0	LC	0	II	12	36	9
16	<i>Mergellus albellus</i>	Smew	0	LC	0	II	6	3	3
17	<i>Tachybaptus ruficollis</i>	Little Grebe	0	LC	0	II	13	21	15
18	<i>Podiceps auritus</i>	Horned Grebe	0	VU	0	II	24	9	0
19	<i>Podiceps cristatus</i>	Great Crested Grebe	0	LC	0	II	7	20	16
20	<i>Podiceps nigricollis</i>	Eared Grebe	0	LC	0	II	99	47	12
21	<i>Fulica atra</i>	Eurasian Coot	0	LC	0	II	1125	1677	1377
22	<i>Tringa ochropus</i>	Green Sandpiper	0	LC	I	II-III	1	0	0
23	<i>Tringa totanus</i>	Common Redshank	0	LC	I	II-III	0	2	2
24	<i>Chroicocephalus ridibundus</i>	Black-headed Gull	0	LC	I	II	0	17	0

⁴ Red Data Book of Kyrgyz Republic, 2006⁵ International Union for Conservation of Nature and Natural Resources, 2024

№	Latin name	Common name	RDB of Kyrgyzstan ⁴	IUCN Red List ⁵	Susceptibility to electrocution	Susceptibility to collision ^{Error!} Bookmark not defined.	Total number of observed individuals		
							December 2024	January 2025	February 2025
25	<i>Larus canus</i>	Common Gull	0	LC	I	II	8	55	38
26	<i>Larus cachinnans</i>	Caspian Gull	0	LC	I	II	105	240	392
27	<i>Phalacrocorax carbo</i>	Great Cormorant	0	LC	I	I	0	2	2
28	<i>Ardea alba</i>	Great Egret	0	LC	I	II	3	3	3
29	<i>Ardea cinerea</i>	Grey Heron	0	LC	I	II	2	1	2
						Total	2302	4303	4339

3.1 Threatened species description and observation

3.1.1 Whooper Swan (*Cygnus cygnus*) - Category VII; IUCN (LC)

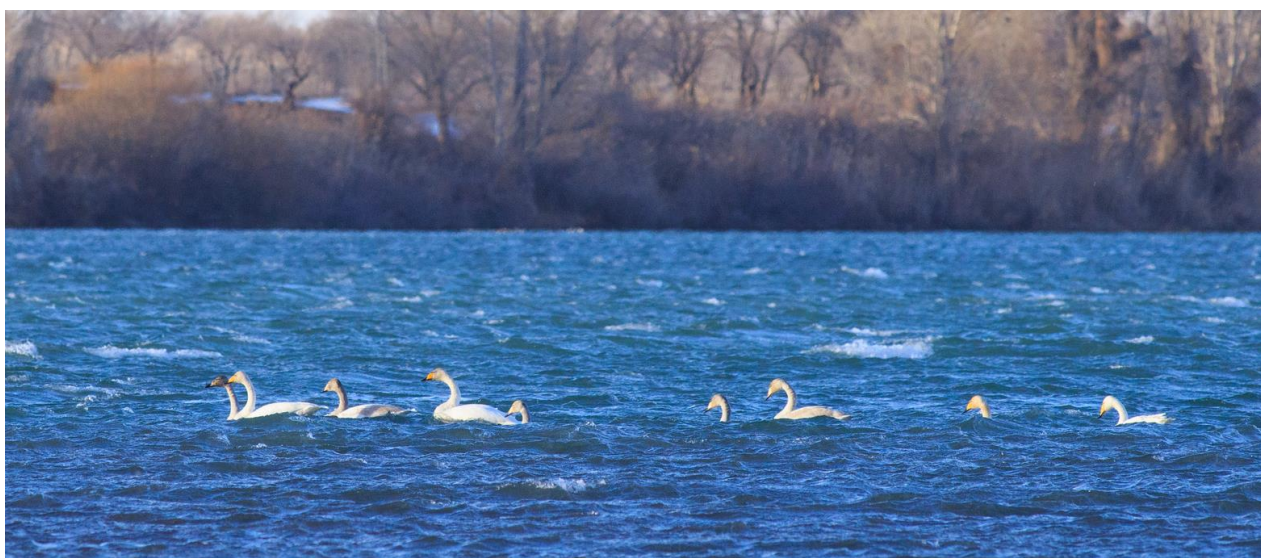
Status: Rare breeding species.

One of seven species of the genus worldwide and one of three in the fauna Kyrgyzstan. Monotypic species.

Habitat: Primarily inhabits shallow waters of large reservoirs with abundant underwater vegetation. Winters in the shallow waters of Lake Issyk-Kul.

Distribution: Widely distributed throughout the forest and steppe zones of Eurasia. Historically nested on Lake Son-Kul (1-2 pairs in the 1980s-1990s) but no recent sightings. During migration, found on all major water bodies across Kyrgyzstan. Occasionally present at large water bodies during summer months. Significant wintering population on Lake Issyk-Kul

Observation: During the observation, between 141 and 168 individuals were recorded in each survey. This species is classified as susceptible to collisions with OHTL, with a status of II.



Photos by Tatyana Menyshikova

3.1.2 Ferruginous Duck (*Aythya nyroca*) - Category VI; IUCN: (NT)

Monotypic species. One of four *Aythya* species found in the avifauna of the Kyrgyz Republic.

Habitat: Prefers lakes, reservoirs, and ponds with abundant aquatic vegetation and rich populations of small aquatic animals.

Distribution: Found in the Chui Valley, Priissykkulia region, and lakes of the Inner Tien Shan within the Kyrgyz Republic.

Observation: Only one individual was observed during the January survey. Classified as status II for susceptibility to collision.

3.1.3 Common Pochard (*Aythya ferina*) - IUCN: (VU)

Status: Common breeding species and numerous during migration periods.

Habitat: Prefers both fresh and saltwater steppe lakes and rivers with significant reed growth, particularly favoring deeper water bodies. Also nests in mountainous regions at elevations up to 1,500 meters in the Altai.

Distribution: Widely distributed throughout Kyrgyzstan, inhabiting all major water bodies across the country.

Observation: During the survey, between 197 and 857 individuals were observed. Classified as status II for susceptibility to collision with OHTL.



3.1.4 Horned Grebe (*Podiceps auritus*) - IUCN: (VU)

Status: A rare breeding migratory bird.

Distribution: In Kyrgyzstan, it inhabits the water areas of Issyk-Kul and is also found on lakes in the central part of the country, such as Chatyr-Kul and Son-Kol.

Habitat: Inhabits small lakes, ponds, and deep-water mires with abundant floating vegetation.

Observation: During the survey, 24 individuals of *Podiceps auritus* were observed in December and 9 individuals were recorded in January. Classified as status II for susceptibility to collision with OHTL.



4 Conclusion

The waterbird winter survey was conducted during the three days in full compliance with the plan. During the study, 29 bird species were found, four of which have IUCN Red List or (and) Kyrgyz Red Data Book conservation status. 28 out of 29 bird species have II collision risk status.

5 Annex 1

Table 2. Observations collected during the survey

Date	Meeting time	N	E	Weather	Latin name	Number
27.12.2024	09:30	42.45028	76.18303	Sunny	<i>Anas acuta</i>	6
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Mareca penelope</i>	3
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Spatula querquedula</i>	4
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Fulica atra</i>	267
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Aythya ferina</i>	58
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Netta rufina</i>	41
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Cygnus olor</i>	24
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Cygnus cygnus</i>	34
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Aythya fuligula</i>	44
27.12.2024	09:31	42.45028	76.18303	Sunny	<i>Podiceps nigricollis</i>	45
27.12.2024	09:32	42.45028	76.18303	Cloudy	<i>Podiceps auritus</i>	12
27.12.2024	09:32	42.45028	76.18303	Cloudy	<i>Anas platyrhynchos</i>	49
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Fulica atra</i>	59
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Tachybaptus ruficollis</i>	8
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Cygnus cygnus</i>	19
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Larus cachinnans</i>	34
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Anas platyrhynchos</i>	9
27.12.2024	10:10	42.45097	76.18695	Cloudy	<i>Netta rufina</i>	24
27.12.2024	10:45	42.45276	76.20642	Cloudy	<i>Anser anser</i>	4
27.12.2024	10:45	42.45276	76.20642	Cloudy	<i>Fulica atra</i>	122
27.12.2024	10:45	42.45276	76.20642	Sunny	<i>Aythya fuligula</i>	38
27.12.2024	10:45	42.45276	76.20642	Sunny	<i>Podiceps nigricollis</i>	19
27.12.2024	10:45	42.45276	76.20642	Sunny	<i>Tachybaptus ruficollis</i>	3
27.12.2024	10:45	42.45276	76.20642	Sunny	<i>Cygnus cygnus</i>	19
27.12.2024	10:45	42.45276	76.20642	Sunny	<i>Larus canus</i>	2
27.12.2024	10:47	42.45276	76.20642	Sunny	<i>Larus cachinnans</i>	3
27.12.2024	10:47	42.45276	76.20642	Sunny	<i>Anas platyrhynchos</i>	5
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Fulica atra</i>	113
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Netta rufina</i>	41
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Aythya ferina</i>	24
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Larus canus</i>	2
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Ardea cinerea</i>	2
27.12.2024	11:00	42.45231	76.20565	Sunny	<i>Ardea alba</i>	3
27.12.2024	11:02	42.45231	76.20565	Sunny	<i>Bucephala clangula</i>	3
27.12.2024	11:10	42.45248	76.20322	Sunny	<i>Fulica atra</i>	87
27.12.2024	11:10	42.45248	76.20322	Sunny	<i>Anas platyrhynchos</i>	12
27.12.2024	11:10	42.45248	76.20322	Sunny	<i>Cygnus olor</i>	14
27.12.2024	11:10	42.45248	76.20322	Sunny	<i>Podiceps cristatus</i>	3
27.12.2024	11:30	42.45147	76.19808	Sunny	<i>Fulica atra</i>	20
27.12.2024	11:30	42.45147	76.19808	Sunny	<i>Podiceps nigricollis</i>	6
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Mergellus albellus</i>	3
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Bucephala clangula</i>	9
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Tachybaptus ruficollis</i>	2
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Cygnus cygnus</i>	6
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Fulica atra</i>	31
27.12.2024	12:10	42.45940	76.23391	Sunny	<i>Aythya fuligula</i>	29
27.12.2024	12:12	42.45940	76.23391	Sunny	<i>Aythya ferina</i>	47

Date	Meeting time	N	E	Weather	Latin name	Number
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Netta rufina</i>	9
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Anas platyrhynchos</i>	6
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Larus cachinnans</i>	1
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Podiceps nigricollis</i>	15
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Cygnus olor</i>	18
27.12.2024	12:19	42.45762	76.22806	Sunny	<i>Podiceps cristatus</i>	1
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Fulica atra</i>	349
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Cygnus cygnus</i>	19
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Larus cachinnans</i>	48
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Larus canus</i>	4
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Aythya fuligula</i>	79
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Aythya ferina</i>	68
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Netta rufina</i>	41
27.12.2024	13:05	42.39528	76.22761	Sunny	<i>Anas platyrhynchos</i>	24
27.12.2024	13:06	42.39528	76.22761	Sunny	<i>Cygnus olor</i>	13
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Tringa ochropus</i>	1
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Cygnus olor</i>	10
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Podiceps cristatus</i>	3
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Fulica atra</i>	77
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Cygnus cygnus</i>	44
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Podiceps nigricollis</i>	14
27.12.2024	13:27	42.41104	76.20796	Sunny	<i>Podiceps auritus</i>	12
27.12.2024	13:30	42.41104	76.20796	Sunny	<i>Mergellus albellus</i>	3
27.12.2024	13:30	42.41104	76.20796	Sunny	<i>Larus cachinnans</i>	19
27.12.2024	13:31	42.41104	76.20796	Sunny	<i>Anas platyrhynchos</i>	12
26.01.2025	15:20	42.41104	76.20796	Sunny	<i>Fulica atra</i>	64
26.01.2025	15:20	42.41104	76.20796	Sunny	<i>Anas platyrhynchos</i>	3
26.01.2025	15:20	42.41104	76.20796	Sunny	<i>Cygnus olor</i>	12
26.01.2025	15:20	42.41104	76.20796	Sunny	<i>Cygnus cygnus</i>	49
26.01.2025	15:20	42.41104	76.20796	Sunny	<i>Aythya fuligula</i>	49
26.01.2025	15:21	42.41104	76.20796	Sunny	<i>Chroicocephalus ridibundus</i>	3
26.01.2025	15:21	42.41104	76.20796	Sunny	<i>Larus cachinnans</i>	2
26.01.2025	15:21	42.41104	76.20796	Sunny	<i>Tadorna ferruginea</i>	6
26.01.2025	15:26	42.41104	76.20796	Sunny	<i>Fulica atra</i>	159
26.01.2025	15:26	42.41104	76.20796	Sunny	<i>Aythya ferina</i>	77
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Aythya ferina</i>	41
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Netta rufina</i>	87
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Cygnus olor</i>	19
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Cygnus cygnus</i>	15
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Tringa totanus</i>	1
26.01.2025	15:39	42.39528	76.22761	Sunny	<i>Larus cachinnans</i>	54
26.01.2025	15:41	42.39528	76.22761	Sunny	<i>Bucephala clangula</i>	4
26.01.2025	15:41	42.39528	76.22761	Sunny	<i>Aythya fuligula</i>	89
26.01.2025	15:43	42.39528	76.22761	Sunny	<i>Mergellus albellus</i>	3
26.01.2025	15:43	42.39528	76.22761	Sunny	<i>Anas platyrhynchos</i>	103
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Anas platyrhynchos</i>	45
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Aythya ferina</i>	481
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Aythya nyroca</i>	1
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Aythya fuligula</i>	239
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Ardea cinerea</i>	1
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Larus cachinnans</i>	134

