

REPORT N° DRAFT FINAL

MAKINSK POULTRY FARM PROJECT

ENVIRONMENTAL & SOCIAL IMPACT
ASSESSMENT (ESIA) SUPPLEMENTARY
INFORMATION REPORT (SIR)

JANUARY 2016

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ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) SUPPLEMENTARY INFORMATION REPORT (SIR)

EBRD

Draft Final

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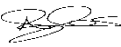

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INTRODUCTION

1.1

BACKGROUND

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing finance to the Ust-Kamenogorsk Poultry Farm JSC (“UKPF” or the “Company”) which is one of the largest vertically integrated poultry producers in Kazakhstan. The Bank’s finance will be in the form of an up to USD 30m mezzanine/equity hybrid investment in return for subscription to newly issued ordinary shares in a newly established investee entity.

Part of the proceeds of the Bank’s investment will be to assist funding of the construction of a new integrated broiler production site and a feed mill at Makinsk (together “the Project”). The investment programme is planned to be implemented over 3 years (2015–17), with main construction phase to be carried out during 2016–17.

WSP | Parsons Brinkerhoff (WSP PB) has been commissioned by EBRD and UKPF to prepare a Supplementary Information Report (SIR) for the Environmental and Social Impact Assessment (ESIA) for the proposed Makinsk Poultry Farm to be in line with EBRD Requirements.

This document constitutes the main SIR ESIA document, with further addendum documents provided in order to provide further coverage of the ESIA requirements. Further documentation relevant to the ESIA disclosure will also be produced through Environmental and Social Action Plan (ESAP) requirements as the project progresses and further project information is finalised. The key addendum reports relevant to this SIR include:

- Non-Technical Summary;
- Stakeholder Engagement Plan;
- Land acquisition and livelihood restoration framework; and
- Social and Health Impact Assessment (Supplementary Information Report).

1.2

SITE AND LOCATION

This planned Poultry Farm is located at Makinsk. Makinsk is a town in northern-central Kazakhstan. It is the administrative center of Bulandy District in the Akmola Region. Population for Makinsk was 16,745 (2009 Census results). The wider Bulandy District has a population of 34,815 (2009 Census results).

Akmola Region is a centrally located region of Kazakhstan. Its capital is Kokshetau. The national capital, Astana, is enclosed by the region, but is politically separate from Akmola Region. The region’s population is 748,300; Kokshetau’s is 124,000. The area is 146,200 square kilometers. It and Karaganda Region are Kazakhstan’s only two regions which don’t touch the country’s outer borders. Akmola Region borders North Kazakhstan Region in the north, Pavlodar Region in the east, Karaganda Region in the south, and Kostanay Region in the west.

The environmental and social context of the site is described fully in Chapter 5.

1.3 SCOPE OF THE SUPPLEMENTARY INFORMATION REPORT FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

The objectives of the assignment will be to produce a fit-for-purpose package of information as a Supplementary Information Report (SIR) to compliment the current Environmental Impact Assessment (EIA) undertaken in Kazakhstan, to allow a full package of disclosure to cover all ESIA requirements required by the EBRD Environment and Social Policy 2014. This Supplementary Information Report, as well as the National EIA and associated documents will then be released for public consultation in accordance with EBRD requirements. In order to achieve this, the following will be undertaken:

- Compare the national requirements for EIA in Kazakhstan to the EBRD requirements for an ESIA, according to the requirements of the EBRD PRs (2014), and which requires consideration of the EIA standards within the current European Union (EU) EIA legislation (updated in 2014).
- Review of documents produced to date for national permitting processes in respect of environmental and social issues. Public consultations on this document were held and the Declaration of the Environmental Impacts was published in the local media and on the website of the Municipality.
- Review of any stakeholder identification, analysis and engagement actions, relative to EBRD PR10, which have been undertaken to date;
- Based on the above:
 - Clearly identify any gaps in the existing documentation and processes relative to the EBRD requirements;
 - Substantiate how the identified gap(s) could pose a risk to the Project;
 - Identify a scope of work that would be required to fill the gaps;
 - Develop an Environmental and Social Action Plan (ESAP); and,
 - Preparation of a Disclosure Pack including supplementary information, a NTS, and a SEP in Russian and English.

The gap analysis detailing the shortcomings of the existing EIA to EU EIA Directive standards was reported in Environmental and Social Assessment for EBRD Ust-Kamenogorsk Poultry Farm JSC Baseline Environmental and Social Audit & Animal Welfare and Biosecurity Audit January 2016. The purpose of the SIR is to address the shortcomings wherever practicable.

Furthermore, gaps have been identified in the baseline data where additional field studies are recommended, comprising an ecological baseline survey and an assessment of the sustainable use of groundwater for the water supply for the project.

1.4 THE EIA PROCESS IN KAZAKHSTAN

The MPF environmental performance is controlled by the regional department of the Ministry of Energy and the Regional Prosecution Office. Below is the description of the compliance that the project is to achieve by the start of the operation:

1. Responsibility for all compliance issues of the project lies on MPF. MPF shall check licenses and emission permits of contractors and suppliers before signing the contracts.

2. EIA is required to include all project stages and components, acquired land and the immediate surroundings air, flora, fauna, surface and groundwater, social settings and archaeology. Assessment of cumulative impact and impact along the supply routes is not required. Some components may be reviewed separately from the EIA if their construction schedule substantially differs from the main development timeline.
3. A positive conclusion of the State Environmental Expertise (SEE) of the Ministry of Energy on the EIA shall be obtained before operation starts. Prior EIA approvals by other regulatory authorities (e.g. Consumer Protection, Emergency Situation) are required.
4. After the SEE positive conclusion is obtained and before the operation starts, an Emission Permit shall be obtained. The application for the permit shall include a maximum permitted emission, discharges and waste disposal projects and an operational environmental control plan. The Emission Permit is to include the emissions made during construction.
5. Construction permits for each project component shall be obtained from the State Technical Expertise by the detailed design contractor;

Construction must be conducted in compliance with the Republic of Kazakhstan (RoK) construction standards, international agreements ratified by the RoK and other regulations some of which are given below:

- Environmental Code #212-III from 9 January, 2007
- Concept of Environmental Safety for 2004-2015
- Water Code #481-II from 9.07.2003 amended on 24.12.2012
- Land Code from #442-II 20.06.2003 with changes and additions from 08.01.2013
- Act on People's Health and Health Care System #193-IV 3 from 18.09.2009
- Act on Industrial Safety on Dangerous Industrial Facilities #314-II from 3.04. 2002
- Fire Safety Act #48-I from 22.11.1996
- Act on Technical Regulation #1232 from 14.12.2007
- Act on Protection, Reproduction and Use of Wildlife #593-II from 9.07.2004
- Resolution of the Government of the Republic of Kazakhstan #245 from 12.03.2008 on the list of best available technologies.
- Sanitary epidemiological requirements for industrial buildings and facilities #93 from 17.01.2012
- Sanitary epidemiological requirements for water sources, potable water intake and supply points, places of cultural and household water use and safety of water bodies #104 from 18.01.2012

Regulations issued before the enforcement of the Environmental Code are applied unless they contradict the Code.

International agreements ratified by the RoK have a priority over its local laws and are applied directly unless it requires enactment of corresponding law by the Constitution (Art. 4).

The Veterinary Law 2013 defines general rules of animals handling. Sanitary Rules and Standards (SanPiNs) regulate food production (#164) and retail (#230), laboratories (#385) and general operational constructions and buildings (#174), personnel medical inspections (#128) and water sources (#209).

The main project specific regulatory document is Veterinary Requirements to the Enterprises that grow and sell animals, Ministry of Agriculture, #7-1/498, 2015. It regulates bird houses internal conditions, sizes and material of structures and buildings, birds' disease prevention procedures; birds maximum density; hatching eggs quality and impact to the personnel and surrounding population. The maximum birds' density is defined in Appendix 11: as 3-3.5/m² for parents (A.2) and 7-8/m² for broilers (B.2). MPF has to add to the standard approach the following requirements of this document:

- Monitor and record feather condition (A.166);
- Tile the meat and bone shop walls to 1.8m height (A.178);
- Provide solariums for parent chickens (A.185.1)
- Restrict access of wild animals by installing a 2m wire mesh fence (A.227).
- Disinfect wastewater before discharge (A.250).

The current MPF design does not adhere to another requirement of this document: distance from the Incubator to the nearest house shall be not less than 200m (A.224).

The project is supported by the regional council that is tasked to accelerate business development in the region and develop the 'Food Belt' around Astana. The Karaozek rural area council has allocated the project the required land, the sanitary-epidemiological approval for this land has been obtained, radiation survey and geotechnical drilling has been conducted. The latter also proved that the land does not contain valuable natural resources. The Regional Forestry and Wildlife Inspection have confirmed that the land does not contain the Red Book species. The Regional Soil Preservation Office (NPCZem) has given recommendations for handling the removed during construction top soil.

The Company has prepared detailed design and environmental impact assessment. After review of the design, the power distribution and water supply companies have given technical conditions for connection to the grid and mains. The EIA and the 1 km Sanitary Protection Zone around the development has been approved by the Regional Consumer Rights Protection Department. At the time of this assessment the State Environmental Expertise was reviewing the EIA. The Expertise positive conclusion would allow the Company to Proceed with the development. On the basis of the approved EIA, the Company will have to obtain the Emission Permit during the calendar year after the start of the construction.

1.5 CONTENT AND FORMAT OF THE ESIA

The ESIA has adopted the following structure:

- An Executive Summary
- Chapter 1: Introduction
- Chapter 2: Description of the Project
- Chapter 3: Policy, Legal and Administrative Framework
- Chapter 4: Description of Alternative Options, including the "No Project" Option
- Chapter 5: Environmental and Social Baseline Information
- Chapter 6: Consultation with stakeholders
- Chapter 7: Assessment and Mitigation of the Impacts
- Chapter 8: Emergency Situations
- Chapter 9: Compliance of the Intended Activity against the approved policy for the given area

- Chapter 10: Monitoring Program comprising an Environmental Social Management Plan (ESMP)

A Bibliography provides the references of documents, the author and technical information that has been used and appendices are provided that site plans and maps.

1.6 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

An ESMP has been prepared as a separate document and addresses all impacts and provides the means to monitor and ensure that impacts are as predicted, to provide reassurance as to the compliance with legal, corporate and EBRD requirements and to allow detection of emerging issues.

The ESMP addresses all anticipated impacts in respect of air, noise, water, soil, waste, social conditions of the local community etc. The ESMP references the relevant standards and regulations (Kazakh and the EBRD) that will apply to all phases of the project and includes the roles and responsibilities of the different parties involved in the design and implementation of the project.

1.7 PROJECT AREA OF INFLUENCE

The area of influence in respect of this project is the investment programme proposed for the development of the new poultry farm at Makinsk and its associated infrastructure such as feed mill, wastewater treatment plant, composting process and water supply.

From the perspective of the Makinsk Poultry Farm, the Project Affected Area is the units that comprise the farm and its associated infrastructure and the immediate vicinity, including the residential areas 125m away from the hatchery unit and 1,250m away from some of the main farm buildings. The Project Area of Influence extends to the settlements nearby including the city of Makinsk.

2 DESCRIPTION OF THE PROJECT

2.1 INTRODUCTION

This Chapter provides details of the proposed development and describes the layout of the planned poultry farm and its associated infrastructure. The description of the project, its components and activities has been provided and based on the various studies completed by MPF in 2014.