Date	Meeting time	N	E	Weather	Latin name	Number
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Cygnus olor</i>	26
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Cygnus cygnus</i>	37
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Ardea alba</i>	3
26.01.2025	16:14	42.45033	76.18307	Sunny	<i>Mareca penelope</i>	2
26.01.2025	16:15	42.45033	76.18307	Sunny	<i>Tringa totanus</i>	1
26.01.2025	16:15	42.45033	76.18307	Sunny	<i>Larus canus</i>	12
26.01.2025	16:15	42.45033	76.18307	Sunny	<i>Chroicocephalus ridibundus</i>	12
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Fulica atra</i>	437
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Netta rufina</i>	268
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Larus cachinnans</i>	34
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Larus canus</i>	29
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Aythya ferina</i>	164
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Cygnus olor</i>	28
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Cygnus cygnus</i>	34
26.01.2025	16:28	42.45276	76.20642	Sunny	<i>Anas platyrhynchos</i>	28
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Fulica atra</i>	390
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Cygnus olor</i>	19
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Cygnus cygnus</i>	14
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Anas platyrhynchos</i>	27
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Spatula clypeata</i>	6
26.01.2025	16:32	42.45231	76.20565	Sunny	<i>Bucephala clangula</i>	32
26.01.2025	16:34	42.45231	76.20565	Sunny	<i>Tachybaptus ruficollis</i>	12
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Podiceps auritus</i>	9
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Podiceps nigricollis</i>	47
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Podiceps cristatus</i>	12
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Fulica atra</i>	459
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Cygnus olor</i>	5
26.01.2025	16:34	42.45248	76.20322	Sunny	<i>Cygnus cygnus</i>	9
26.01.2025	16:36	42.45248	76.20322	Sunny	<i>Aythya ferina</i>	65
26.01.2025	16:36	42.45248	76.20322	Sunny	<i>Netta rufina</i>	29
26.01.2025	16:36	42.45248	76.20322	Sunny	<i>Anas platyrhynchos</i>	12
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Anas acuta</i>	9
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Tadorna ferruginea</i>	6
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Tachybaptus ruficollis</i>	9
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Podiceps cristatus</i>	6
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Larus canus</i>	5
26.01.2025	16:40	42.45248	76.20322	Sunny	<i>Larus cachinnans</i>	5
26.01.2025	17:02	42.45940	76.23391	Sunny	<i>Fulica atra</i>	47
26.01.2025	17:02	42.45940	76.23391	Sunny	<i>Aythya ferina</i>	29
26.01.2025	17:02	42.45940	76.23391	Sunny	<i>Podiceps cristatus</i>	2
26.01.2025	17:02	42.45940	76.23391	Sunny	<i>Cygnus cygnus</i>	6
26.01.2025	17:02	42.45940	76.23391	Sunny	<i>Larus cachinnans</i>	2
26.01.2025	17:02	42.45762	76.22806	Sunny	<i>Fulica atra</i>	121
26.01.2025	17:02	42.45762	76.22806	Sunny	<i>Netta rufina</i>	19
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Cygnus olor</i>	2
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Cygnus cygnus</i>	4
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Tadorna ferruginea</i>	6
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Larus cachinnans</i>	9
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Chroicocephalus ridibundus</i>	2
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Larus canus</i>	9

Date	Meeting time	N	E	Weather	Latin name	Number
26.01.2025	17:08	42.45762	76.22806	Sunny	<i>Phalacrocorax carbo</i>	2
09.02.2025	11:15	42.4594	76.23391	Sunny	<i>Fulica atra</i>	5
09.02.2025	11:15	42.4594	76.23391	Sunny	<i>Cygnus cygnus</i>	3
09.02.2025	11:15	42.4576	76.22806	Sunny	<i>Larus cachinnans</i>	2
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Cygnus cygnus</i>	39
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Cygnus olor</i>	21
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Fulica atra</i>	459
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Aythya fuligula</i>	264
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Netta rufina</i>	365
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Aythya ferina</i>	201
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Podiceps cristatus</i>	9
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Tachybaptus ruficollis</i>	12
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Anas platyrhynchos</i>	36
09.02.2025	11:32	42.4515	76.19808	Sunny	<i>Larus cachinnans</i>	56
09.02.2025	11:37	42.4515	76.19808	Sunny	<i>Aythya marila</i>	12
09.02.2025	11:37	42.4515	76.19808	Sunny	<i>Bucephala clangula</i>	3
09.02.2025	11:50	42.4528	76.20642	Sunny	<i>Larus cachinnans</i>	208
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Fulica atra</i>	397
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Cygnus olor</i>	39
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Cygnus cygnus</i>	26
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Netta rufina</i>	209
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Aythya ferina</i>	63
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Podiceps cristatus</i>	5
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Aythya fuligula</i>	49
09.02.2025	11:50	42.4528	76.20642	Cloudy	<i>Aythya marila</i>	25
09.02.2025	12:03	42.451	76.18695	Cloudy	<i>no birds, a lot of people</i>	0
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Larus cachinnans</i>	59
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Fulica atra</i>	458
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Cygnus olor</i>	45
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Cygnus cygnus</i>	28
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Netta rufina</i>	159
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Aythya ferina</i>	25
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Podiceps cristatus</i>	2
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Aythya fuligula</i>	78
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Aythya marila</i>	19
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Anas platyrhynchos</i>	36
09.02.2025	12:03	42.4503	76.18307	Sunny	<i>Tachybaptus ruficollis</i>	3
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Anas platyrhynchos</i>	103
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Netta rufina</i>	87
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Cygnus olor</i>	19
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Cygnus cygnus</i>	15
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Tringa totanus</i>	1
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Larus canus</i>	26
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Bucephala clangula</i>	6
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Aythya fuligula</i>	154
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Mergellus albellus</i>	3
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Larus cachinnans</i>	44
09.02.2025	12:09	42.411	76.20796	Sunny	<i>Aythya ferina</i>	159
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Cygnus olor</i>	12
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Cygnus cygnus</i>	19
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Fulica atra</i>	58
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Anas platyrhynchos</i>	47

Date	Meeting time	N	E	Weather	Latin name	Number
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Anas acuta</i>	10
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Tringa totanus</i>	1
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Aythya ferina</i>	26
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Ardea alba</i>	3
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Ardea cinerea</i>	2
09.02.2025	12:35	42.4067	76.22046	Sunny	<i>Phalacrocorax carbo</i>	2
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Anas platyrhynchos</i>	9
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Cygnus olor</i>	9
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Cygnus cygnus</i>	12
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Podiceps nigricollis</i>	12
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Larus cachinnans</i>	23
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Larus canus</i>	12
09.02.2025	12:46	42.3953	76.22761	Sunny	<i>Netta rufina</i>	45

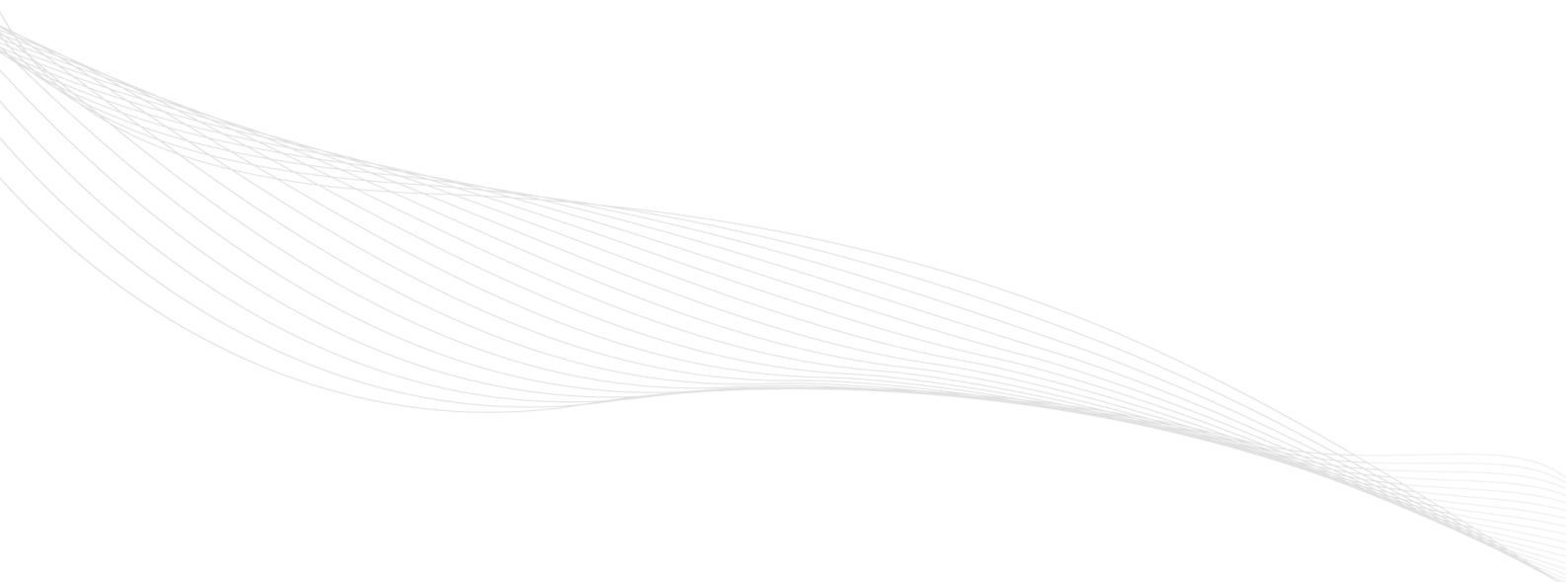


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Technical appendix 18: Canyon visual survey report



Kemin-Balykchy 500 kV OHTL

Environmental & Social Impact Assessment (ESIA): Canyon visual survey report

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Document Information

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1.0	25 May 2025	Final report	Danila Avdulov	Nicola Davies	Nicola Davies

Disclaimer

The Visual survey report (the "Report") has been prepared by Juru. Whilst the information contained in the Report reflects the current status, Juru makes no representation or warranty, express or implied, as to the accuracy of the information set forth in this Report and accepts no liability for any information that may have been misstated or omitted.

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Table of Contents

1.....	3
2 Introduction.....	4
3 Results.....	6
3.1 Area 1	6
3.2 Area 2	10
3.3 Area 3	17
3.4 Area 4	24
4 Summary	30

Table of Figures

Figure 1: Photopoints at the Kok-Moynok Canyon.....	5
Figure 2: Area 1 photopoints	7
Figure 3: Photopoint 1. Canyon access road	8
Figure 4: Photopoint 2. Canyon access road	9
Figure 5: Area 2 photopoints	11
Figure 6: Photopoint 3. Entrance canyon gorge	12
Figure 7: Photopoint 4. Canyon scenic walls - entrance gorge	13
Figure 8: Photopoint 5. Existing 220kV line - central view (south).....	14
Figure 9: Photopoint 6. Existing 220kV line - view to the left (west).....	15
Figure 10: Photopoint 7. Existing 220kV line - view to the right (south)	16
Figure 11: Area 3 photopoints.....	18
Figure 12: Photopoint 8. Existing 220kV line - central view (south).....	19
Figure 13: Photopoint 9. Existing 220kV line tower - view to the right (east)	20
Figure 14: Photopoint 10. View to the planned line (north).....	21
Figure 15: Photopoint 11. Existing 500kV line (NE)	22
Figure 16: Photopoint 12. Existing 220kV lines (north). Upper canyon point.....	23
Figure 17: Area 4 photopoints.....	25
Figure 18: Photopoint 13. View to the existing 220kV and 500kv lines (south)	26
Figure 19: Photopoint 14. All three existing lines within the canyon area (east).....	27
Figure 20: Photopoint 15. View on the scenic part of canyon and existing 220kV and 500kV lines (SE)	28
Figure 21: Photopoint 16. View on the scenic part of canyon and existing 220kV and 500kV lines (SW)	29

1 Introduction

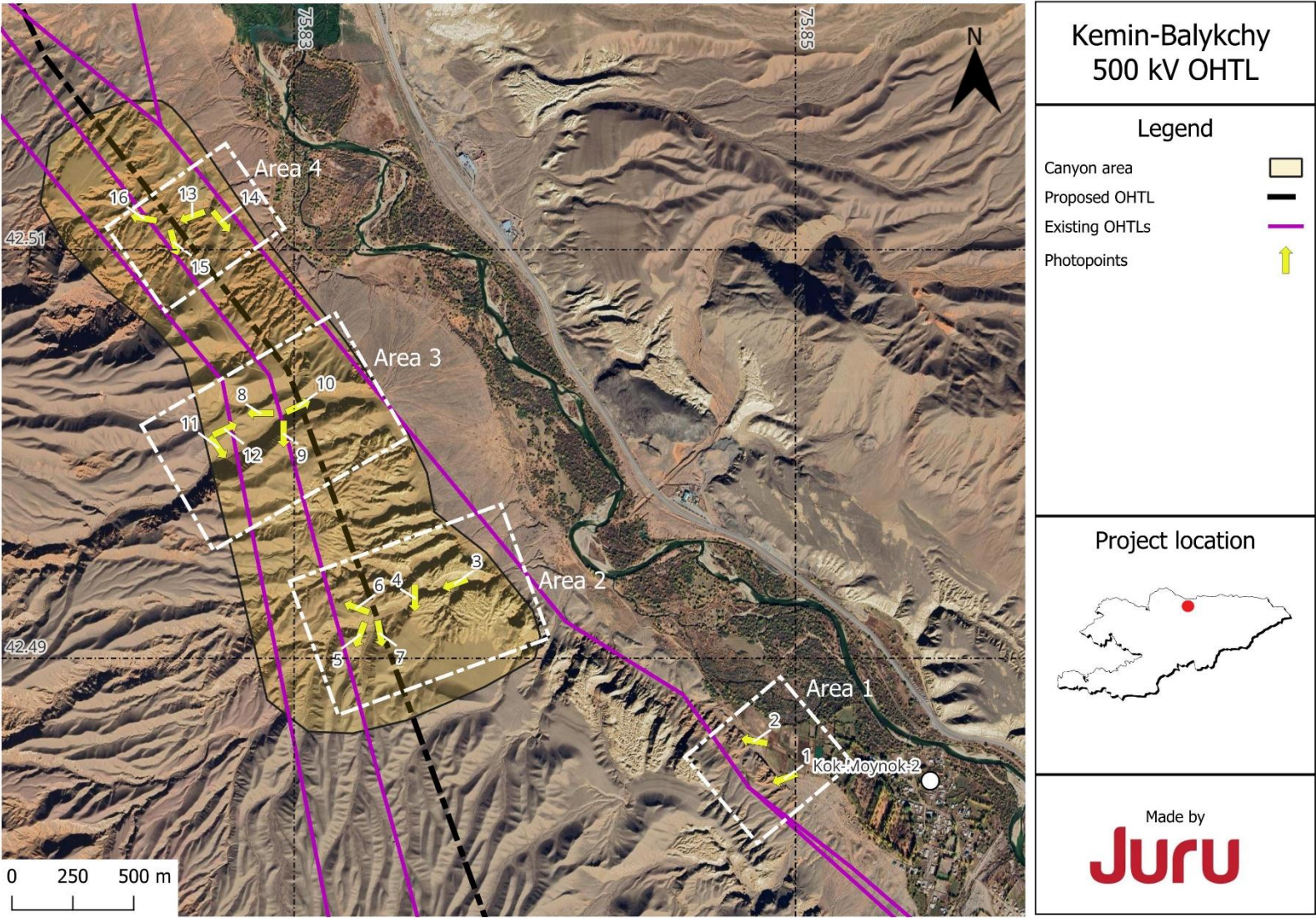
In the western part of the Issyk-Kul Region, parallel to the EM-11 highway and on the left bank of the Chu river, lies the Kok-Moynok Canyon. The canyon is a scenic location and one of the region's notable landmarks. At the time of this report's preparation, access to the canyon is unrestricted, and there is no tourism infrastructure in place. The canyon is also part of the "Texey" Geopark¹ (an area that brings together scenic sites without assigning them any protected status).

Nevertheless, three OHTLs run through the canyon - one 500 kV line and two 220 kV lines. Two of the lines (one 220 kV and one 500 kV) pass directly through the center of the canyon, aligned with elevated points in the terrain, while the third line runs along the northern edge of the canyon, near gravel/dirt access routes. The planned 500 kV Kemin-Balykchy line also crosses the canyon. It was designed to maintain the minimum distance from existing lines in accordance with current standards. The distance between the planned line and the nearest existing 220 kV line within the canyon varies between 70 and 100 meters.

Figure 1 shows the area encompassing the canyon itself (no official boundaries exist; they were defined based on visual observations of dirt roads actively used by tourists within the quarry) as well as access routes from the Kok-Moynok-2 village - the shortest route from the EM-11 highway runs from there. Arrows on the map indicating photo points are oriented in the direction the photographs were taken. Several areas - labeled 1 to 4 - are highlighted on the map and will be discussed further below.

¹ Geoparks are areas that showcase geological diversity and promote sustainable regional development based on local initiatives - <https://teskei-geopark.com/ru/about/what-is-geopark>

Figure 1: Photopoints at the Kok-Moynok Canyon



2 Results

2.1 Area 1

Area 1 is located along the access road to the canyon (Figure 2). On the right side of the road stretches an elevated landform composed of red rock formations of a picturesque shape - the same type of rock that forms the canyon itself. A 220 kV transmission line runs along the top of these rock ledges (approximately 10 meters high) for the entire length of the road. Example views from the road are shown in Figures Figure 3 and Figure 4.

Figure 2: Area 1 photopoints

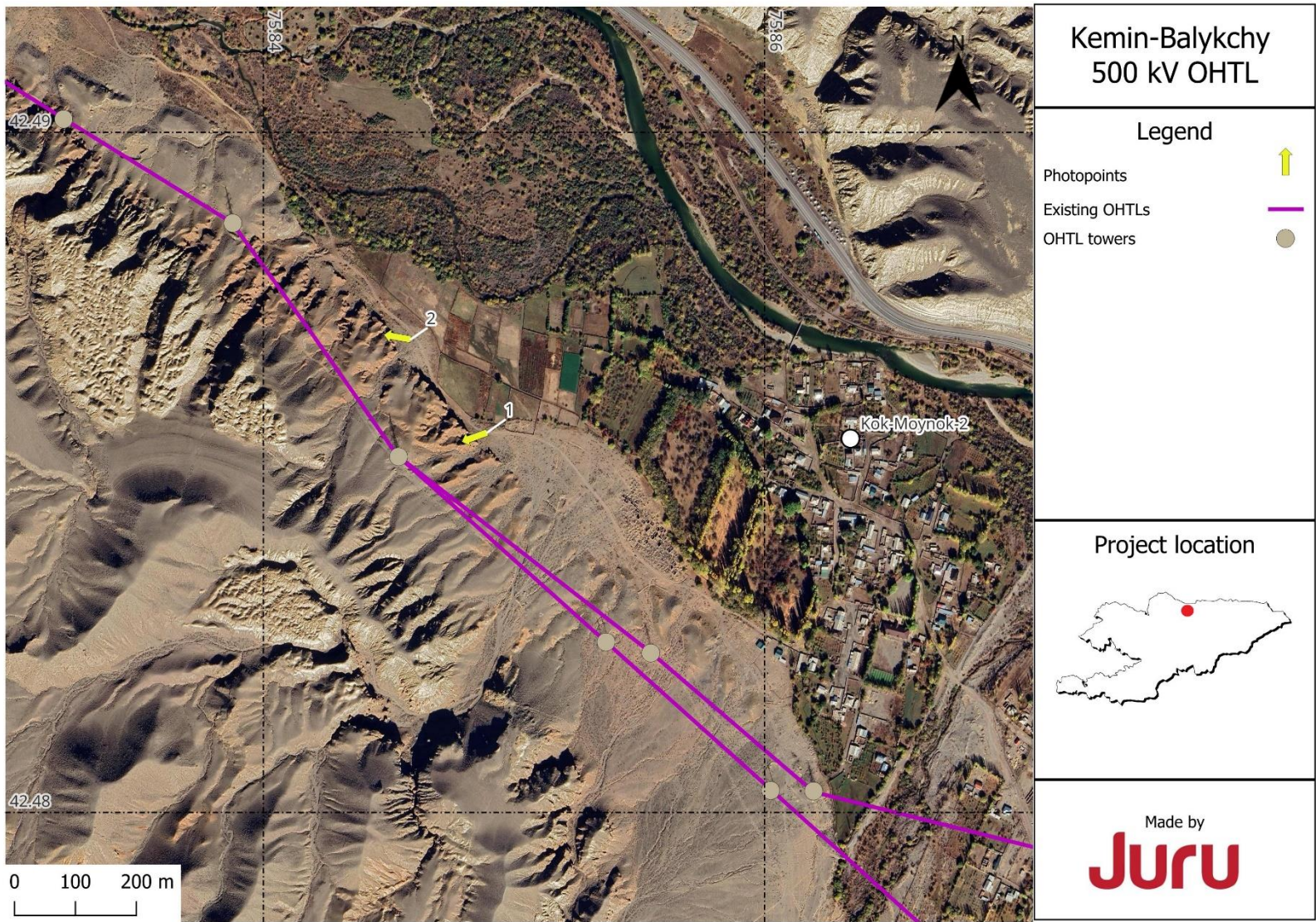


Figure 3: Photopoint 1. Canyon access road



Figure 4: Photopoint 2. Canyon access road



2.2 Area 2

Area 2 is the most accessible part of the quarry due to its close proximity to the access road (Figure 5).

In this section, entry into the canyon is characterized by narrow gorges - this part of the area may be one of the most important in terms of tourism potential due to its distinct contrast with the surrounding terrain (Figure 6 and Figure 7). The narrow gorges gradually transition into wider and gentler slopes. From here, there is a clear view of the existing 220 kV transmission line (Figures Figure 8, Figure 9, Figure 10). The planned Kemin-Balykchy 500 kV OHTL crosses above the central elevation shown in Figure 8.