2.2 SITE CONTEXT AND DESCRIPTION

DESCRIPTION OF THE SITE AND ITS SURROUNDING

The proposed development is located on green field agricultural land to the west of the town on Makinsk. Makinsk is a town in northern-central Kazakhstan. It is the administrative center of Bulandy District in the Akmola Region. Population for Makinsk was 16,745 (2009 Census results). The wider Bulandy District has a population of 34,815 (2009 Census results).

Akmola Region is a centrally located region of Kazakhstan. Its capital is Kokshetau. The national capital, Astana, is enclosed by the region, but is politically separate from Akmola Region. The region's population is 748,300; Kokshetau's is 124,000. The area is 146,200 square kilometers. It and Karaganda Region are Kazakhstan's only two regions which don't touch the country's outer borders. Akmola Region borders North Kazakhstan Region in the north, Pavlodar Region in the east, Karagandy Region in the south, and Kostanay Region in the west. Map 2-1 shows the location of Akmola Region within Kazakhstan.

Map 2-1 Akmola Region of Kazakhstan



The proposed site lies immediately to the west of the town of Makinsk with the farm units in excess of 2km from the town with the associated infrastructure such as the feed mill, water treatment, wastewater treatment and composting facility closer to the town. Map 2-2 shows the layout of the farm units and associated infrastructure.

Map 2-2 Proposed Layout of Farm Units and Associated Infrastructure

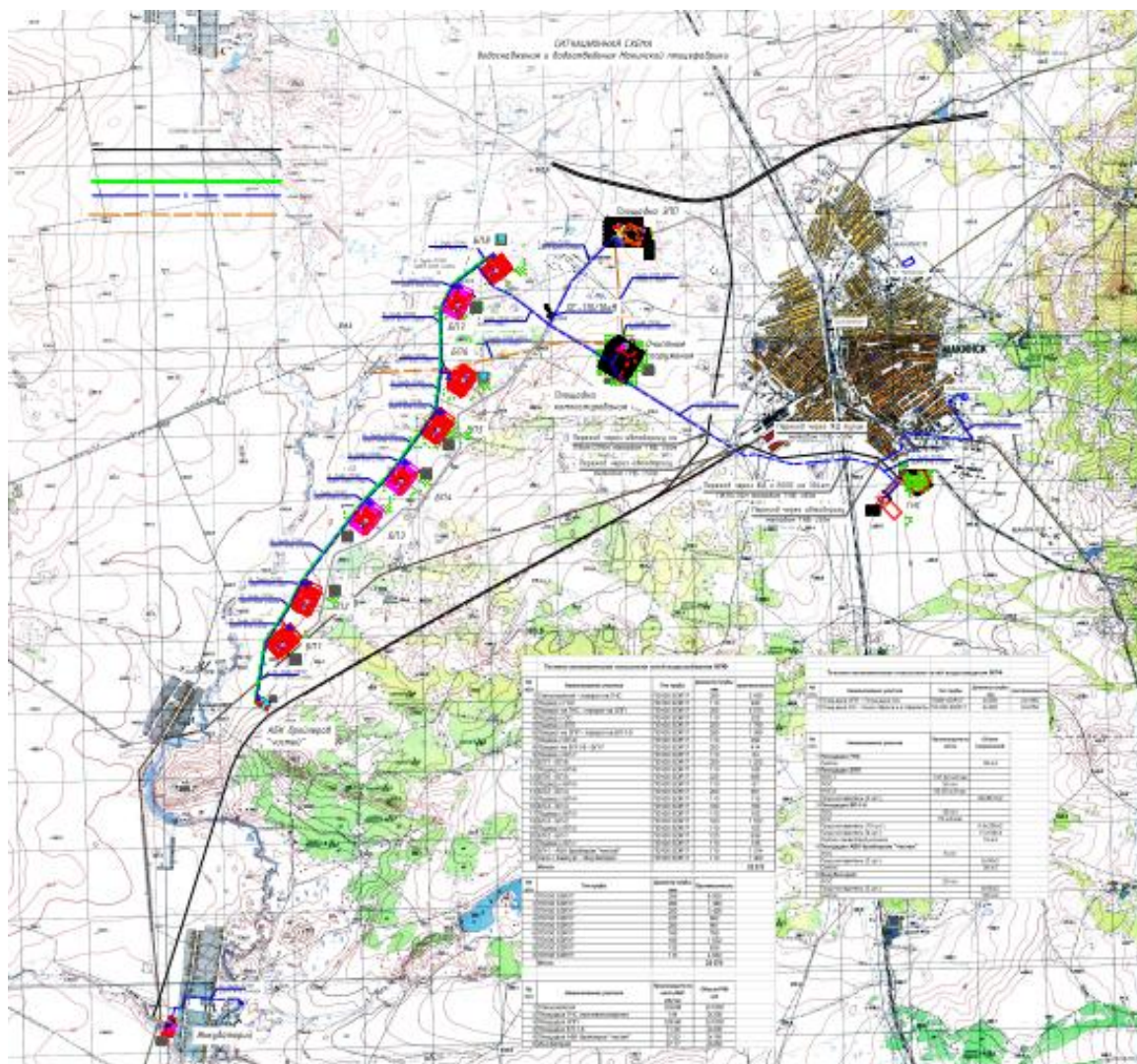


Figure 2-1 View of Slaughterhouse Location – Visited by WSP PB in December 2015



The land acquired on behalf of the Makinsk Poultry farm project was all state owned land. The project is to use 301 hectares of which 76 hectares is for the farm area for the technical aspects of the farm whilst a further 225 hectares will be utilised for the associated infrastructure such as the electrical, water and wastewater systems.

The wastewater treatment plant is to be located on a parcel of land that was previously set aside for a new landfill for the town of Makinsk. However, the landfill was given another parcel of land within an appropriate development zone to allow the wastewater treatment plant to be built in the proposed location. This wastewater treatment plant will be utilised by both the farm and the town.

KEY FEATURES AND SENSITIVE RECEPTORS

NATURAL ENVIRONMENT

There are no ecologically protected areas within the immediate vicinity of the MPF site.

There are no Specially Protected Areas of Nature (SPANs) near to site, the closest protected area is Bulandy Nature Preserve (7 km east) from the project location. The preserve protects moose but also has deer, roe, boar, lynx, wolf, fox, steppe fox, hare, badger, weasel, marten, ermine, marmot, muskrat, polecat and large birds partridge, grouse and wood and black grouses, quail, duck, coot and sandpiper for which limited hunting is allowed.

The site under development at Makinsk was Steppe which was utilised for the grazing of horse, sheep and cows.

BUILT ENVIRONMENT

Each of the different sections of the Makinsk Poultry farm are discussed in turn below with their proximity to nearby residential receptors:

Incubator site will be located in Karaozeksk rural district, near Baysuat village. The closest residential dwellings are located easterly at the distance of 125m from the site.

Administrative and service building of broilers (clean) will be located in Karaozeksk rural district, near Karaozek village. The nearest residential buildings are located to the west at a distance of 1,250m from the site. In a northerly direction for a distance of 800m will be located site for growing of broilers BP1.

Site for growing of broilers (BP1) will be located in Karaozeksk rural district. The nearest residential buildings, Karaozek village are located in a southwestern direction at a distance of 1,500m from the site.

Site for growing of broilers (BP2) will be located in Karaozeksk rural district. The nearest residential buildings, Karaozek village are located in southwestern direction at the distance 2,220m from site.

Site for growing of broilers (BP 3) will be located in Karaozeksk rural district. The nearest residential building, Karaozek village is located in a southwestern direction at a distance of 3,980m from the site territory. In a North-easterly direction at a distance of 375m will be located site for growing broilers BP 4. Westerly at a distance of 994m from the site Kayraky River flows. Easterly – territory is free of buildings.

Site for growing of broilers (BP 4) will be located in Karaozeksk rural district. The nearest residential buildings, Karaozek village are located in southwestern direction at the distance 4,965m from the site territory.

Site for growing of broilers (BP 5) will be located in Karaozeksk rural district. The nearest residential building, Makinsk city is located in easterly direction at the distance of 5,410m from the site.

Site for growing of broilers (BP 6) will be located in Karaozeksk rural district. The nearest residential building, Makinsk city is located in easterly direction at the distance of 4,870m from the site territory.

Site for growing of broilers (BP 7) will be located in Karaozeksk rural district. The nearest residential buildings, Makinsk city are located in easterly direction at the distance of 5,070m from the site territory.

Site for growing of broilers (BP 8) will be located in Karaozeksk rural district. The nearest residential buildings are at Makinsk city in an easterly direction at the distance of 4,280m from the site.

Site of plant on poultry processing will be located on territory of Makinsk. The nearest residential buildings are at Makinsk city in an easterly direction at the distance of 2,012m from the site.

Administrative and service building of broilers (dirty) will be located on territory of site of plant on poultry processing.

Site of PS-110/10kV will be located in Karaozeksk rural district. Karaozek village is located in south-westerly direction at the distance of 7,750m from the site.

Site of station for the biological treatment of sewage water will be located in Karaozeksk rural district. The nearest residential buildings at Karaozek are located in a south-westerly direction at a distance of 7,750 m from the site. The nearest residential building, Makinsk city is located in easterly direction at the distance of 1,820m from the site territory

Composting site is located at the same site with station biological treatment of sewage water. The nearest residential buildings are at Makinsk city in an easterly direction at the distance of 2,015m from the site.

2.3 PROPOSED MAKINSK POULTRY FARM

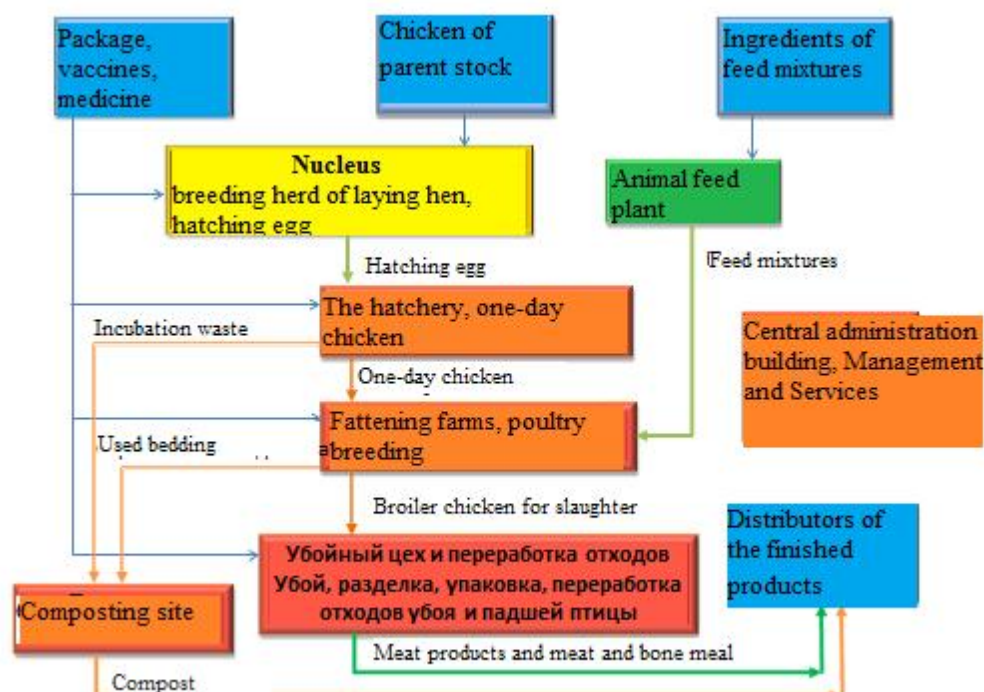
In general, the company's market for the poultry products is the national market, i.e. Kazakhstan as poultry products are not exported, so the export potential has not been investigated, but it is assumed that there are good opportunities for the development of sales in the countries of the Customs Union.

The distribution system will remain the same, ie, Mixed B2B (own and through distributors), sales through the major distribution companies, major retailers, branded network of retail outlets, retail outlets, HORECA.

POULTRY FARM AND ASSOCIATED INFRASTRUCTURE DESCRIPTION

Figure 2-3 shows the layout of the poultry farm process.

Figure 2-2 Process Layout of Makinsk Poultry Farm Operations



Note:

- Brown color indicates the units of the projected Poultry farm;
- Green color designates the objects constructed at the first stage, parallel to the construction of Poultry farm on individual projects;
- Orange color designates the objects, constructed at the second stage on individual projects
- Blue color designates the organizations, performing a contract.

The Poultry farm process begins with the hatching of eggs supply in an incubator unit. This is followed by 21 days of the incubation process, and broiler chicks hatching. At the end of the process one day-old chicks are taken by special vehicles to Broiler houses for housing into the poultry houses intended for growing the broiler chickens. For 40-42 days the poultry houses continues the process of growing the poultry in accordance with the production schedule of the housing. At the end of the growing cycle poultry should be prepared for slaughter and transported to the poultry processing plant. After a series of processes, such as stunning, slaughter, bleeding, scalding, removal of feathers, gutting, cleaning, cooling, cutting, sorting and packaging, the final product should be taken out to the central storage and end product distribution warehouses.

See Map 2-2 above which shows the layout of the proposed development.

Each element of the proposed farm project is summarised in Table 2-1 Description of Farm and Associated Infrastructure

below.

Table 2-1 Description of Farm and Associated Infrastructure

ELEMENT	DESIGN PARAMETERS AND DETAILS
Farms	<p>The key farm activities are detailed below:</p> <ul style="list-style-type: none"> 62,258 tons of live weight annually; 8 broiler farms with 12 houses each comprising with their own associated checkpoint building for biosecurity control; Chickens for slaughter; incubator- for day old chicks and hatching eggs per year; slaughter floor; Dirty and clean roads to ensure biosecurity; Rendering facility producing approximately 11 tonnes of meat and bone meal per day; Laundry; Central warehouse; Garage for 12 cars; and Gas fired hot water boilers with a capacity of 6.8MW. Gas fired boiler providing 15 tons of steam per hour.
Feed Mill	<p>Feed is delivered from the feed mill to the farm with 3-4 days margin. The grain elevator, located in Makinsk, was acquired where it is planned to build the feed mill with the capacity of 20 tonnes per hour. The feed mill is planned to be operational run simultaneously with the first stage of the poultry farm. It is planned that this plant will provide 100% of the feed for the poultry farm complex.</p> <p>The following equipment is to be installed at the feed mill:</p> <ul style="list-style-type: none"> Scales; Transport lines-conveyors and bucket elevators Crushers Mixers Mixer Granulator Sifter (separator) Elevator equipment Reception: Transporters with 36 internal silos and 8 street silos
Composting Pad	<p>The composting process will process 73,727 tons per year of waste.</p> <p>The litter from the broiler houses is shipped using litter dump trucks to the composting pad with a frequency according to the production schedule of the MPF which will be based on the 42 day growing cycle of the birds. Litter will be stored in windrows with a height of 2.6 m, width of 6m (in accordance with the terms and conditions of the manufacturer of equipment for turning clamp) and length of 100 meters. The composting period is 42-55 days.</p> <p>In addition to the treatment area there is further asphalt pad areas designed for the storage of finished products and raw materials during times of slowing technology and inability to export products because of climatic conditions (Frost, snow).</p> <p>The compost is spread as manure on the fields of the consumer and this agricultural fertiliser period lasts approximately 60 days a year, from the moment of harvest season (August-September) to the moment when snow falls. The spreading will take place using two compost spreaders with a capacity of 20 tons per hour, based on one tractor and forklift carrying load of compost in the spreader on the edge of the field.</p>
Wastewater Treatment Plant (WWTP)	<p>The wastewater treatment plant (WWTP) incorporates dissolved air flotation technology. Wastewater comes to an open reservoir designed for the separation of solid particles from water using air. Flakes float to the surface of the reservoir which automatically removes them using a drag mechanism. Flotation uses plastic plates, which increase the surface area and guarantees that even the smallest flakes are removed from the wastewater. Built-in recirculation/aeration ensures the required air-</p>

	<p>water mixture. Physico-chemical cleaning methods are by coagulation. As a result of physico-chemical treatment three streams are formed:</p> <ul style="list-style-type: none"> ▪ Treated sewage water is sent into the buffer capacity before biological treatment facilities; ▪ Removed floating material is sent for recycling in the shop on manufacture of meat and bone meal; and ▪ Sludge goes to mechanical strainer and is later transported by truck to be composted to manure.
Boilers	LPG is used within the boilers and there is a gas storage next to the feed mill. The central heating at some smaller isolated buildings is from electric boilers. An LPG fired central heating boiler will be at each farm component: broiler houses (100kW), broiler office (560kW), fodder mill, slaughter plant (steam, 6 800kW) and incubator (1 900kW).
Buildings	<p>Administrative building- there are two administrative areas for the production process – one for each of the clean and dirty area. The clean area administrative building is located in front of the broiler houses, whilst the dirty area administrative building is located at the poultry processing plant territory. These territories are used for compliance with sanitary and epidemiological and hygienic standards of production;</p> <p>Garages are present at administrative clean, dirty , slaughterhouse and composting pad for machinery and collection vehicles including car washing facility and fuel storage provision.</p> <p>8 farms consisting of 12 broiler houses each, hatchery unit, slaughterhouse and rendering plant, feed mill and grain elevator, wastewater treatment plant and compost hangar.</p>
Access and security	<p>Paved clean and dirty access roads constructed for the project.</p> <p>Passage onto and exit from the farms is by a checkpoint. The building dimensions 6 x 6 m. units posted security room, bathroom, entrance.</p> <p>CCTV system of cameras at checkpoint and fence perimeter for 24-hour security of the site with digital recording facility.</p>
Site paving	Paved entrance area, paved parking area and lighting.
Equipment	<p>Grain and feed transport trucks, staff minibuses for moving staff between farms and smaller cars.</p> <p>2 landspreading units with a capacity of 20 tonnes per hour</p> <p>1 forklift</p>
Vehicle wash	One vehicle wash facility located at each garage.
Surface water	Surface water collection, storage and discharge.
Services	<p>Includes wastewater, waste collection, electricity, drinking water and communications. The slaughterhouse will also include an ammonia based refrigeration system.</p> <p>Power supply will be provided from electrical mains and hot water and steam from the boilers as detailed above.</p>
Others	<p>Fire extinguishers are located throughout the buildings.</p> <p>Ammonia refrigeration system fitted with leak detection system.</p>

The internal road network will be developed in part during the first phase construction works and also during the operation of the farms. These roads will either be for clean and dirty areas and vehicles will be limited to only those that are suitable for the biosecurity of the clean area.

Lighting in the buildings is undertaken by using LED lamps (LED) as the most efficient. The broiler buildings have 3 rows of lighting. Illuminance is governed by the RoK special lighting program, starting with 35-40 Lux @ sunshine for young birds, and up to 5-7 Lux sunshine duration at the age of more than 7 days.

3 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 LEGAL FRAMEWORK

The construction and operation of the proposed Makinsk Poultry Farm will meet the requirements of the RoK policy and legal requirements and international environmental agreement and standards and guidance such as those developed by the EBRD that are relevant to the project and these are discussed below. Compliance with the legal requirements listed in Sections 3.1 and 3.2 are mandatory. Compliance with the requirements list in Section 3.3 will be required by the EBRD. Consequently this national EIA, SIR and the project have been designed to comply with all these requirements.

3.2 REPUBLIC OF KAZAKHSTAN REGULATION

Environmental permitting in RoK historically was predominately based on the requirements of Soviet legislation. Table 3-1 below provides a summary of the RoK legislation relevant to this project that has been considered in the EIA, although this is not an exhaustive list.

Table 3-1 Principal RoK Environmental, Social and H&S Laws and Codes Relevant to the Project

ROK LAW/CODE	DATE ADOPTED
Environmental Code	2007
Labour Code	2015
Public Health and Healthcare System Code	2009
Land Code	2003
Water Code	2003
Forest Code	2003
Law on Veterinary Medicine	2002
Law on Conservation, Reproduction and Usage of Fauna	2004
Law on Conservation of Flora	2002
Law on Specially Protected Natural Areas	2006

ENVIRONMENTAL CODE

The Code covers all aspects of environmental legislation including main requirements for environmental state expert examinations, environmental audits, permissions, monitoring procedures, waste management, greenhouse gas emissions, air pollution, soil contamination, radiation.

LABOUR CODE

The labour code covers:

- Labour relations, the foundations of the origin of the labour relations, parties of labour relations
- Representation during collective labour relations
- Terms and timings

- Control and supervision over compliance with labour legislation
- Exercising and protecting labour rights
- Social partnership in the area of labour
- Regulation of collective labour disputes
- Execution of an employment contract
- Termination of employment contract
- Protection of the personal data of the employees
- Working time
- Vacations
- Wages and compensation
- Guarantees and compensation
- Labour discipline
- Material liability
- Health and safety of employees

PUBLIC HEALTH AND HEALTHCARE SYSTEM CODE

The Code establishes the legal, economic and financial guidelines for medical care and service delivery, which ensures the realisation of people's constitutional right to preserve their health.

LAND CODE

The Land Code defines the main directives for management and use of state lands, including those allocated for various purposes, such as agriculture, urban construction, industry and mining, energy production, transmission and communication lines, transport and other purposes. The Code defines the lands under the specially protected areas as well as forested, watered and reserved lands. It also establishes the measures aimed to the lands protection, as well as the rights of state bodies, local authorities and citizens towards the land.

WATER CODE

The main purpose of the Water Code is to provide the legal basis for the protection of the country's water resources, the satisfaction of water needs of citizens and economic sectors through effective management of water resources, and safeguarding the protection of water resources for future generations. The Water Code addresses the following key issues: responsibilities of state/local authorities and public, water cadastre and monitoring system, public access to the relevant information, water use and water system use permitting systems, trans-boundary water resources use, water quality standards, hydraulic structures, operational safety issues, protection of water resources and state supervision.

FOREST CODE

The Code shall regulate relations connected with sustainable forest management - guarding, protection, rehabilitation, afforestation and rational use of forests and forest lands of the Republic of Kazakhstan as well as with forest stock-taking, monitoring, control and forest lands.

LAW ON VETERINARY MEDICINE

The Law sets legal, financial and institutional basis for veterinary medicine and covers various aspects of veterinary-sanitary management including prevention and treatment of animal diseases. It also specifies funding sources and liability for violation.

LAW ON FAUNA

The law defines RoK state policy in the field of maintenance, protection, usage and regeneration of fauna. The law defines the objectives of survey of the fauna, state monitoring, state inventory, requirements and approaches of red book preparation on fauna, conditions, peculiarities, limitations of allocation of fauna objects for purposeful usage, basis of termination of the right to use, provisions on fauna maintenance, and economic encouragement of usage and implementation of supervision. The law also defines the rights and obligations of the state governance and local governmental bodies in the field of flora maintenance, protection, reproduction and usage.

LAW ON FLORA

The law defines RoK state policy in the field of maintenance, protection, usage and regeneration of flora. The law defines objectives of flora examination, state monitoring, state inventory, requirements and approaches of red book preparation on flora, conditions, peculiarities, limitations of allocation of flora objects for purposeful usage, basis of termination of the right to use, provisions on flora maintenance, and economic encouragement of usage and implementation of supervision. The law also defines the rights and obligations of the state governance and local governmental bodies in the field of flora maintenance, protection, reproduction and usage, mechanisms of state inventory, principles of deciding their indicator.