Figure 5: Area 2 photopoints

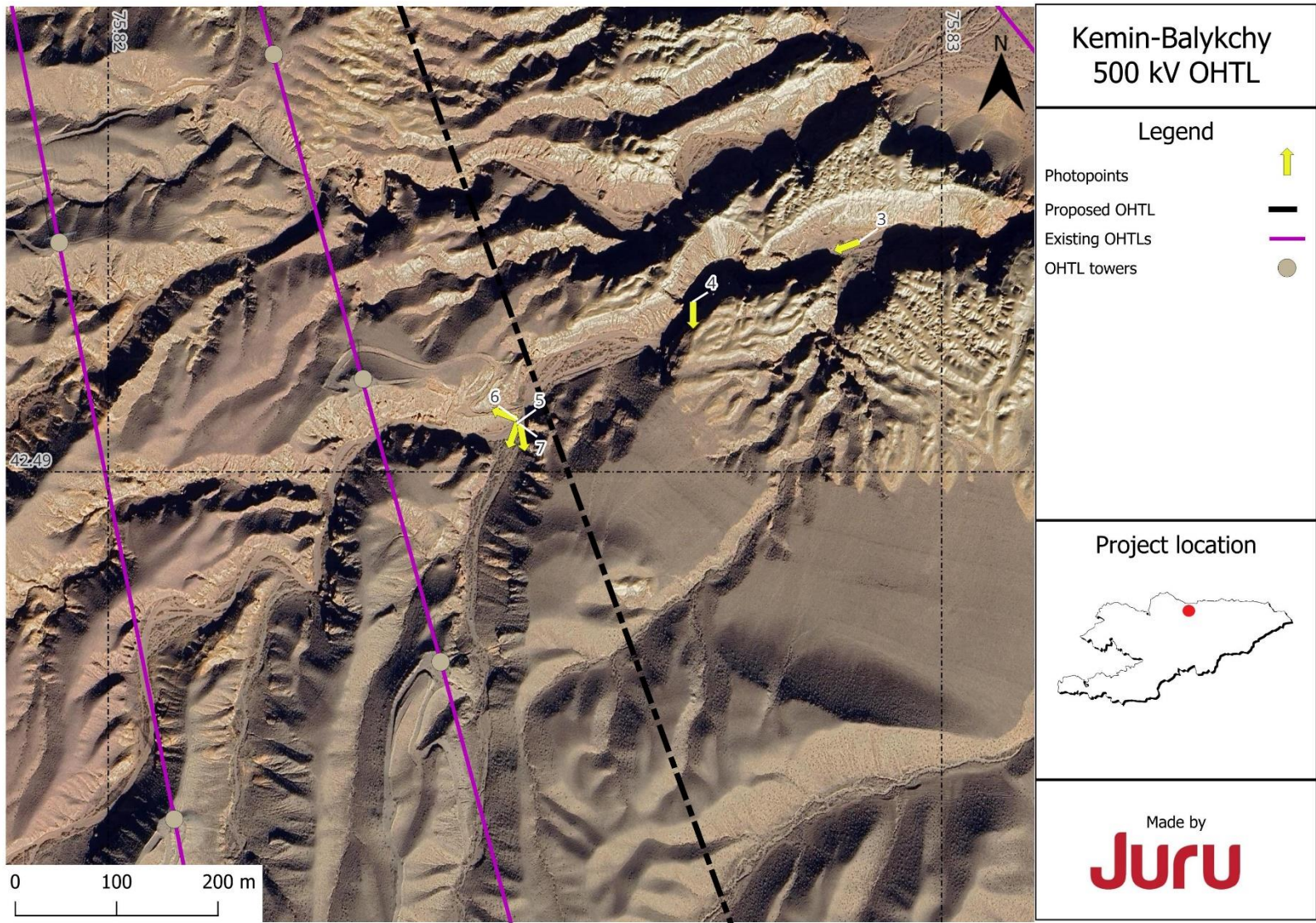


Figure 6: Photopoint 3. Entrance canyon gorge



Figure 7: Photopoint 4. Canyon scenic walls - entrance gorge



Figure 8: Photopoint 5. Existing 220kV line - central view (south)



Figure 9: Photopoint 6. Existing 220kV line - view to the left (west)



Figure 10: Photopoint 7. Existing 220kV line - view to the right (south)



2.3 Area 3

Area 3 is the next most accessible section after Area 2 (Figure 11).

In this part of the canyon, the landscape widens and features erosion grooves along the canyon walls, giving it a distinctive appearance. Unlike the previous area, the towers of the 220 kV line (the one closest to the planned line) are less visible here due to the steep slopes; however, the conductors themselves remain clearly visible (Figure 12 and Figure 13).

Figure 14 captures a natural view that will be altered by the conductors of the planned line - they will pass very close to the foreground of the photograph.

If one continues deeper into the canyon, it becomes necessary to ascend a slope, from where, beneath the 500 kV line (Figure 15 and Figure 16), a view opens up to both 220 kV lines to the south. The planned line will run between them, adjacent to the closest one.

Figure 11: Area 3 photopoints

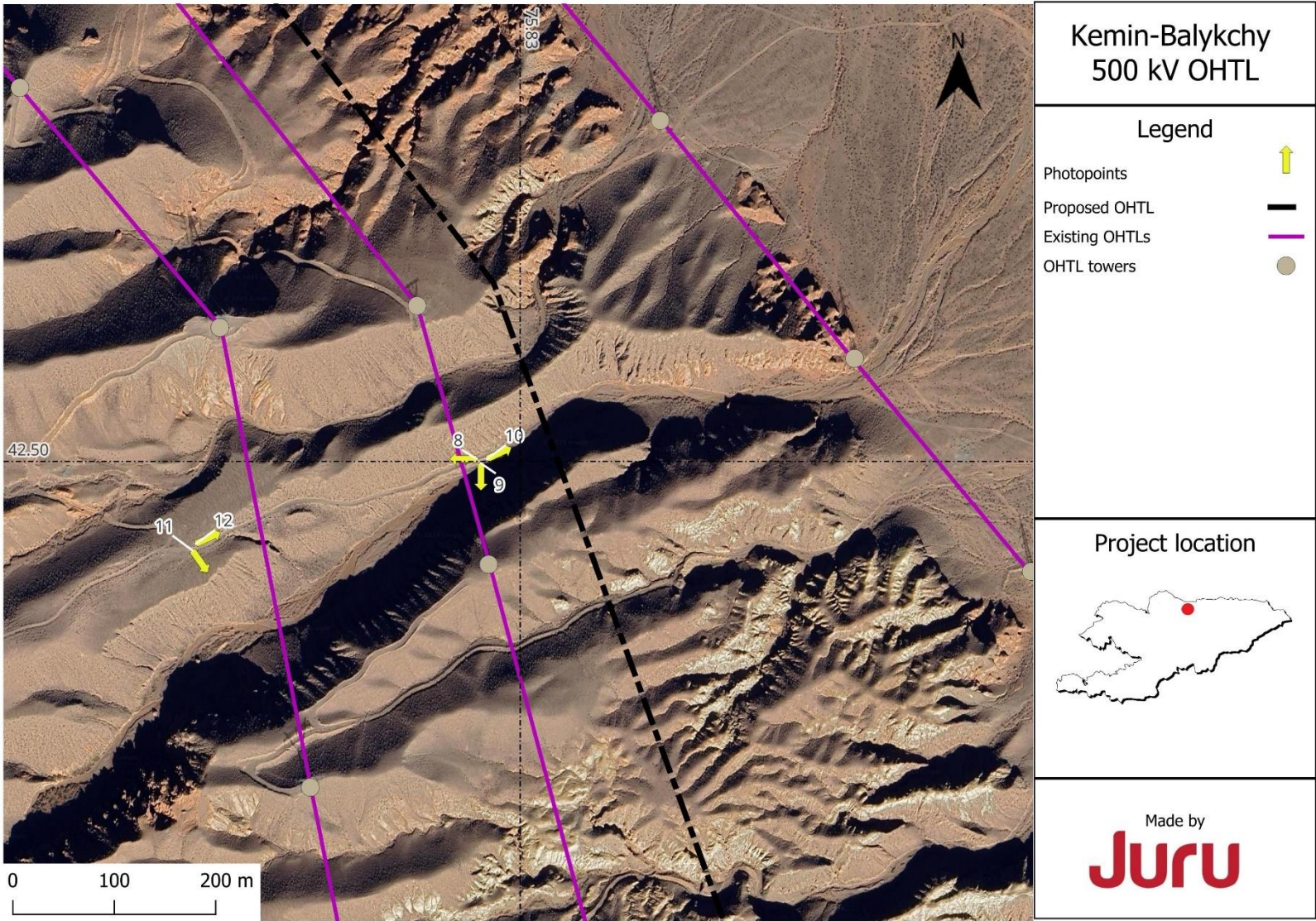


Figure 12: Photopoint 8. Existing 220kV line - central view (south)



Figure 13: Photopoint 9. Existing 220kV line tower - view to the right (east)



Figure 14: Photopoint 10. View to the planned line (north)



Figure 15: Photopoint 11. Existing 500kV line (NE)



Figure 16: Photopoint 12. Existing 220kV lines (north). Upper canyon point



2.4 Area 4

The furthest section along the road consists of several parallel gorges, 15–30 meters deep, with intricately shaped slopes in red rocks - this location may be the most visually appealing for visitors (Figure 17).

After crossing the first 220 kV line from the road, the terrain gradually rises along the roadside, developing into fully formed gorges. From this point, all existing transmission lines are clearly visible (Figure 18 and Figure 19).

At the location where the planned line is set to pass, several deep gorges with steep red slopes begin - placing this section between the planned and existing 220 kV line (Figure 20 and Figure 21). The gorges continue between the existing 220 kV and 500 kV lines and end in elevated terrain near the 500 kV line crossing. In this area, the towers are barely visible from the bottoms of the gorges, though some conductors of the existing lines can be seen.

Figure 17: Area 4 photopoints

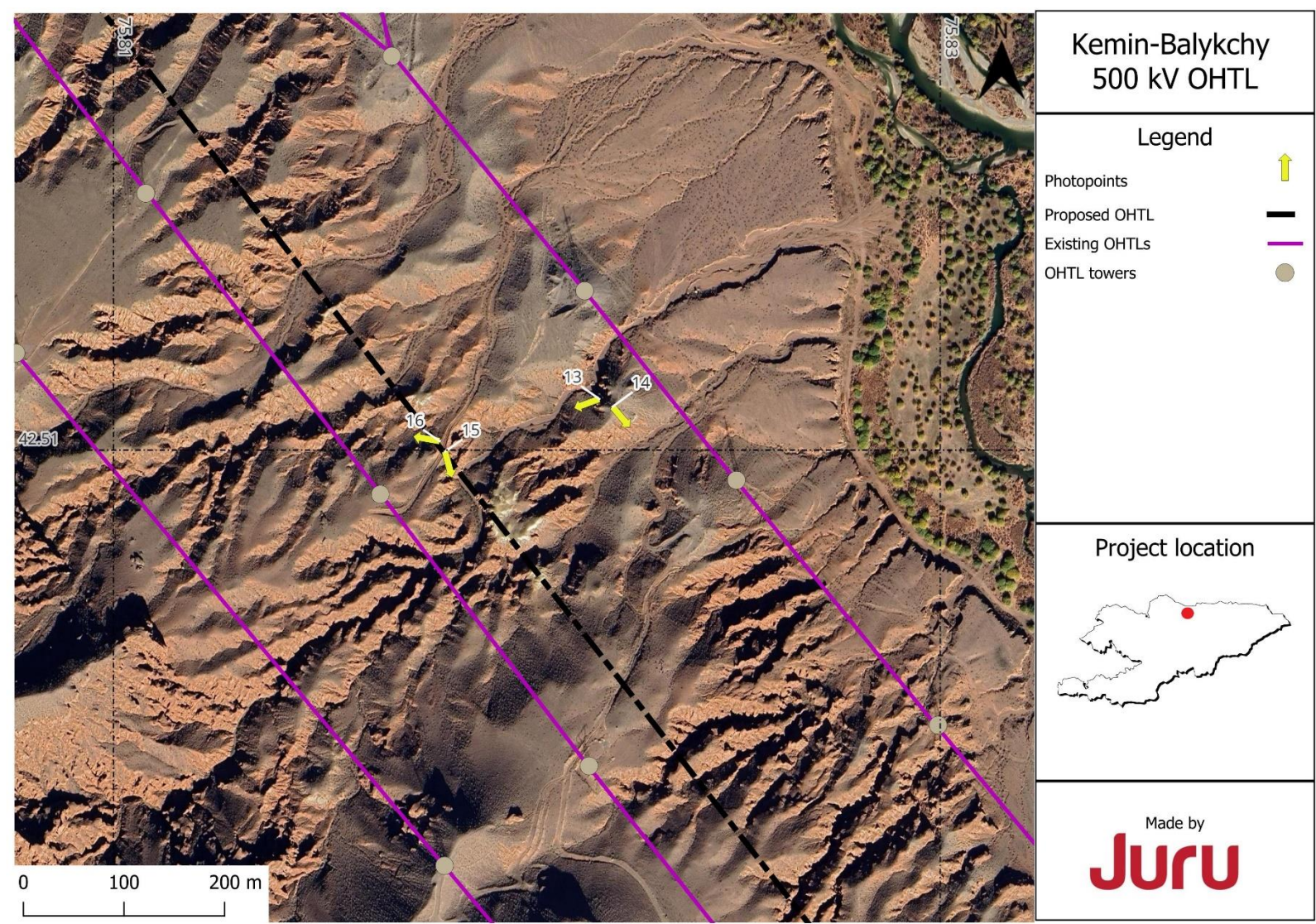


Figure 18: Photopoint 13. View to the existing 220kV and 500kv lines (south)



Figure 19: Photopoint 14. All three existing lines within the canyon area (east)



Figure 20: Photopoint 15. View on the scenic part of canyon and existing 220kV and 500kV lines (SE)



Figure 21: Photopoint 16. View on the scenic part of canyon and existing 220kV and 500kV lines (SW)



3 Summary

Each of the surveyed sections of the canyon has its own distinct characteristics, both in terms of aesthetic value and the layout of existing transmission lines.