LAW ON SPECIALLY PROTECTED NATURAL AREAS

The law defines the legal basis and relations of state policy for development, restoration, maintenance, reproduction and use of natural complex and separate objects, as well as ecosystems of specially protected natural areas of the Republic. According to the law, specially protected natural areas are divided into four categories, National parks, State Reserves, Natural museums and the forth category is divided into three separate types: areas of international, republican and local importance.

The law defines concepts, regimes of maintenance, principles of preparation of specially protected natural areas management plans, monitoring, calculation and state registrar, as well as the requirements of usage, limitations and principles, rights and obligations of state governmental and local governmental bodies, maintenance bodies of the protected areas, the rights public to get information on protected areas, financial sources of protected areas, requirement of supervision and responsibility for violating the Law on Specially Protected Natural Areas.

3.3 REGIONAL AND INTERNATIONAL AGREEMENTS

Below are the conventions related to the projects that are ratified by the RoK.

Table 3-2 Participation of the RoK in the Relevant International Environmental Agreements

CONVENTION	RATIFIED BY ROK
World Meteorological Organization (October 11, 1947)	18.12.1992
Convention on Biological Diverion (Rio de Janeiro, June 1992)	19.08.1994
International Convention on Civil Liability for Oil Pollution	4.05.1994

CONVENTION	RATIFIED BY ROK
Damage (Brussels, 29 November 1969)	
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, November 1972)	29.04.1994
International Convention for the Prevention of Pollution from Ships (London, November 1973)	4.05.1994
Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (Geneva, May 1977)	20.02.1995
Energy Charter Treaty (Lisbon, December 1994)	18.10.1995
United Nations Framework Convention on Climate Change (Rio de Janeiro, June 1992)	04.05.1995
United Nations Convention to Combat Desertification (Paris, June 1994)	07.07.1997
The Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, September 1987) with amendments	30.10.1997; 07.05.2001; 6.04.2011
The Vienna Convention for the Protection of the Ozone Layer (Vienna, November 1989)	30.10.1997
Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, March 1973)	6.04.1999
UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Finland, February 1991)	21.10.2000
UNECE Convention on Long-range Transboundary Air Pollution (Geneva, November 1979)	23.10.2000
UNECE Convention on the Transboundary Effects of Industrial Accident (Finland, March 1992)	23.10.2000
UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus, June 1998)	23.10.2000
UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) (Helsinki, March 1992)	23.10.2000
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, March 1989)	10.02.2003
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Paris, December 1982) with amendments	13.12.2005
Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran, November 2003)	13.12.2005
Stockholm Convention on Persistent Organic Pollutants (Stockholm, May 2001)	7.06.2007
Rotterdam Convention on the Prior Informed Consent	2007

CONVENTION	RATIFIED BY ROK
Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam, September 1998)	
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, June 1979)	13.12.2005
The Cartagena Protocol on Biosafety to the Convention on Biological Diversity	17.06.2008
Kyoto Protocol to the UN Framework Convention on Climate Change (Kyoto, December, 1997) and Amendments	26.03.2009; 25.08.2011

3.4

INTERNATIONAL BEST PRACTICE AND THE EBRD REQUIREMENTS

The European Union (EU) has laid down strict requirements for the management of poultry operations to prevent and reduce as far as possible the negative effects on the environment from the growing of chickens.

EU ANIMAL BY-PRODUCTS REGULATIONS

With the animal by-products regulations¹, animal by-products are defined as the entire bodies or parts of bodies of animals or products of animal origin not intended for human consumption. The scope covers the health and surveillance rules for the collection, transport, storage, handling, processing and use or disposal of animal by-products and also the placing on the market and, in certain specific cases, the export and transit including products derived from animal by-products. The slaughter house will incorporate a rendering facility which will produce animal by-products for sale to the market. At the Ust-Kamenogorsk poultry facility the rendered chicken is incorporated into the feed although it is advised that this is prohibited under the animal by-products regulations.

THE INDUSTRIAL EMISSIONS DIRECTIVE (IED)

The IED Directive combines seven existing Environmental Directives including, IPPC, Waste Incineration, Solvent Emissions, Titanium Dioxide and Large Combustion Plant Directives. Each member state was required to transpose the directive into law by January 2013. From this date, relevant sites would be required to apply for a permit under the IED Directive² (2010/75/EU). The new Makinsk Poultry Farm (MPF) site would fall under IED regime due to the principal operation of the farm:

“Annex I, Section 6 their Activities 6.6. Intensive rearing of poultry or pigs: (a) with more than 40 000 places for poultry”.

Table 3-3 gives the full scope of each of the projects activities that could be considered to require an IED permit in their own right.

¹ Regulation (EC) No [1774/2002](#) of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption

² Directive 2010/75/EC of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast)

Table 3-3 Comparative Position Regarding IED Permitting

SITE AND PROCESSES LIKELY TO REQUIRE PERMITS	REQUIREMENT	PERMIT REQUIRED IN AN EU CONTEXT UNDER THE IED
Makinsk		
Poultry Farm	6.6. Intensive rearing of poultry or pigs: (a) with more than 40 000 places for poultry;	Yes
Feed Mill	6.4 (b) Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed from: iii) animal and vegetable raw materials, both in combined and separate products, with a finished product production capacity in tonnes per day greater than: — 75 if A is equal to 10 or more; or, — $[300 - (22,5 \times A)]$ in any other case, where 'A' is the portion of animal material (in percent of weight) of the finished product production capacity.	Yes- 20 tonnes per hour which equates to 480 tonnes per day
Meat Processing Facility	6.4. (a) Operating slaughterhouses with a carcass production capacity greater than 50 tonnes per day	Yes- 9,000 heads per hour with each bird weighing 2.2-2.5kg
Boiler Plant	1.1. Combustion of fuels in installations with a total rated thermal input of 50 MW or more	No- below 50MW
Wastewater Treatment Plant	6.11. Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation covered by Chapter II	Yes
Composting Process	5.3 (b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC: (i) biological treatment;	Yes- The 73,000 tonnes of litter to be converted to compost comfortably exceeds the 75 tonnes per day threshold.

Table 3-4 High Level BAT Assessment of Project Components

PROJECT COMPONENT	BAT STATUS
Poultry Farm	<p>The sanitary protection zone of 1km for the farm units ensures that any potential for emissions to air, odour or noise affecting local communities are minimised.</p> <p>Animal welfare and dietary requirements will meet BAT. Efficient drinking systems to be used.</p> <p>Litter applied by hand and feed to have vegetable oil in pellet to reduce dust emissions.</p> <p>Certified EMS to be developed for the poultry farm and all associated activities.</p>
Feed Mill	<p>There is little information with regards to the feed mill as this is still not fully designed.</p> <p>The following equipment is to be installed at the feed mill:</p> <ul style="list-style-type: none"> ▪ Scales; ▪ Transport lines-conveyors and bucket elevators ▪ Crushers ▪ Mixers ▪ Oil injectors ▪ Mixer Granulator ▪ Sifter (separator) ▪ Elevator equipment ▪ Reception: Transporters with 36 internal silos and 8 street silos <p>The system of abatement of dust emissions to air has not currently been finalised. However, if the design incorporates bag filters, as detailed by the ESAP and what the UKPF site is being upgraded to, then this should ensure compliance with IED emission limit requirements for particulates of 50 mg/m³.</p> <p>Preliminary noise assessment suggests that noise is likely to be below WHO day and night time limits at the nearest residential receptor.</p>
Meat Processing Facility	<p>Wastewater and clean water kept separate. Good reuse throughout a shift with water only disposed of at end of shift.</p> <p>Hoses to be fitted with trigger switches. Cleaning requirements undertaken in accordance with food safety HACCP requirements.</p> <p>Refrigeration system monitored and controlled with ammonia monitors to alarm in the event of a leak being detected.</p> <p>Water stunning used rather than inert gases.</p> <p>Odorous emissions from rendering process are not thermally treated.</p>
Boiler Plant	<p>The aggregated capacity of all boiler plant is below 20MW and will utilise LPG until natural gas supply is available. LPG more appropriate than fuel oil and the intent to move to natural gas when available will meet BAT requirement.</p> <p>The largest unit is 6.8MW with most of the broiler houses using 0.1MW units which are all not required to meet any emission limits.</p>

PROJECT COMPONENT	BAT STATUS
Wastewater Treatment Plant (WWTP)	Grease traps and screens to be in place to remove contaminants prior to the WWTP The wastewater treatment process will be a dissolved air flotation process with activated sludge treatment which will ensure that BAT emission limits for discharges to water are met.
Composting Process	Litter heaps to be placed on hardstanding which slope to water collection system which goes to the WWTP. Thus, no discharges of leachate to land. Litter heaps are to be stored externally and not covered. Land spreading has not previously been assessed and procedures need to be put in place to ensure this is managed correctly.

EBRD PERFORMANCE REQUIREMENTS

The EBRD seeks to ensure that all projects financed are socially and environmentally sustainable, respect the rights of affected workers and communities, and are designed and operated in compliance with applicable regulatory requirements and good international practices. The EBRD's Environmental and Social Policy was published in 1991 and updated in 2008 and 2014. The EBRD PRs consider the potential environmental and social impacts that must be assessed to demonstrate compliance, and provide the basis on which clients must demonstrate commitment to the sustainability of their business operations. The EBRD's Environmental and Social Policy includes compliance with the PR, which outline social and environmental responsibilities and specific practices that the EBRD clients must follow:

→ Performance Requirement 1 - Environmental and Social Appraisal and Management

The requirement defines the importance of a systematic approach to the management of the environmental and social impacts associated with project activities and operations. The PR provides guidance on the client's responsibilities for managing and monitoring environment and social issues and how these will be assessed in relation to the Bank's Policy. The PR also defines the 'area of influence' associated with the project that comprise all direct, indirect and supporting activities. In addition, the area and communities potentially impacted by project activities should be defined within the area of influence.

→ Performance Requirement 2 - Labour and Working Conditions

The EBRD requires that the structure and human resources for projects are transparent, fair and provide a framework for the sustainability of the enterprise over the lifetime of the project. The requirements should be articulated through appropriate policies, working conditions and equal opportunities.

→ Performance Requirement 3 - Pollution Prevention and Control

Increased economic activity associated with projects can result in pollution to air, water and land, as well as increased consumption of finite natural resources. The role of adhering to good international practice is identified, including the principle that the potential for environmental damage should be rectified at source, and the 'polluter pays' principle.

→ **Performance Requirement 4 - Community Health, Safety and Security**

PR4 requires that adverse health and safety impacts should be avoided or mitigated to reduce the potential effects on project workers, affected communities and consumers. The objective of this PR that include the protection and promotion of a health and safety culture throughout the client organisation together with appropriate management systems that enforce appropriate measures and anticipate risks associated with project activities.

→ **Performance Requirement 5 - Land Acquisition, Involuntary Resettlement and Economic Displacement**

Land acquisition needs consideration for this project. The land acquired on behalf of the Makinsk Poultry farm project was all state owned land. The project is to use 301 hectares of which 76 hectares is for the farm area for the technical aspects of the farm whilst a further 225 hectares will be utilised for the associated infrastructure such as the electrical, roads, water and wastewater systems. The wastewater treatment plant is to be located on a parcel of land that was previously set aside for a new landfill for the town of Makinsk. However, the landfill was given another parcel of land within an appropriate development zone to allow the wastewater treatment plant to be built in the proposed location. This wastewater treatment plant will be utilised by both the farm and the town.

Under the RoK national legislation, a Sanitary Protection Zone (SPZ) of 1,000m will be in place for the farms, 50m for the hatchery and 100m for the feed mill. Most of the land within the SPZ will be Steppe.

The objectives of the PR include measures to reduce impacts associated with land acquisition, and methods and measures to maintain and improve living standards of Project-affected communities. As such as part of the project, a Land Acquisition and Livelihood Restoration Framework have been developed.

→ **Performance Requirement 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources**

The importance of maintaining core ecological functions is emphasised as these are integral to conserving and protecting ecosystem services and biodiversity potentially impacted by the Project activities. The PR identifies the use of the precautionary principle, mitigation hierarchy (including the objective of achieving no net loss, and where appropriate a net gain of biodiversity) and the promotion of good international practice throughout the Project activities.

→ **Performance Requirement 7 - Indigenous Peoples**

No Indigenous Peoples identified associated with this Project.

→ **Performance Requirement 8 - Cultural Heritage**

The importance of cultural heritage for current and future generations must be recognised. The Project should aim to protect cultural heritage and be precautionary in the management and sustainable use of these resources.

→ **Performance Requirement 9 - Financial intermediaries**

There are no financial intermediaries involved in the Project.

→ **Performance Requirement 10 - Information Disclosure and Stakeholder Engagement**

The importance of open and transparent communication and engagement with Project workers, affected communities and other stakeholders is identified in this PR. As such as part of the project, a Stakeholder Engagement Plan (SEP) has been updated.

An important additional requirement of the EBRD PRs is that projects funded by the EBRD achieve the outcomes of relevant European Union (EU) Directives. This also applies to projects in countries outside of the EU, and as such this project will be required by the EBRD to meet relevant EU Directives.

4 PROJECT ALTERNATIVES

4.1 STRATEGIC LOCATION OF THE POULTRY FARM

The Akmola region of the Republic of Kazakhstan (RoK) was identified as the preferred region for the proposed poultry farm project. The selection of the Akmola region for the proposed farm was determined by the proximity to the capital Astana which is the main sales market for poultry farm products as well as a good supply of grain in the region from local crop farms.

FOOD SECURITY

Currently, one of the priorities in the agro-industrial sector of the RoK is to ensure food security in the country. One of the priorities of the Akmola's local plan is to ensure overall supply of good quality food for the capital of Kazakhstan – the city of Astana. In this case, Akmola region has a major competitive advantage, due to its location on the geographical territory surrounding the capital Astana.

The Akmola region is one of the major grain-producing regions of Kazakhstan. It is one of the major grain exporters in the country, including durable species of wheat. This region produces a quarter of the total volume of high-quality wheat in the RoK. The gross annual average of grain harvest comprises about 4 million tonnes, including an export potential of 1.5 million tonnes of high-quality grain. Therefore, construction of the proposed farm in the Akmola region would result in sustainability benefits associated with reducing the need to transport raw materials to and goods from the farm.

TRANSPORT INFRASTRUCTURE

The Akmola region has a favourable location for the project, because it is situated at the intersection of the regional highways that lead to the capital Astana. It has a developed railway network, road network and air transport. Kazakhstan's first six-lane 205 km long motorway between Astana and Shchuchinsk is currently under construction in the region, and also the funding to improve the state of the local roads is increasing annually.

In accordance with the announcement of the President of the RoK (11 November 2014), it is expected that the transport and logistics infrastructure will be further developed in the future. Infrastructure schemes will provide roads, rail lines and airlines to interconnect the regions between themselves and with the capital Astana.

4.2 LOCATIONS WITHIN THE AKMOLA REGION

The selection of the location for the development of the proposed poultry farm considered districts within, or near to, the Akmol region. An options study was undertaken by 'TOO Astanatechstrojexpert' to identify the most suitable location for the proposed development within, or near to, the Akmol region.³ Technical, environmental and social factors were considered in assessing the potential location. In total, nine districts for the proposed poultry farm site were considered:

- Arshaly;
- Astrakhan;
- Ereymentau;
- Shortandy;
- Tselinograd;
- Akkol;
- Korgalzhyn;
- Egindikol; and
- Bulandy.

Site selection criteria involved taking into account future location of the poultry farm in relation to available feed mills. In particular, the poultry farm and the feed mill should be in close proximity to each other, at a distance of no more than 10 km - 50 km.

Additional key factors that were considered included availability of existing infrastructure, number of urban consumers of future poultry farm products, raw materials availability, and existing competitors. Another priority was availability of railway lines and railway sidings in close proximity to the proposed development.

Of the nine districts initially considered, five districts were shortlisted as possible locations:

- Arshaly,
- Astrakhan,
- Akkol,
- Bulandy, and
- Shortandy.

The main reason for the selection of these districts was the fact that there is an existing cultivation of grain (grade 4), which represents the main source for animal feed. The final choice of the district for the proposed development site was determined by the following criteria:

- Existing infrastructure, including labour;
- Presence of a sufficient number of urban consumers of poultry farm products nearby; and

³ TOO «Astanatechstrojexpert», (2015). ТЕХНИКО-ЭКОНОМИЧЕСКОЕ ОБОСНОВАНИЕ (Feasibility Study). Astana, Kazakhstan.

- Raw materials availability;

The assessment resulted in Bulandy district scoring the best overall score. As a result the town of Makinsk in the Bulandy district was chosen as preferred location for the proposed poultry farm.

Bulandy district is located in the northern part of the Akmola region. The area of the district comprises 51,000 km². The area is bordered by Leninsky district in the north, by Akkol and Astrakhan districts in the south, by Enbekshilder district in the east, and by Atbasar and Sandyktau districts in the west. Makinsk is the administrative centre of Bulandy district.

4.3 LOCATIONS WITHIN THE BULANDY DISTRICT

Two potential sites were identified during this analysis: one site to the west and the other to the east of the town of Makinsk.

The site to the east was deemed unsuitable due to its close proximity to the Bulandy Nature Reserve (approximately 7 km). Therefore, for biosecurity reasons and in order to avoid potential risk of adverse impacts that the proposed poultry farm could have on the Bulandy Nature Reserve, the site to the east of the town of Makinsk was not selected for the realisation of the proposed development.

As a result, it was recommended to build the proposed poultry farm to the west of the town of Makinsk.

4.4 SITE LAYOUT ALTERNATIVES

Site layout was constrained and influenced by the following criteria:

- Size of the area required to allow sufficient distance between each of the farm units (300 m to 1,000 m);
- Need to avoid sanitary protection zones (SPZ);
- Need to provide appropriate buffer distance from residential areas;

4.5 TECHNOLOGICAL ALTERNATIVES

Technology selection criteria involved taking into account:

- Breed choice;
- Sanitation;
- Veterinary and environmental requirements;
- Use of modern methods for incubation;
- Use of modern methods for feeding;
- Use of modern methods for rearing and slaughter;
- Minimization of potential risks in the operation process;

As a result of the technological alternatives analysis, modern hi-tech technology and machinery were selected for the proposed poultry farm construction and operation.

4.6 'NO PROJECT' ALTERNATIVE

Under the "no project" alternative (or do-nothing scenario), the site would remain an undeveloped brownfield, except for a parcel which would be allocated for a new landfill for the town of Makinsk.

Furthermore, if the project is not realised then the increased demand for poultry and protein supply with the country would remain unfulfilled and the economic benefits of the project to the Akmola region (e.g. employment and supply chain trade) would not be realised.

5 ENVIRONMENTAL BASELINE INFORMATION

This Chapter includes a description of relevant aspects of the physical and natural environment in the Project's area of influence which serve as a baseline against which the anticipated impacts of the project will be determined.

The baseline conditions have been established through a combination of desk studies, field surveys and consultation with key stakeholders carried out by MPF during the development of the national EIA in 2014, and those carried out by the project team during the visit in December 2015.

No further field studies have been completed by WSP PB in order to prepare this section of the report, although where gaps have been identified in the baseline data and additional field studies are recommended these have been incorporated in the ESAP. These include an ecological baseline survey and an assessment of sustainable water yield for the water supply for the project.

Social baseline information has been provided in a separate social assessment report.

5.1 METEOROLOGICAL AND CLIMATE

NATIONAL CLIMATIC CONDITIONS

The climatic conditions within the RoK are generally dry and continental, although significant variation does occur within the different regions. The RoK is not landlocked as it has 12,012km of land borders with China (1,533 km), Kyrgyzstan (1,051) km, Russia (6,846) km, Turkmenistan (379) km and Uzbekistan (2,203) km. The RoK borders the Aral Sea, now split into two bodies of water (1,070 km), and the Caspian Sea (1,894 km).

The climatic conditions within the RoK are highly variable with the following climatic zones being present:

- Warm humid continental climate;
- Hot humid continental climate;
- Cold semi-arid climates; and
- Cold desert climate.

An example of the warm humid continental climate is Astana which has an average temperature variation of 37.3°C across the year with February coldest at -16.6°C and July the warmest at 20.7°C. Average rainfall varies from 12mm in February to 53mm in July.

An example of the hot humid continental climate is Almaty which has an average temperature variation of 29.5°C across the year with January coldest at -6.8°C and July the warmest at 22.7°C. Average rainfall varies from 27mm in September to 97mm in May.

An example of the cold semi-arid climate is Taraz which has an average temperature variation of 29.6°C across the year with January coldest at -4.6°C and July the warmest at 25.0°C. Average rainfall varies from 5mm in August to 49mm in April.

An example of the cold desert climate is Aktau which has an average temperature variation of 27.4°C across the year with January coldest at -1.2°C and July the warmest at 26.2°C. Average rainfall varies from 8mm in January to 17mm in May.

5.2 LOCAL CLIMATIC CONDITIONS

As detailed above the project location is within the warm humid continental climate zone typified by Astana.

The location of the closest meteorological station to the Project area is Sucinsk meteorological station, which is located approximately 38 km from the proposed site location. See Table 5-1 below.

Table 5-1 Meteorological Stations in the Project Area

SETTLEMENT	HEIGHT ABOVE SEA LEVEL
Sucinsk	263m

The average high and low temperatures for Makinsk for each month are presented below in Table 5-2. The highest average temperature was recorded in June and July at 24°C, whilst the lowest average temperature was recorded in January at -21°C.

Table 5-2 Average High/Low Temperatures by Month (2000-2012)

MONTH	AVERAGE HIGH/LOW TEMPERATURE (°C)
January	-11/-21
February	-10/-20
March	-2/-13
April	9/-3
May	19/5
June	24/10
July	24/12
August	22/9
September	16/4
October	9/-1
November	-3/-12
December	-10/-19

Source: World Weather Online

The relative humidity data in Makinsk is presented below in Table 5-3. The average annual relative humidity was recorded at 74.1%, with the highest relative humidity percentage in January (97.9%) and the lowest average relative humidity percentage in June (50.9%).