Already along the access roads in Area 1, the visual transformation of the landscape is noticeable.

In Area 2, according to publicly available photo materials, the narrow canyon segment appears to be the most visited - it lies between the 220 kV line running along the access road and the planned line, though at a significant distance from both.

In Area 3, the planned line may visually narrow the scenic corridor between the existing 220 kV lines, though this is more likely due to the presence of the conductors than the towers themselves.

Area 4 offers a view of the rising terrain of the canyon, making all three lines clearly visible from the entrance. The most dramatic and visually prominent sections of the canyon begin near the planned line and continue toward the 500 kV line to the south.

Technical appendix 19: Archaeological Field Studies

Заказчик:

Исполнитель:

А Абдыканова

СОГЛАСОВАНО

Министерство культуры,
информации и молодёжной политики
Кыргызской Республики

Исх.№ _____

«____» _____ 2025 г.

ЗАКЛЮЧЕНИЕ

историко-культурной экспертизы участка ЛЭП общей протяженностью
52,9 ка на территории Иссык-Кульской и Чуйской областей

Бишкек – 2025

СОДЕРЖАНИЕ

АННОТАЦИЯ

ВВЕДЕНИЕ

ПРЕДЫДУЩИЕ ИССЛЕДОВАНИЯ

МЕТОДИКА

РЕЗУЛЬТАТЫ ЭКСПЕРТИЗЫ

ЗАКЛЮЧЕНИЕ

ЛИТЕРАТУРА

ПРИЛОЖЕНИЯ

АННОТАЦИЯ

Данная работа посвящена историко-культурной экспертизе участка ЛЭП общей протяженностью 52,9 км на территории Иссык-Кульской и Чуйской областей, с целью определения наличия или отсутствия объектов историко-культурного значения.

По итогам экспертизы на обследованном участке выявлены объекты и другие следы историко-культурного наследия.

ВВЕДЕНИЕ

Целью данной работы стало археологическое изучение участка участка ЛЭП общей протяженностью 52,9 км на территории Иссык-Кульской и Чуйской областей.

Территория участков была обследована путем археологической разведки, на предмет наличия или отсутствия объектов историко-культурного наследия.

В качестве основания проведения экспертизы послужил договор с компанией Энерджи Консалт.КГ по запросу от имени Juru Ltd. по заказу Европейского Банка Реконструкции и Развития и ОАО «Национальная электрическая сеть Кыргызстана» (ОАО «НЭС Кыргызстана»).

ПРЕДЫДУЩИЕ ИССЛЕДОВАНИЯ

Район обследования охватывает местность к западу от г. Балыкчи к северу от автодороги, ущелье Боом – северную часть до моста через реку Чу на повороте к перевалу Кубаки и южную часть от автодороги, долину Жел-Арык в Кеминском районе до существующей подстанции.

Согласно государственному списку объектов историко-культурного наследия на территории Тонского района Иссык-Кульской области в котором всего числится 14 объектов, и 10 объектов из них являются памятниками археологии, в зоне обследования расположен могильник Кок-Булак под номером 237 (Постановление Правительства КР от 20 августа 2002 года №568 «Об утверждении Положения об учете, охране, реставрации и использовании объектов историко-культурного наследия Кыргызской Республики»).

Могильник Кок-Булак был дополнительно исследован археологом О. Солтобаевым в 2019 году. Согласно отчету, могильник состоит из 29 комплексов, где объекты историко-культурного наследия представлены в основном курганами и петроглифами. По результатам обследования НИПИ «Кыргызреставрация» в 2021 году был создан проект зон охраны могильника Кок-Булак.

Район ущелья Боом и долина реки Жел-Арык ранее упоминаются в исследованиях с конца 19 века.

Известный востоковед В. В. Бартольд упоминает о небольших поселениях на левом берегу р. Чу – по дороге от Токмока через перевал Кастек, отмеченный Ковалёвым, и у с. Карабулак, где местные жители видели глиняные водопроводные трубы (Бартольд, 1897).

В 1899 г. местный краевед, Ф.В. Поярков по информации токмакского

учителя В.П. Ровнягина отметил 48 тюркских каменных изваяний в местности «Карой» вблизи почтовой станции Джель-Арык в 2 км от моста в Боомском ущелье. По его описанию они располагались на протяжении 1,5 вёрст и изначально их было больше. В соседнем урочище «Кашкален» на левом берегу р. Чу он насчитал 95 каменных изваяния (Поярков, 1897).

В 10 км к востоку от г. Кемин 1929 году А. И. Тереножкин отмечает могильник в виде ориентированной с севера на юг цепочки из 8 курганных насыпей из камня и земли (Тереножкин, 2012)

Археологические данные имеются у археолога В. П. Мокрынина по левому и правому берегу р. Чу. Среди исследованных и упомянутых им в 1974 году являются могильники Борумбай I-IV, Байбиче I-III и в районе сёл Джель-Арык и Чолок (Мокрынин, 1975).

Район Чолока у существующей подстанции был обследован археологом А. Абдыкановой в 2022 году. По результатам были выявлены могильники Кызыл-Октябрь 1-4, Саз-Булак, Жел-Арык 4, Чолок 1-2, часть которых в районе села Кызыл-Октябрь были раскопаны археологом К. Акматовым в 2023-2024 гг. (Абдыканова, 2022; Акматов, 2023; 2024). Могильники Чолок 1-2 являются объектом историко-культурного наследия республиканского значения под номером 170 и 171 (Постановление..., 2002). Могильник был открыт и задокументирован археологом В.П. Мокрыниным (Мокрынин, 1975).

Карта расположения объектов историко-культурного наследия в зоне обследования дана по следующей ссылке:

<https://www.google.com/maps/d/edit?hl=en&mid=1ykAq-EbVlzDP0t3z5e3JnWUtdOStyes&ll=42.58649100566859%2C75.80488650634614&z=11>

МЕТОДИКА

В ходе археологической разведки были применены методы визуального осмотра территории, проложены зигзагообразные маршруты для охвата наиболее большей площади, проведена GPS-фиксация маршрута, очертаний участков, а также других особенностей рельефа, проработаны информационные материалы в виде карт, книг и статей посвященных археологическому изучению местности.

РЕЗУЛЬТАТЫ ЭКСПЕРТИЗЫ

В окрестностях г. Балыкчы, в ущелье Боом и долине реки Жел-Арык был обследован участок проектируемой ЛЭП общей протяженностью 52,4 км (Рис.1-12). ЛЭП состоит из опор (каждые 250 и/или 350 метров), которые будут соединять ПС к западу от г. Балыкчы с ПС в Кемине.

Участок ПС в 7 км к западу от Балыкчи составляет 14,5 га и расположен на расстоянии 50 метров и далее к востоку, югу и западу от курганов могильника Кок-Булак.

От участка ПС в северо-восточном направлении уходит проектируемая ЛЭП. Вдоль линии **на расстоянии от 24 метров и далее выявлены отдельные курганы (n=4) могильника Кок-Булак**, что необходимо учесть при установке опор. Курган диаметром до 10 метров, высотой до 0,3 метра с каменно-земляной насыпью. Предварительно датируются в широких рамках эпохи ранних кочевников (VIII в. до н.э. – V в. н.э.). Координаты курганов:

(КВ 1) 42.46925, 76.05825

(КВ 2) 42.47037, 76.04521

(КВ 3) 42.47095, 76.04514

(КВ 4) 42.47177, 76.03544

Через 4,3 км ЛЭП входит в ущелье и проходит через высокие террасы. На пойменной террасе реки Кыямат-Кыркоол **в 20 метрах и далее северу от ЛЭП расположен комплекс Кыямат-Кыркоол, состоящий из петроглифов (n=11) и каменного изваяния**. Большая часть петроглифов зафиксирована на каменистой гряде, расположенной в 110 метрах и далее к северу от ЛЭП. Петроглифы и изваяния датируются средневековым временем. Координаты объектов:

(ККР 1) 42.4744, 76.00977

(ККР 2) 42.47456, 76.00957

(ККР 3) 42.47467, 76.00951

(ККР 4) 42.47474, 76.0096

(ККР 5) 42.47477, 76.00959

(ККР 6) 42.47487, 76.00968

(ККР 7) 42.47495, 76.00962

(КК ТТ) 42.4746, 76.00766

(ККР 8) 42.47459, 76.0072

(ККР 9) 42.47479, 76.00696

(ККР 10) 42.47353, 76.00496 (на расстоянии 20 метров)

(ККР 11) 42.47332, 76.00433 (на расстоянии 40 метров)

Далее через 2,3 км в урочище Капчыгай **на расстоянии 24 метров к югу от ЛЭП выявлены одиночный курган**. Курган с кольцевой

выкладкой, диаметром 6 метров, высотой 0,3 метра. Предварительно датируется тюркским временем (VI-XII вв.). Координаты кургана: (K1) 42.4723, 75.9764.

При переходе через реку Чу, на левом берегу на расстоянии 1 метра и далее выявлены курганы и петроглифы комплекса Тундук 2 (6 курганов и 2 валуна с петроглифами). Курганы разновременные, сакского и тюркского времени. Из сакских встречаются с кольцевой крепидой и прямоугольной оградкой по периметру. Один курган с оградкой и ящиком по центру на поверхности. Три кургана с широкой и высокой до 0,5 метров кольцевой насыпью с впадиной по центру типичны для тюркского времени. Петроглифы на валунах представлены изображениями горных козлов, поздними и более древними. Местами на комплексе встречаются остатки оснований древних жилищ. Координаты объектов:

T2 (1) 42.46607, 75.88022 (в 1 метре от ЛЭП)

T2P (2) 42.46561, 75.8797 (на ЛЭП)

T2 (3) 42.46534, 75.87936 (в 7 метрах)

T2 (4) 42.46542, 75.87897 (на ЛЭП)

T2 (5) 42.46544, 75.87998 (в 28 метрах)

T2P (6) 42.46529, 75.87986 (в 24 метрах)

T2 (7) 42.46514, 75.8798 (в 37 метрах)

T2 (8) 42.46515, 75.87994 (в 48 метрах)

Далее на левой террасе реки Байдамтал к югу от комплекса поминальных оградок Байдамтал в 6 метрах и далее от ЛЭП выявлена еще одна поминальная оградка. Координаты оградки: 42.47246, 75.84876.

Также выявлены ряд курганных могильников, комплексов петроглифов, поселений и поминальных комплексов, расположенных на расстоянии от 50 метров и далее от обследованного участка. Выявленные объекты предварительно датируются эпохой ранних кочевников (VIII в. до н.э. – V в. н.э.), тюркским периодом (VI-XII вв.), поздним средневековьем.

ЗАКЛЮЧЕНИЕ

от 11» июня 2025 г.

Настоящее Заключение историко-культурной экспертизы составлено А. Абдыкановой согласно условиям договора на проведение экспертизы от «4» апреля 2025 г. по заказу ОсОО «Энерджи Консалт.КГ» по запросу от имени Jugu Ltd. по заказу Европейского Банка Реконструкции и Развития и ОАО «Национальная электрическая сеть Кыргызстана» (ОАО «НЭС Кыргызстана») (далее – Заказчик).

Историко-культурная экспертиза (далее – Экспертиза) проведена на основании:

- Закона Кыргызской Республики № 91 от 26.07.1999 г. «Об охране и использовании историко-культурного наследия»;
- Земельного кодекса Кыргызской Республики от 02.06.1999 г., № 45.

Основание для проведения Экспертизы:

Трансформация и освоение земель.

Цель работ:

Определение наличия или отсутствия объектов историко-культурного наследия в зоне трансформации и освоения земель.

Территория Экспертизы:

Участок проектируемой ЛЭП общей протяженностью 52,9 км на территории Иссык-Кульской и Чуйской областей.

Методика:

Экспертиза проведена на основании информации, полученной от Заказчика, согласно методике проведения археологических экспертиз путем предварительной работы с библиографическими данными, анализа космических снимков программы Google Earth, топографических карт, GPS-фиксации, фотофиксации и визуального осмотра местности на наличие объектов историко-культурного наследия.