Table 5-3 Relative Humidity Data by Month

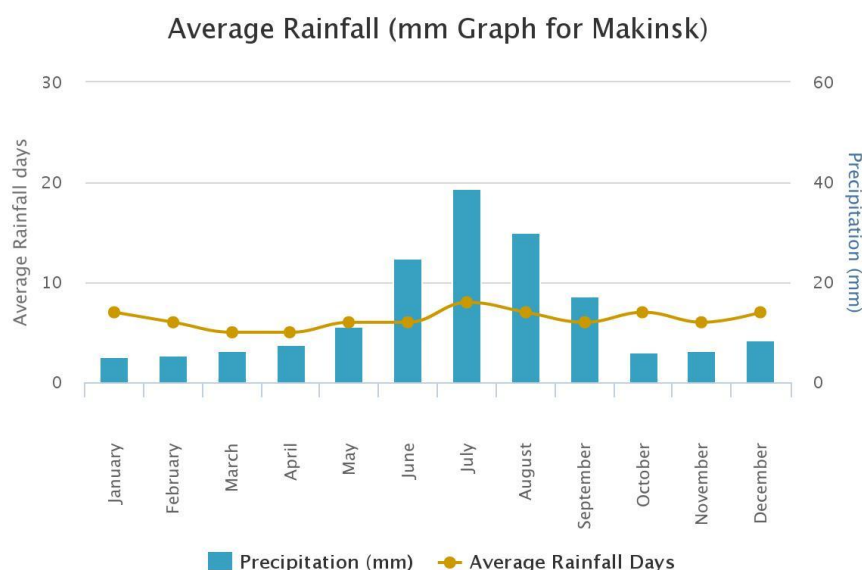
MONTH	RELATIVE HUMIDITY (%)
January	97.9
February	94.8
March	92.7
April	66.7
May	51.5
June	50.9
July	56.8
August	59.2
September	58.7
October	75.3
November	89.6
December	95.3
Average annual	74.1

Source: Weatherbase

Average rainfall data for each month is presented in Figure 5-1 Average Rainfall by Month (mm)

below. This shows that the lowest rainfall is in January at 5.2mm and 7 rainfall days to a high in July of 38.9mm and 8 rainfall days on average.

Figure 5-1 Average Rainfall by Month (mm)



Source: World Weather Online

The average wind speeds are provided in Table 5-4 below.

Table 5-4 Wind Data for Akmola Region

MONTH	AVERAGE SPEED KNOTS	AVERAGE SPEED M/SEC
January	9	4.6
February	9	4.6
March	11	5.7
April	9	4.6
May	10	5.1
June	8	4.1
July	9	4.6
August	8	4.1
September	8	4.1
October	8	4.1
November	10	5.1
December	9	4.6

Source: <http://www.windfinder.com/windstatistics/astana>

Wind direction is predominantly from the south-west throughout the year. The annual average wind speed for 2011 is 2.1 m/sec. There are also seasonal wind patterns in the winter months where there is an equal or greater proportion of time in which the wind blows from the south-west, whilst from May to June the predominant direction is easterly.

5.3 LANDSCAPE AND VISUAL CONTEXT

The proposed farm site covers an area of approximately 107 ha. Within the area, the total construction footprint of the proposed facility is approximately 8 ha. The proposed farm site is

bordered by a major road to the north of the site. There are no settlements or residential buildings on the other side of the road. The site is bordered by a major road to the east. In close proximity on the other side of the road there are residential buildings, part of the town Makinsk. The north-east site boundary is in close proximity to a railway line and the town Makinsk, which is located at a distance of approximately 635 m from the site at its closest point. The south-west corner of the development site is adjacent to the Baisuat village. The site boundary to the west is in close proximity to the Karaozek village. The Kayrakty River flows to the west of the site boundary and Sukhaya River to the south-west of the site.

BASELINE

LANDSCAPE CHARACTER

The site is located within the Kazakh Steppe landscape which covers an area of approximately 804,500 km² across most of northern Kazakhstan. The landscape is characterised as semi-arid, receiving an average of 200 mm to 400 mm of rain per year.

The proposed site comprises flat terrain and is relatively uniform in character. Elevation within 2 km of the proposed site does not vary by more than 50 m. The site consists predominantly of dark brown soils. The formation of the soil in this area was influenced by continental climate, which is characterized by high aridity and sharp changes in temperature.

The site comprises largely undeveloped land with no buildings (residential or other) being located on site previously to the beginning of construction works. The Baisuat village to the south-west is in immediate proximity to proposed location of the incubator building (125 m). The proposed feed mill that would supply feed for the chickens is immediately adjacent to the north-east site boundary. No other residential or industrial buildings are immediately surrounding the proposed farm site.

Given the flat character of the terrain, the views across the proposed development into the site are predominantly long range views. The views towards the site from the Kayrakty River and pond on the Kayrakty River are partly blocked by woodland areas.

Figure 5-2 Example of Typical Landscape in Makinsk Area



LOCAL VEGETATION

Due to the low rainfall the area receives, the steppe consists of mostly grasslands and large, sandy areas. Some woodland areas consisting of birches and pines are growing in immediate proximity to the site. Vegetation on the site is predominantly low growing and sparse, with approximately eight to ten plant species per 100 m². Local vegetation predominantly comprises of low-level drought-resistant plants including:⁴

- *Artemisia frigida*
- *Artemisia nitrosa*
- *Festuca*
- *Festuca sulcata*
- *Helictotrichon desertorum*
- *Koeleria gracilis*
- *Stipa capillata*
- *Suaeda corniculata*
- *Salicornia europaea*
- *Stipa rubens*

⁴ Gladkova, A., (2015). ОЦЕНКА ВОЗДЕЙСТВИЯ НА ОКРУЖАЮЩУЮ СРЕДУ (ОВОС) к рабочему проекту “Строительство Птицефабрики в Буландынском районе Акмолинской области Республики Казахстан” (Environmental Impact Assessment (EIA) for the project “Construction of poultry farm in Bulandy district, Akmalala region of the Republic of Kazakhstan”). Astana, Kazakhstan.

Figure 5-3 Example of Local Vegetation in Makinsk Area



SETTLEMENTS

There are three main settlements within a 1.5 km radius of the site. The nearest settlement is Baisuat village.

Makinsk (Russian: Макинск) – is a town in northern-central Kazakhstan. It is the administrative centre of the Bulandy District in the Akmola Region. Makinsk has a population of 16,745 people (2009 Census results). It is located to the north-east of the site, at a distance of approximately 635 m.

Karaozek (Russian: Караозек, before 2007 – Kolokolovka) – village in the Bulandy District in Akmola Region of the Republic of Kazakhstan. It is situated to the south-west (approximately 11 km away) from the town Makinsk. Karaozek has a population of 1026 people (2009 Census results). It is located to the west of the site, at a distance of approximately 1,250 m.

Baisuat (Russian: Байсуат, before 2007 – Prochorovka) – village in the Bulandy District in Akmola Region of the Republic of Kazakhstan. It is situated to the south-west (approximately 11 km away) from Makinsk. Karaozek has a population of 230 people (2009 Census results). It is located to the south-west of the site, at a distance of approximately 125 m.

VISUAL RECEPTORS

The highly sensitive visual receptors predominantly comprise people living in residential properties in:

- Makinsk town (distance from the proposed site boundary to the nearest residential property: approximately 635 m)
- Karaozek village (distance from the proposed site to the nearest residential property: approximately 1,250 m)
- Baisuat village (distance from the proposed site to the nearest residential property: approximately 125 m)

Visual receptors of moderate sensitivity include people enjoying views from:

- Kayraktyi River (distance from the site to the river: approximately 700 m)
- Pond on Kayrakty River (distance from the site to the river: approximately 500 m)
- Sukhaya River (distance from the site to the river: approximately 75 m)

Receptors of low sensitivity include people using roads to travel to work.

5.4

AIR QUALITY

NATIONAL MONITORING

Air quality was monitored across Kazakhstan at 29 locations in eleven cities between 2010 and 2012⁵. Concentrations of Total Suspended Solids (from which particulate matter (PM₁₀) concentrations are estimated), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) were monitored using manual, short-term methods; annual mean concentrations were then calculated and compared to European Union Limit Values (40µg/m³ for annual mean PM₁₀ and NO₂, which are the Limit Values for the protection of human health, and 20µg/m³ for SO₂, which is the annual mean Limit Value for the protection of ecosystems).

The majority of the monitoring carried out was in relatively close proximity to industrial facilities (including heavy industry, mining, smelting operations). The results indicated that all three pollutants breached the EU Limit Values for a number of years at the majority of the monitoring sites. The high concentrations were attributed to high levels of traffic, small-scale combustion sources, industrial and mining activities. A contributory factor to the high SO₂ concentrations is the high sulphur content of fuel used within Kazakhstan. The limitations of the short-term monitoring should however be recognised; the study recommended that an expanded and modernised monitoring network, considering a wider range of pollutants and continuous monitoring, is implemented.

None of the monitoring stations are located in close proximity to the Proposed Development Site, and none are considered to be particularly representative of conditions in the vicinity of the Site; the Site is located in a rural area, approximately 4.6km west of the nearest town (Makinsk). Concentrations of all three pollutants at the Site, are therefore likely to be significantly lower than those presented within the above study.

Kazakhstan has implemented Maximum Permissible Concentration (MPCs) levels of pollutants which are defined in legislation, and are presented in Table 5-5 Maximum Permissible Concentration of Pollutants in Ambient Air in Kazakhstan

Table 5-5 Maximum Permissible Concentration of Pollutants in Ambient Air in Kazakhstan

COMPONENT	MAXIMUM PERMISSIBLE CONCENTRATION (µG/M ³)		
	Short Term Maximum	Daily Mean	Hazard Class
Carbon oxide	5000	3000	4
Nitrogen oxide	400	60	3
Nitrogen dioxide	85	40	2

⁵ Joint Economic Research Program (JERP), The World Bank and Ministry of Environment and Water Resources of the Republic of Kazakhstan, November 2013. Towards Cleaner Industry and Improved Air Quality Monitoring in Kazakhstan.

COMPONENT	MAXIMUM PERMISSIBLE CONCENTRATION ($\mu\text{G}/\text{M}^3$)		
	Short Term Maximum	Daily Mean	Hazard Class
Suspended matters	500	150	3
Phenol	10	3	2
Formaldehyde	35	3	2
Ammonia	200	40	4
Sulphur dioxide	500	50	3
Hydrogen sulphide	8	-	2
Chlorine	100	30	2
Hydrogen fluoride	20	5	2
Ozone	160	30	1
Hydrogen chloride	200	100	2
Chrome (VI)	-	1.5	1
Lead	1	0.3	1
Cadmium	-	0.3	1
Arsenic	-	3	2
Chrome	-	1.5	1
Copper	-	2	2
Hydrocarbons	1000	-	3

MONITORING AT SIMILAR FACILITIES

Monitoring has been carried out at a number of locations around the boundary of the sanitary protection zone for an existing similar facility (Ust-Kamenogorsk Poultry Farm). Data available for 2015 indicate that at each monitoring location concentrations of ammonia (NH_3), NO_2 , SO_2 , and hydrogen sulphide (H_2S) are below the Kazakhstan MPCs. Dust concentrations, however, exceed the defined MPC for suspended matters.

LOCAL AIR QUALITY CONDITIONS

The Proposed Development is located in a predominantly agricultural area. An existing Waste Water Treatment Plant (WWTP) lies to the northeast of the Proposed Development, on the edge of Makinsk. Existing sources of emissions in the area are likely to include road traffic emissions (from vehicles traveling on the R-170 and A1), dust generated by activities relating to the agricultural activities, and odour from the WWTP. Overall, existing air quality is likely to be good within proximity to the Site, with a risk of elevated PM_{10} concentrations as a result of agricultural operations.

5.5 NOISE AND VIBRATION

It is understood that the only local state policy referring to noise is the control of sound levels in the workplace which is subject to a limit of 80 dB(A). No documentation or reference could be found in the OVOS to environmental noise limits beyond the Site boundary.

The following guidance documents have therefore been used as the basis for assessment of operational noise from the proposed development:

- The EBRD document Environmental and Social Policy, May 2008
- The IFC document Environmental, Health, and Safety Guidelines: General EHS Guidelines: Environmental, 2007;

→ The World Health Organisation document Guidelines for Community Noise, 1999

The EBRD document refers any specific requirements for pollution prevention to EU legislation or other good international practices. The general aim of pollution prevention is to apply control technologies and practices that are best suited to avoid or, where avoidance is not feasible, minimise or reduce adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective.