Заключение:

По результатам археологического обследования проектируемой ЛЭП общей протяженностью 52,9 км на территории Иссык-Кульской и Чуйской областей, выявлены следующие объекты и иные следы историко-культурного наследия:

А) на расстоянии до 50 метров:

- 1) 4 кургана могильника Кок-Булак (на расстоянии 24 метра и далее)

- 2) **2 валуна с петроглифами из комплекса Кыямат-Кыркоол (в 20 метрах и далее)**
- 3) **Могильник Тундук 2 к западу от могильника Тундук (на ЛЭП и далее)**
- 4) **Поминальная оградка к югу от комплекса Байдамтал (в 6 метрах и далее)**

Б) на расстоянии от 50 метров до 150 метров:

- 1) комплекс могильников Кок-Булак;
- 2) могильник Шыргый
- 3) могильник Тундук
- 4) одиночный курган Талды-Булак

В) на расстоянии далее 150 метров:

- 1) комплекс Кыямат-Кыркоол 2 (1 петроглиф и 4 кургана)
- 2) могильник Капчыгай 1-3
- 3) могильник Шыргый 2-3
- 4) Кокпак Кыркоо
- 5) могильник Тундук 3 (4 кургана)
- 6) комплекс поминальных оградок с каменными изваяниями Байдамтал
- 7) могильник Байдамтал 2
- 8) могильники Талды-Булак 1-2
- 9) комплекс петроглифов Талды-Булак
- 10) поселение Конорчек
- 11) могильник Жел-Арык 2-7

При установке опор Заказчику необходимо учитывать расположение выявленных объектов историко-культурного наследия на расстоянии 50 метров и далее от рабочей зоны.

Для объектов историко-культурного наследия, выявленных на расстоянии от 50 до 150 метров необходимо организовать работы по созданию Проекта охранных зон.

Данное заключение не является основанием для освоения земель, предназначенных для создания подъездных дорог к рабочим зонам. Для дополнительных участков, предназначенных для нужд строительства необходимо провести отдельную историко-культурную экспертизу.

Исполнитель:

А. Абдыканова

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ПРИЛОЖЕНИЯ

Рис.1. Общая карта участка и ОИКН

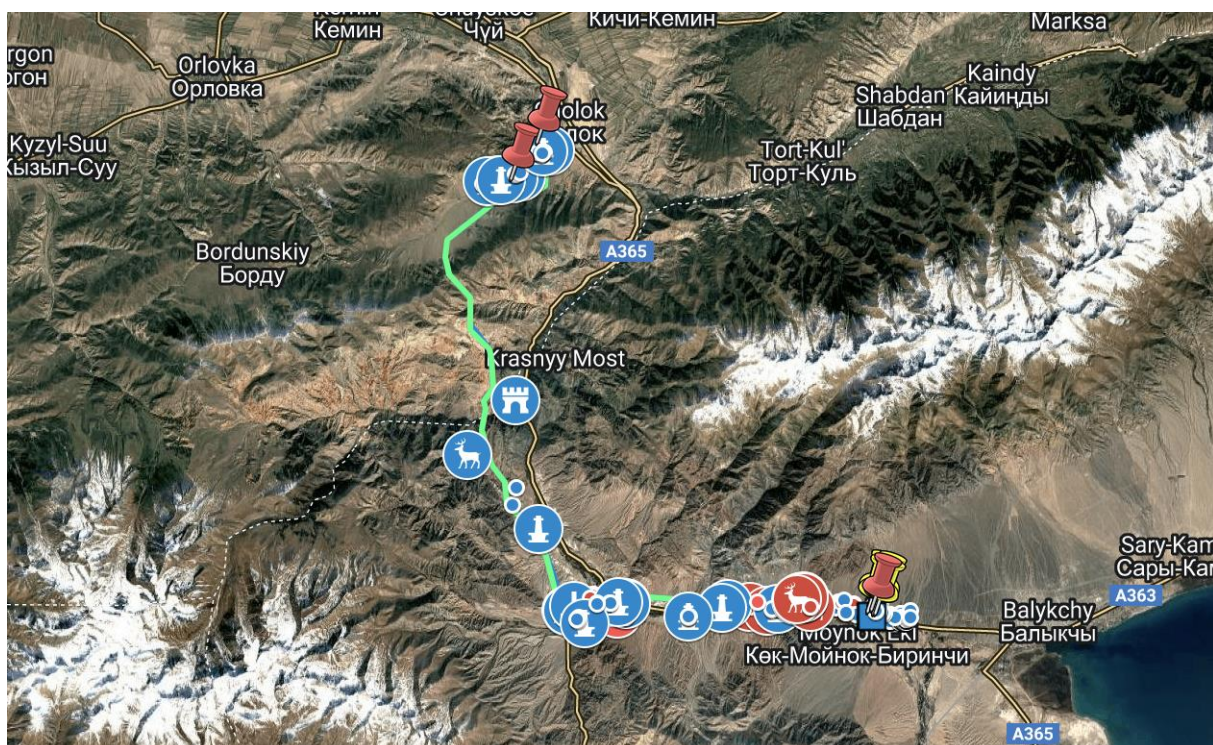


Рис.2. Карта участка (ПС) и ОИКН к западу от Балыкчы

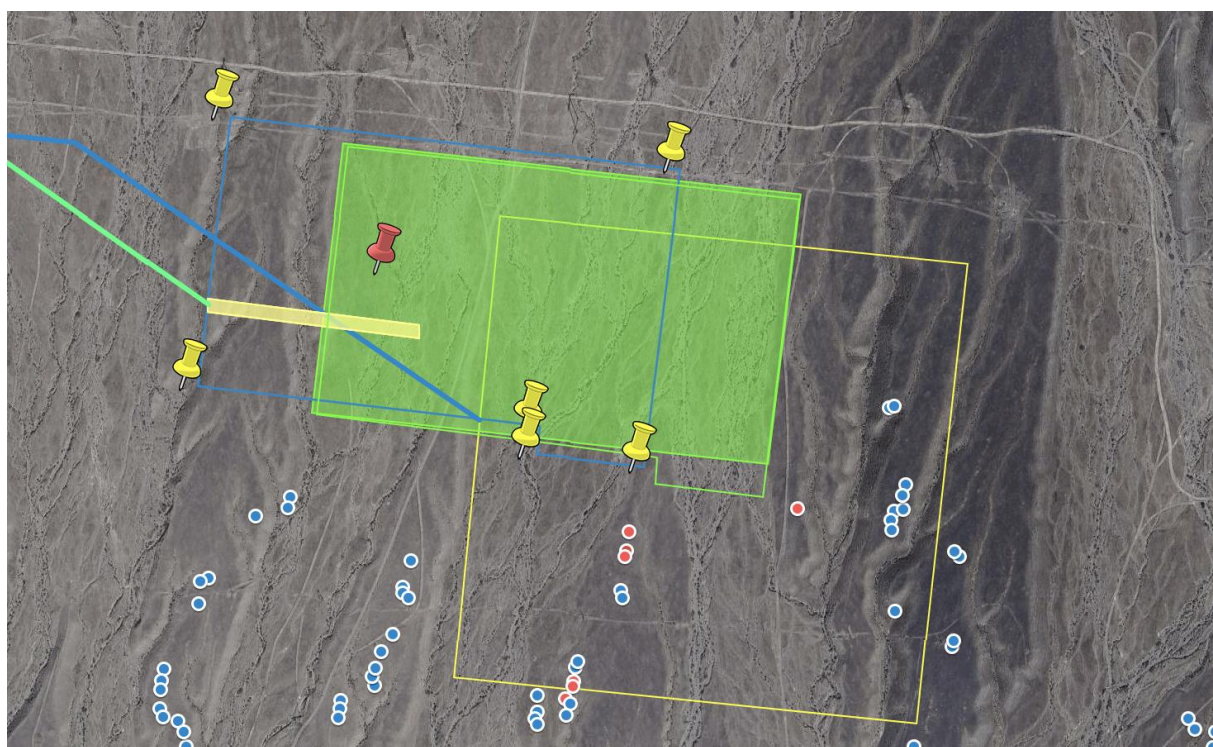


Рис.3. Карта ЛЭП и курганы могильника Кок-Булак

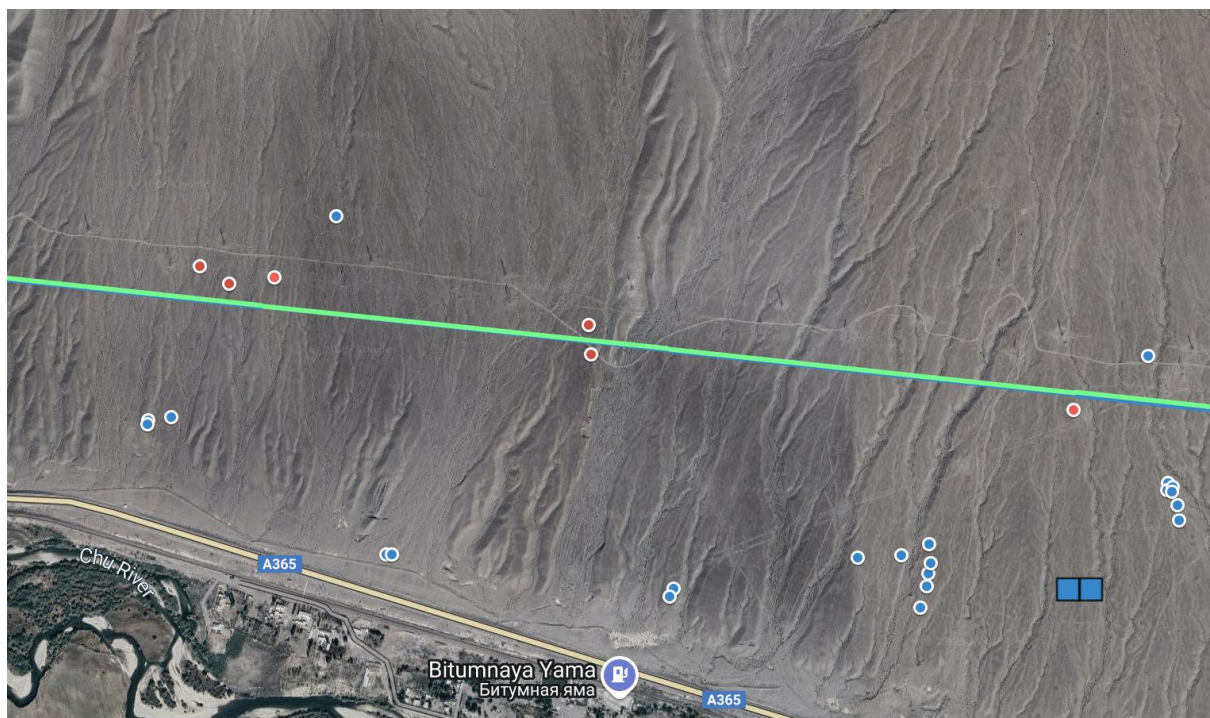


Рис.4. Карта ЛЭП, комплекс петроглифов Кыямат-Кыргоол, балбал, курганы могильника Кыямат-Кыргоол 2

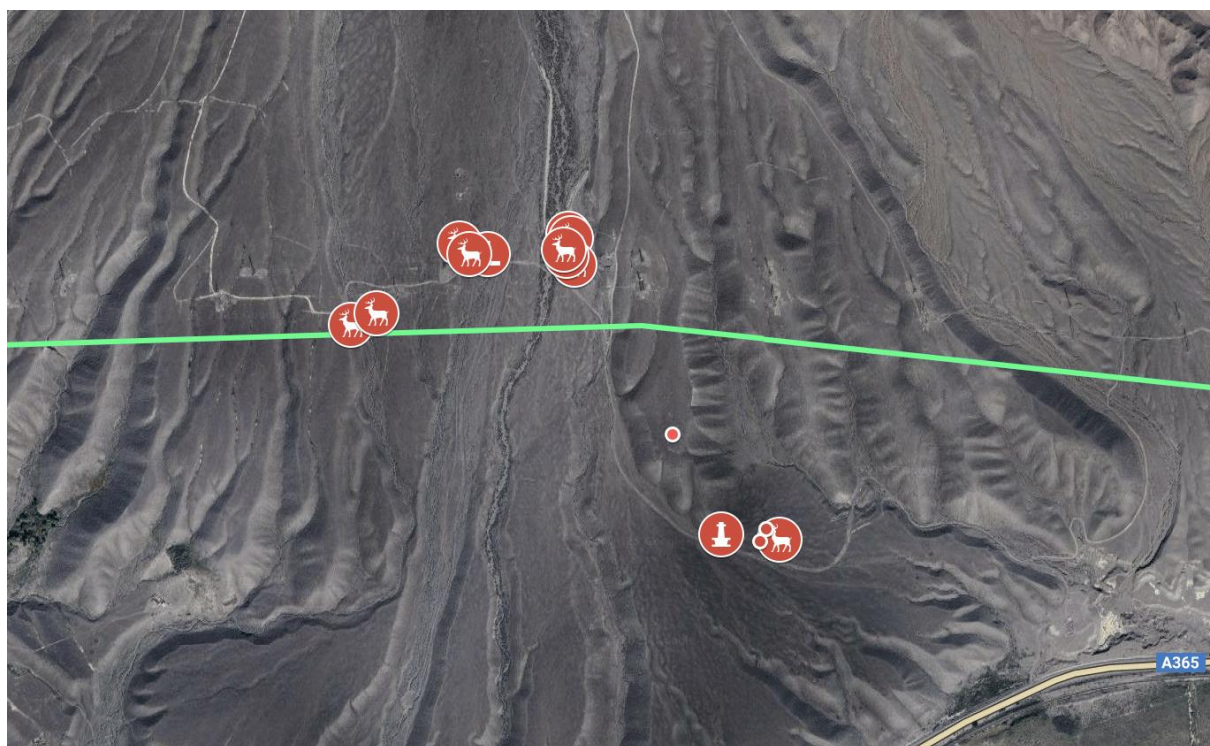


Рис.5. Карта ЛЭП и могильник Капчыгай 1-2

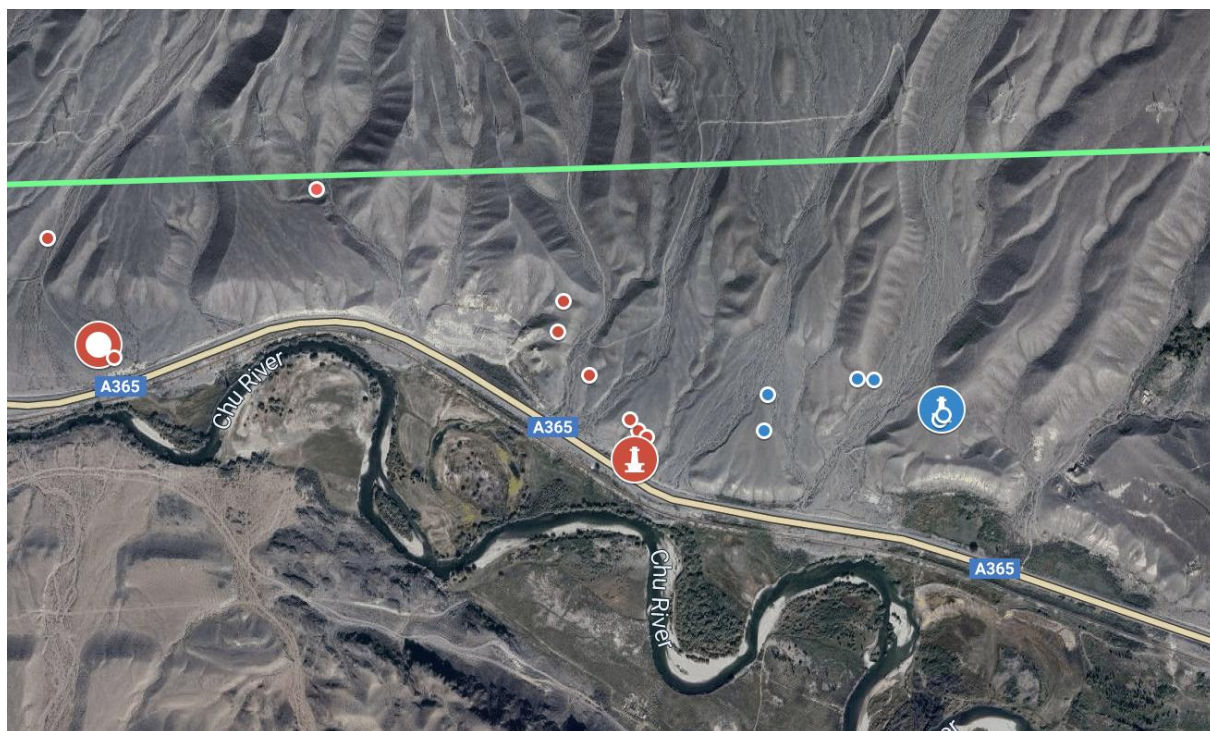


Рис.6. Карта ЛЭП и могильники Шырмый 1-3

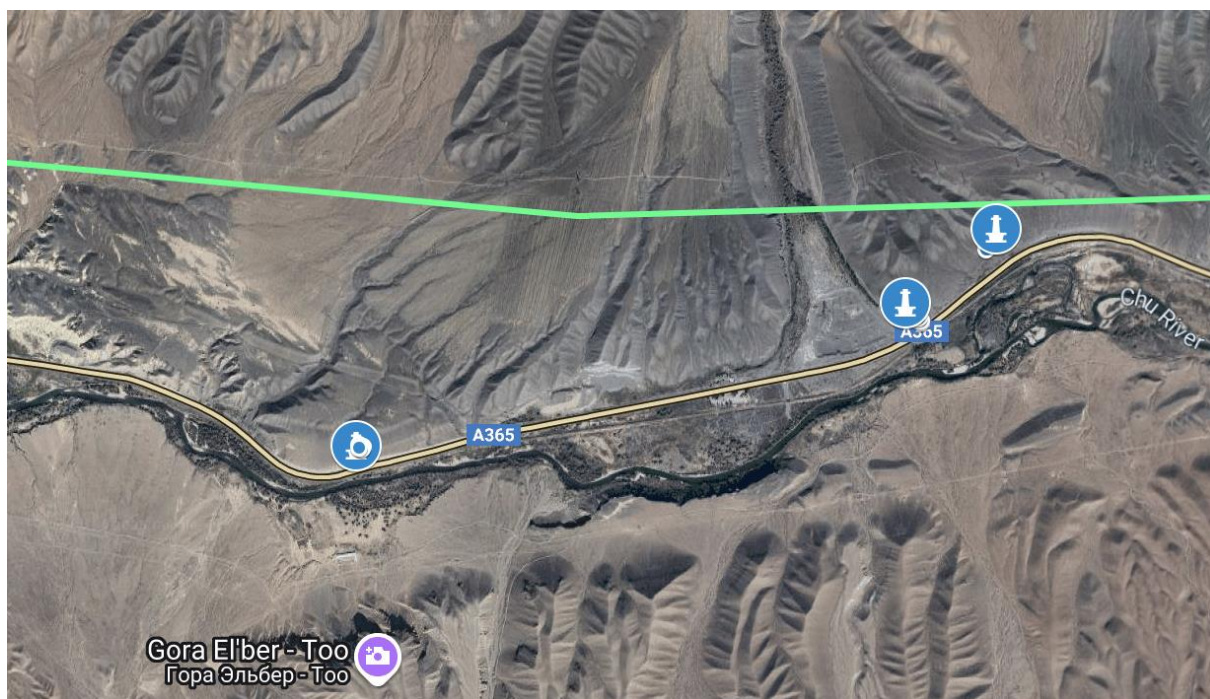


Рис.7. Карта ЛЭП, могильники Кокпак-Кыркоо 1-2

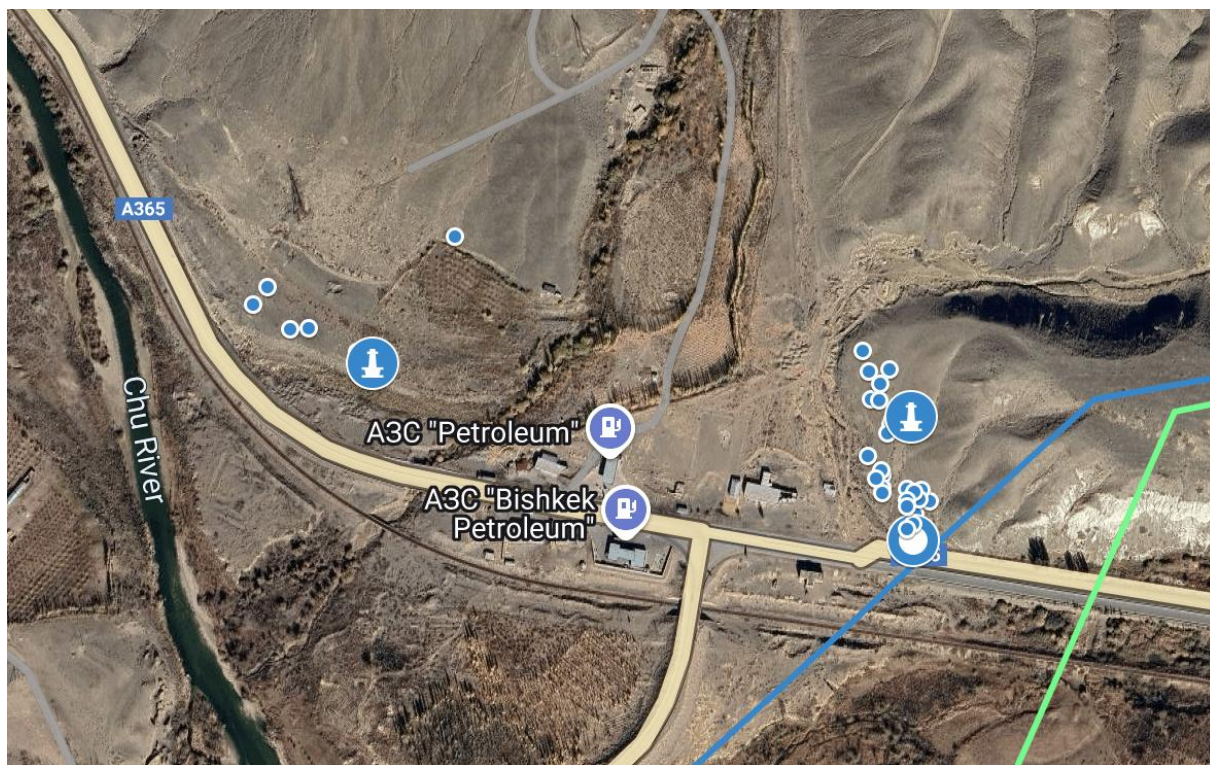


Рис.8. Карта ЛЭП и могильник Тундук 1-2



Рис.9. Карта ЛЭП, комплекс Байдамтал, могильник Тундук и могильник Байдамтал



Рис.10. Карта ЛЭП и поминальная оградка комплекса Байдамтал

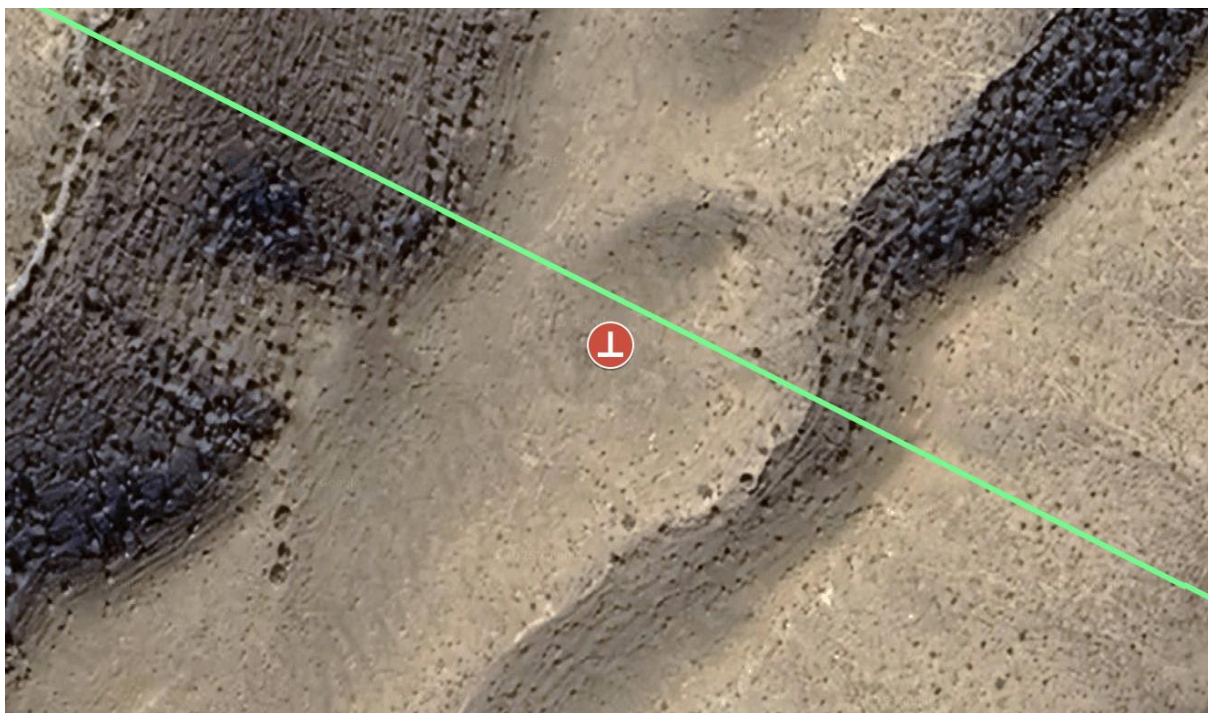


Рис.11. Карта ЛЭП и могильник Талды-Булак

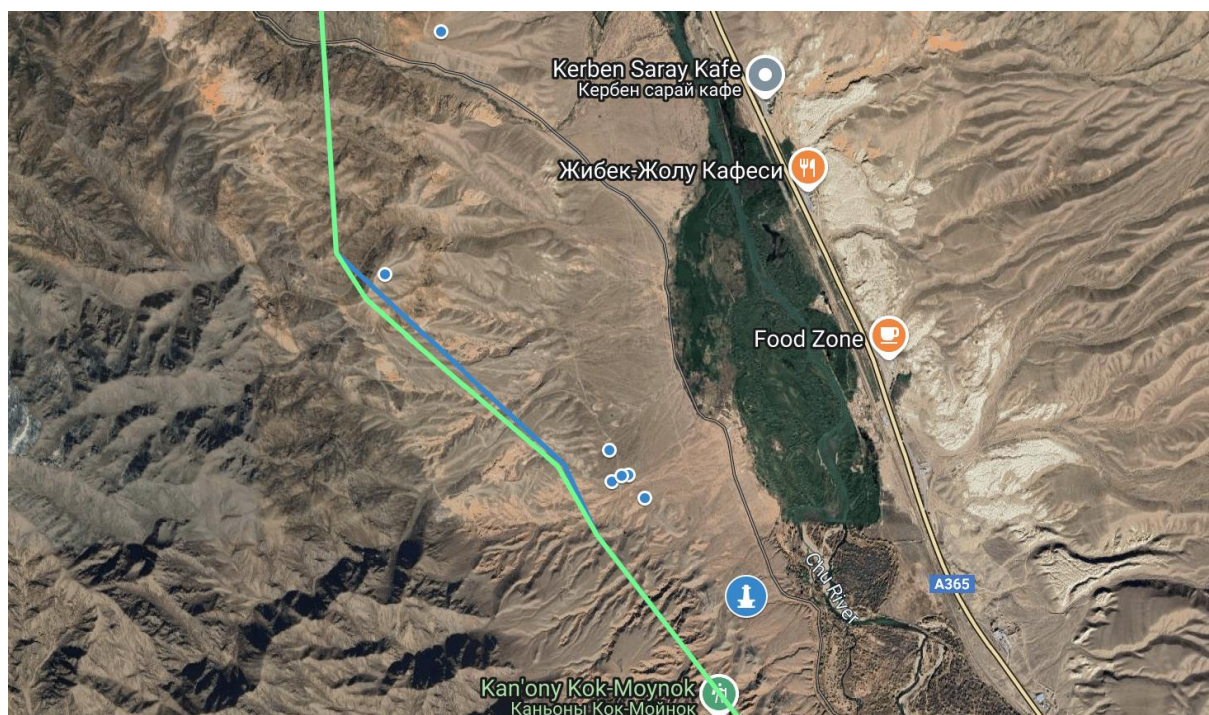


Рис.12. Карта ЛЭП, комплекс петроглифов и поселение Конорчок

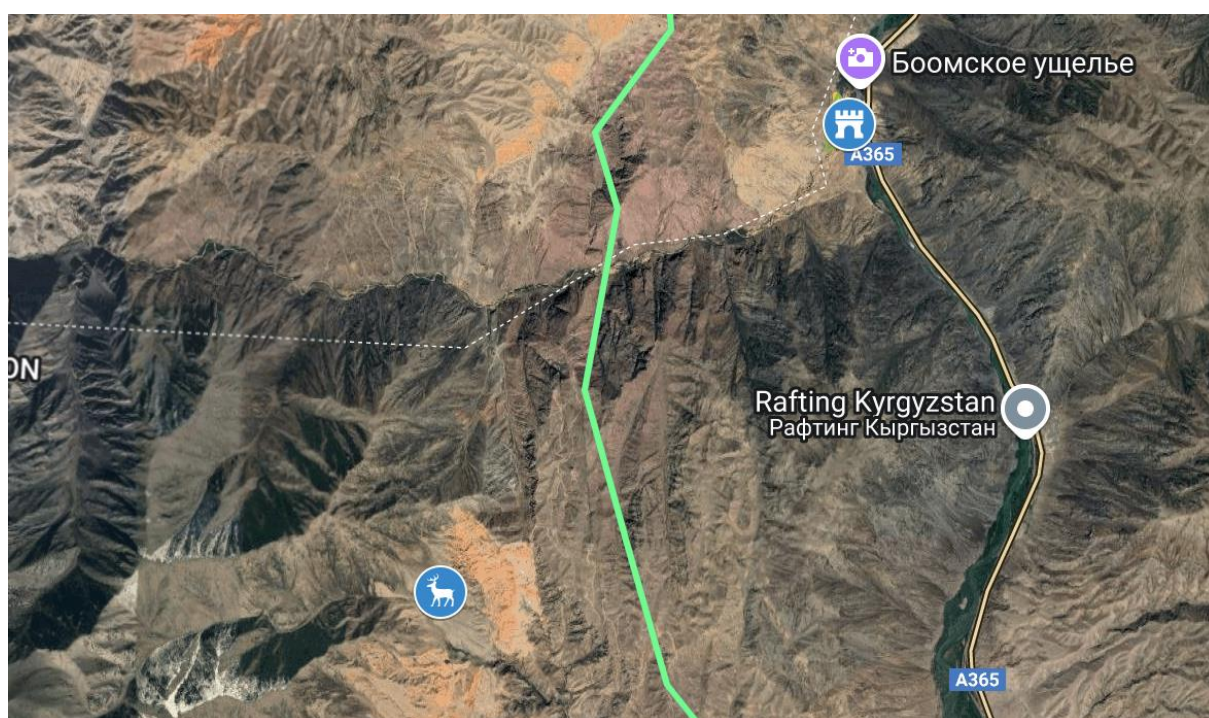


Рис.13. Карта ЛЭП и могильники Жел-Арык 2-7

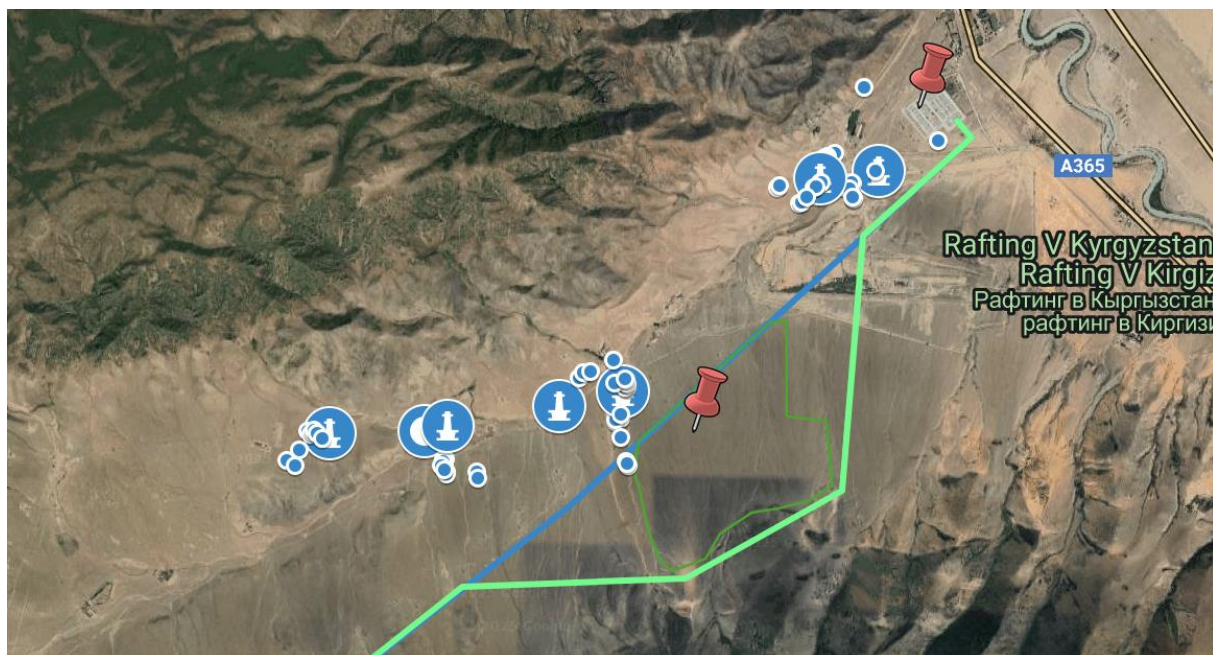


Рис.14. Курганы Кок-Булак, вид с юга



Рис.15. Курганы Кок-Булак, вид с востока



Рис.16. Петроглифы Кыямат-Кыркоол



Рис.17. Каменное изваяние Кыямат-Кыркоол, вид с юга



Рис.18. Курган могильника Кыямат-Кыркоол 2,



Рис.19. Курган могильника Капчыгай 2, вид с востока



Рис.20. Курган могильника Шырғый, вид с юга



Рис.21. Могильник Кокпак-Кыркоо, вид с юго-востока



Рис.22. Курган могильника Тундук, вид с северо-востока



Рис.23. Курган могильника Тундук 2



Рис.24. Курган могильника Тундук 2



Рис.25. Петроглиф у могильника Тундук 2



Рис.26. Курган могильника Байдамтал 2, вид с юга



Рис.27. Комплекс Байдамтал, вид с северо-запада



Рис.28. Комплекс Байдамтал, вид с юга



Рис.29. Поминальная оградка к северу от комплекса Байдамтал, вид с востока



Рис.30. Курган могильника Талды-Булак, вид с северо-запада



Рис.31. Курган могильника Талды-Булак, вид с северо-запада



Рис.32. Курган могильника Талды-Булак, вид с северо-запада





Национальная Академия наук Кыргызской Республики