Section 1.7 of the IFC document refers to noise and, in addition to providing generic control measures that should be considered, presents noise limits for off-site residential receptors. These limits are subject to a maximum increase in background noise levels of 3 dB. The limits quoted are 55 dB $L_{Aeq,1hr}$ during the day (07:00-22:00) and 45 dB $L_{Aeq,1hr}$ at night (22:00-07:00), making reference to the WHO guidelines as a source.

The WHO guidelines provide noise limits for noise at various community locations. For residential receptors, the following guideline values apply:

- Outdoor living areas daytime and evening: 55 dB $L_{Aeq,16hr}$ (to prevent serious annoyance)
50 dB $L_{Aeq,16hr}$ (to prevent moderate annoyance)
- Outside bedrooms at night 45 dB $L_{Aeq,16hr}$ (to prevent sleep disturbance)

Noise impacts shall therefore be assessed against the absolute guideline levels summarised in mits:

Table 5-6 Maximum Allowable Noise Levels

7, below, where significant impacts shall be considered to be those that exceed these limits:

Table 5-6 Maximum Allowable Noise Levels

RECEPTOR	HOURS	MAXIMUM ALLOWABLE NOISE LEVELS
Outside residential dwellings	07:00-22:00	55 dB $L_{Aeq,1hr}$
	22:00-07:00	45 dB $L_{Aeq,1hr}$

5.6 SOIL, GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

SOIL

The terrain underlying and surrounding the site is flat. Elevation within 2 km does not exceed 50 meters to 1 km.

The surrounding terrain is monotonous and sparsely vegetated, with the soil consisting of a subzone of moderately dry Fescue-feather grass steppes in dark chestnut soils. The soil is characterised by a continental climate, associated with high aridity and sharp changes in temperature. On soil-vegetation is made up of steppes landscape.

A profile of dark chestnut soils is relatively clear differentiation in genetic horizons. Prevalence of humus varies from 38 to 60 cm., but traces of humus can also be observed at depths of up to 70-80 cm. Humus content in the upper horizon of dark chestnut soil relatively normal high- -4.5 3.5%. Deeper it dropping to 2.3% in the horizon -3.0 B1 and up to 1.8% in the horizon -2.1 B2. High humus

The upper humic-accumulation horizon is made up of undisturbed soils, mainly between 13 and 18 cm. It is made up of a brownish-dark grey silt lumpy structure.

Soil containing hydrochloric acid is found at a depth of 30-45 cm. At a depth of 75-85 cm it is characterised by clays or heavy loam. This is characterised by a high content of gypsum, which is present in the form of small crystals.

The dark chestnut soil salinity is related to their formation on multi-coloured tertiary clays. This soil is rich in potassium but lacking in phosphorus.

GEOLOGY

The published geology (USSR Ministry of Geology, Map of Mineral Resources, Sheet No. 42-XXV, 1:200,000 scale) indicates the ground conditions to comprise recent and Quaternary alluvial deposits associated with the flood plain of the River older deposits of fossil soils (loam) and colluvium. The basement rocks comprise Ordovician granodiorites beneath the eastern side of the river. Folded Ordovician metasediments and Archaen amphibolites subcrop are shown beneath the eastern side of the valley.

See Figure 5-4 to 5-15 below for site specific profiles.

Figure 5-4 Geological Profile of Incubator

Объект: Инкубаторий **Object: Incubator**

Геологическое строение: **geologic structure:**

1. суглинок, (dpQп-ш); **loam**
2. песок крупный, (dpQп-ш), (N-Q1); **sand large size**
3. песок гравелистый, (dpQп-ш); **gravelly sand**
4. суглинок, (N-Q1); **loam**
5. глина, (N-Q1). **clay**

Подземные воды на глубине от 3,1м до 4,5м. **Groundwater at a depth of 3.1m to 4.5m.**

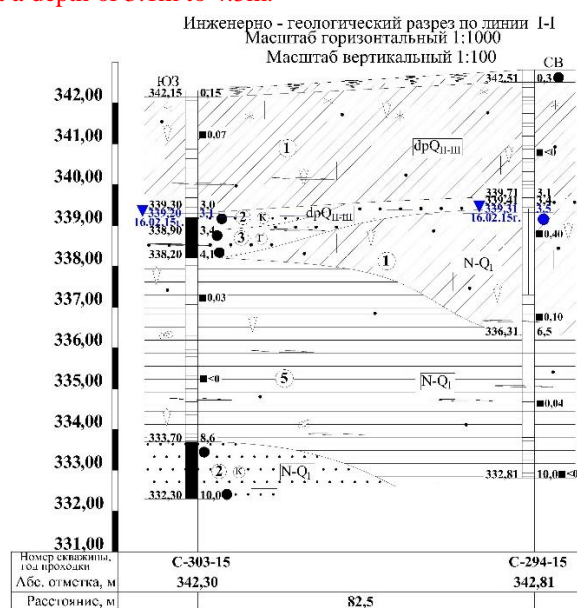
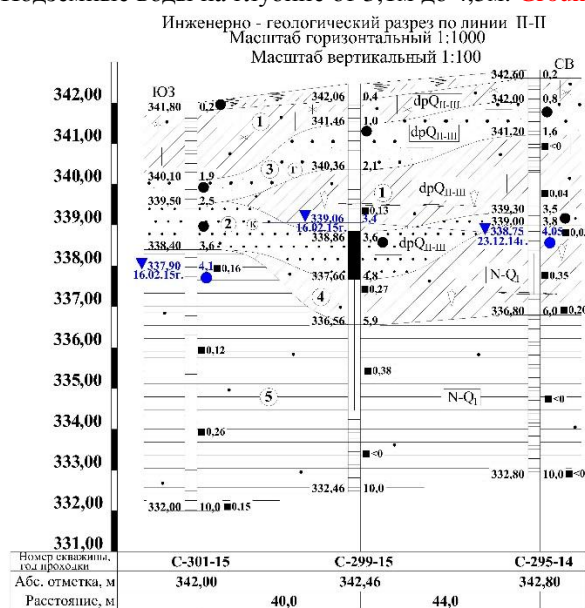


Figure 5-5 Geological Profile of Facility Ground

Объект: Хозяйственная площадка **Object: facility ground**

Геологическое строение: **geologic structure:**

1. суглинок бурого цвета, (dpQп-ш); **brown loam**
2. песок средней крупности, (dpQп-ш), (N-Q1); **sand medium size**
3. песок гравелистый, (dpQп-ш); **gravelly sand**
4. песок крупный, (N-Q1); **sand large size**
5. глина, (N-Q1); **clay**
6. песок дресвянистый, (eMZ); **sand**
7. дресвяно-щебенистый грунт, (eMZ). **priming material**

Подземные воды на глубине от 5,7 до 6,4 м. **Groundwater at a depth of 5.7 to 6.4 m.**

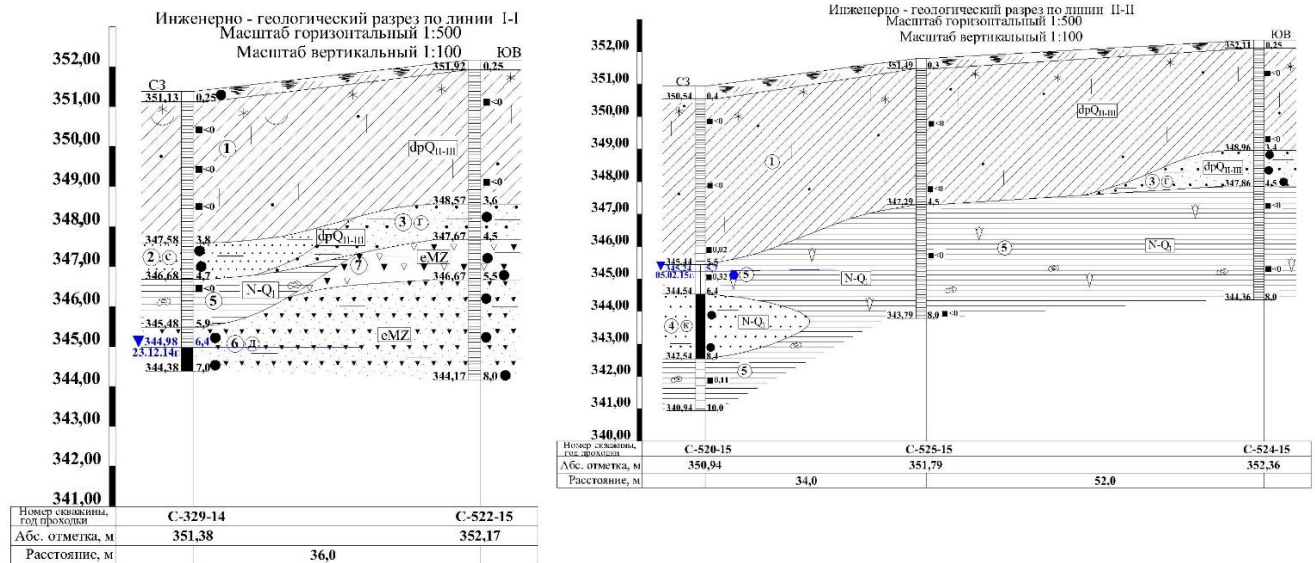


Figure 5-6 Geological Profile of Broiler House 1

Объект: Площадка для выращивания бройлеров №1 Object: **Ground for breeding broiler chicken №1**

Геологическое строение: **geologic structure:**

1. суглинок бурого цвета, (dpQп-ш); **brown loam**
2. песок средней крупности, (N-Q1); **sand medium size**
3. песок крупный, (N-Q1); **sand large size**
4. песок гравелистый, (N-Q1); **gravelly sand**
5. суглинок, (N-Q1); **loam**
6. глина, (N-Q1). **clay**

Подземные воды на глубине от 2,4 до 4,0 м. **Groundwater at a depth of 2.4 to 4.0 m.**