Институт истории, археологии и этнологии
им. Б. Дж. Джамгерчинова

ОТКРЫТЫЙ ЛИСТ

Форма 3

на право проведения археологических разведок и
экспертизы осваиваемых земель *на территории*
Кыргызской Республики
февраль-декабрь 2025 г.

Настоящий Открытый лист выдан "12" февраль 2025 г. Археологическим полевым
комитетом Института истории, археологии и этнологии им. Б. Дж. Джамгерчинова
Национальной академии наук Кыргызской Республики

Абдыканова А.К.

в соответствии со статьей 33 Закона Кыргызской Республики № 91 от 26 июля 1999 г.
«Об охране и использовании историко-культурного наследия Кыргызской Республики».

Все государственные органы обязаны оказывать содействие держателю Открытого
листа.

На основании данного Открытого листа его держатель имеет право производства
экспертизы территорий на наличие/отсутствие памятников археологии. При необходимости
с производством земляных работ (шурфов), размером не менее 1х1 м. и не более 2х1 м., а
также ограниченных по площади зачисток на существующих обнажениях; на право
производства топографических, геофизических и других неразрушающих методов
исследования и документирования на памятнике.

По завершении исследований по данному Открытому листу его держатель обязан
провести полевою консервацию раскапываемых объектов памятника археологии.

Держатель данного Открытого листа обязан лично проводить исследования на
памятнике археологии в течение всего периода исследований; передача другому лицу права
исследования не допускается.

Открытый лист должен быть возвращен в Археологический полевой комитет
Института вместе с Отчетом о проведенных исследованиях не позднее 30 марта 2026 г.

М.П. проф. Асанканов А.А.

М.П. Зарегистрировано «24» февраля 2025 г. №10

Отметка о регистрации государственным органом по охране памятников

М.П. Зарегистрировано «___» _____ 20__ г.