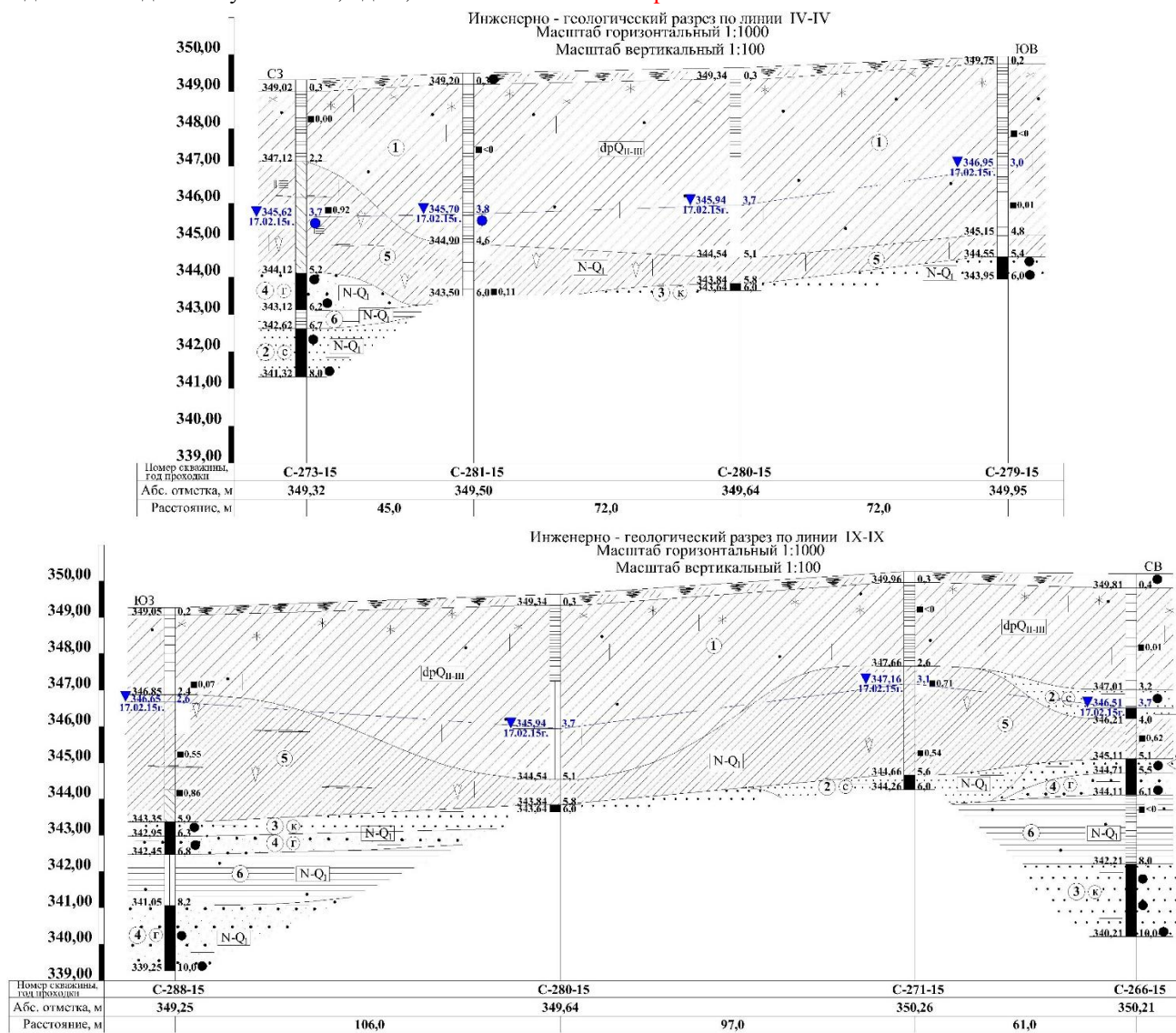


Figure 5-7 Geological Profile of Broiler House 2

Объект: Площадка для выращивания бройлеров №2 Object: Ground for breeding broiler chicken №2

Геологическое строение: geologic structure:

1. суглинок, (dpQп-ш) loam
2. песок крупный, (dpQп-ш), (N-Q1); sand large size
3. песок гравелистый, (dpQп-ш); gravelly sand
4. суглинок, (N-Q1); loam
5. глина иловатая, (N-Q1); clay
6. глина, (N-Q1). clay

Подземные воды на глубине от 2,5 до 3,5 м. Groundwater at a depth of 2.5 to 3.5 m.

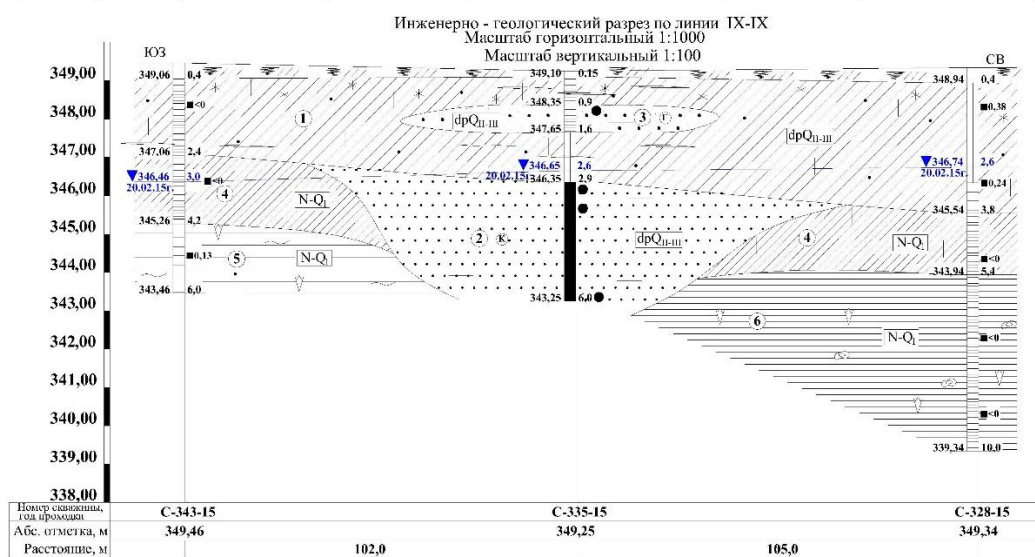
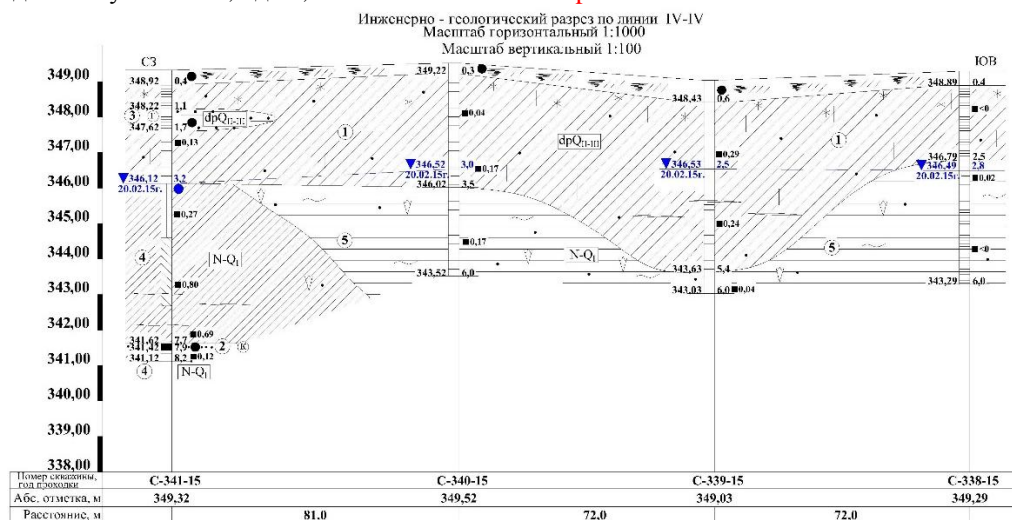


Figure 5-8 Geological Profile of Broiler House 3

Объект: Площадка для выращивания бройлеров №3 Object: Ground for breeding broiler chicken №3

Геологическое строение: geologic structure:

1. суглинок, (dpQп-ш) loam
2. суглинок, (N-Q1); loam
3. суглинок, (eMZ); loam
4. песок дресвянистый, (eMZ); sand
5. дресвяно-щебенистый грунт, (eMZ); priming material
6. гранит крупнозернистый, (D2). granite large size

Подземные воды на глубине от 5,8 до 7,0 м. Groundwater at a depth of 5.8 to 7.0 m.

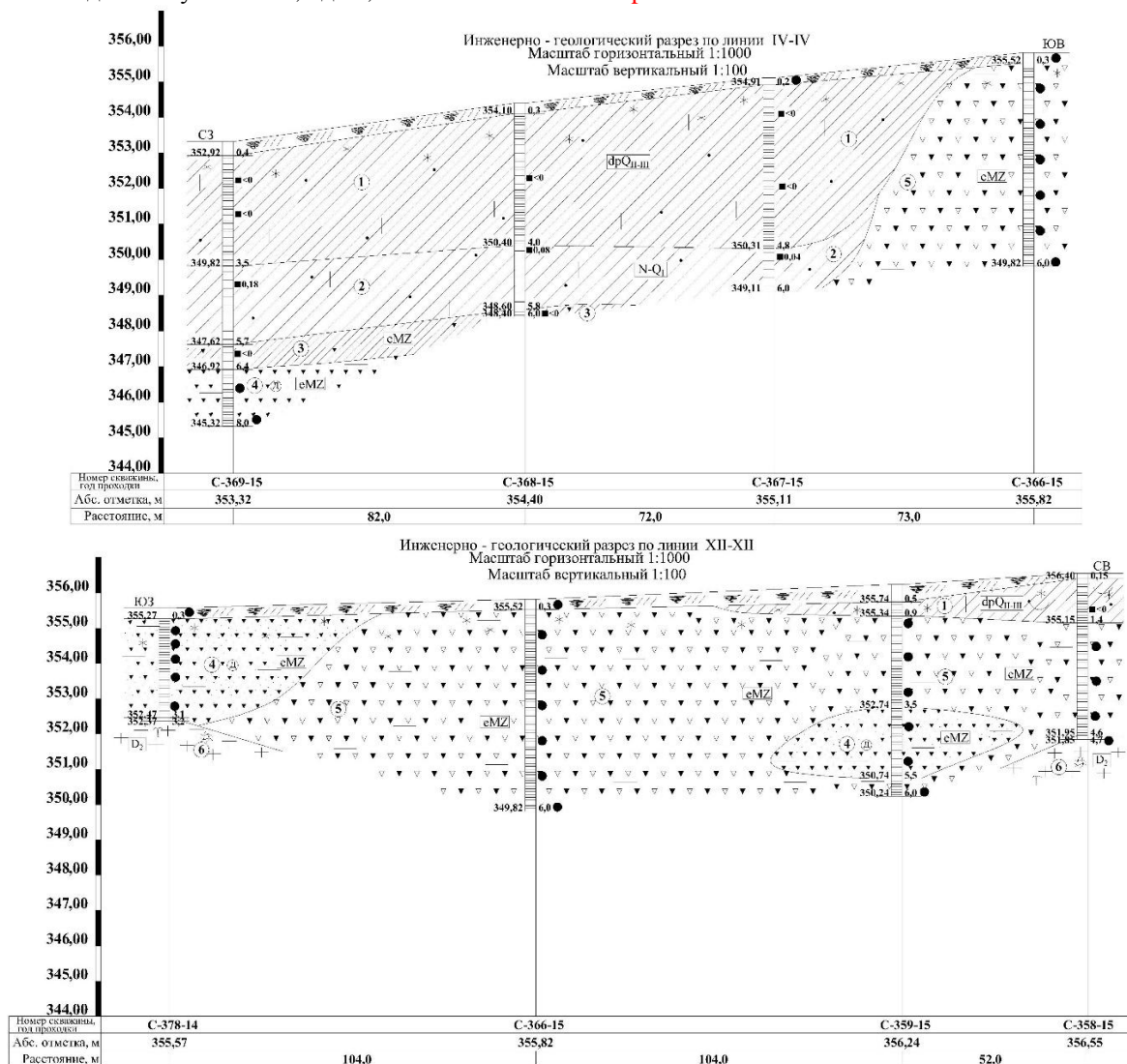


Figure 5-9 Geological Profile of Broiler House 4

Объект: Площадка для выращивания бройлеров №4 Object: Ground for breeding broiler chicken №4

Геологическое строение: geologic structure:

1. суглинок, (dpQп-ш) loam
2. суглинок, (N-Q1); loam
3. суглинок, (eMZ); loam
4. песок дресвянистый, (eMZ); sand
5. дресвяно-щебенистый грунт, (eMZ); priming material
6. гранит крупнозернистый, (D2). granite large size

Установившийся уровень подземных вод на 04.03.15г зафиксирован на глубине 5,2-5,8м от дневной поверхности земли. Groundwater level recorded on 04 March 2015 at a depth of 5.2m-5.8m from the surface of the earth.

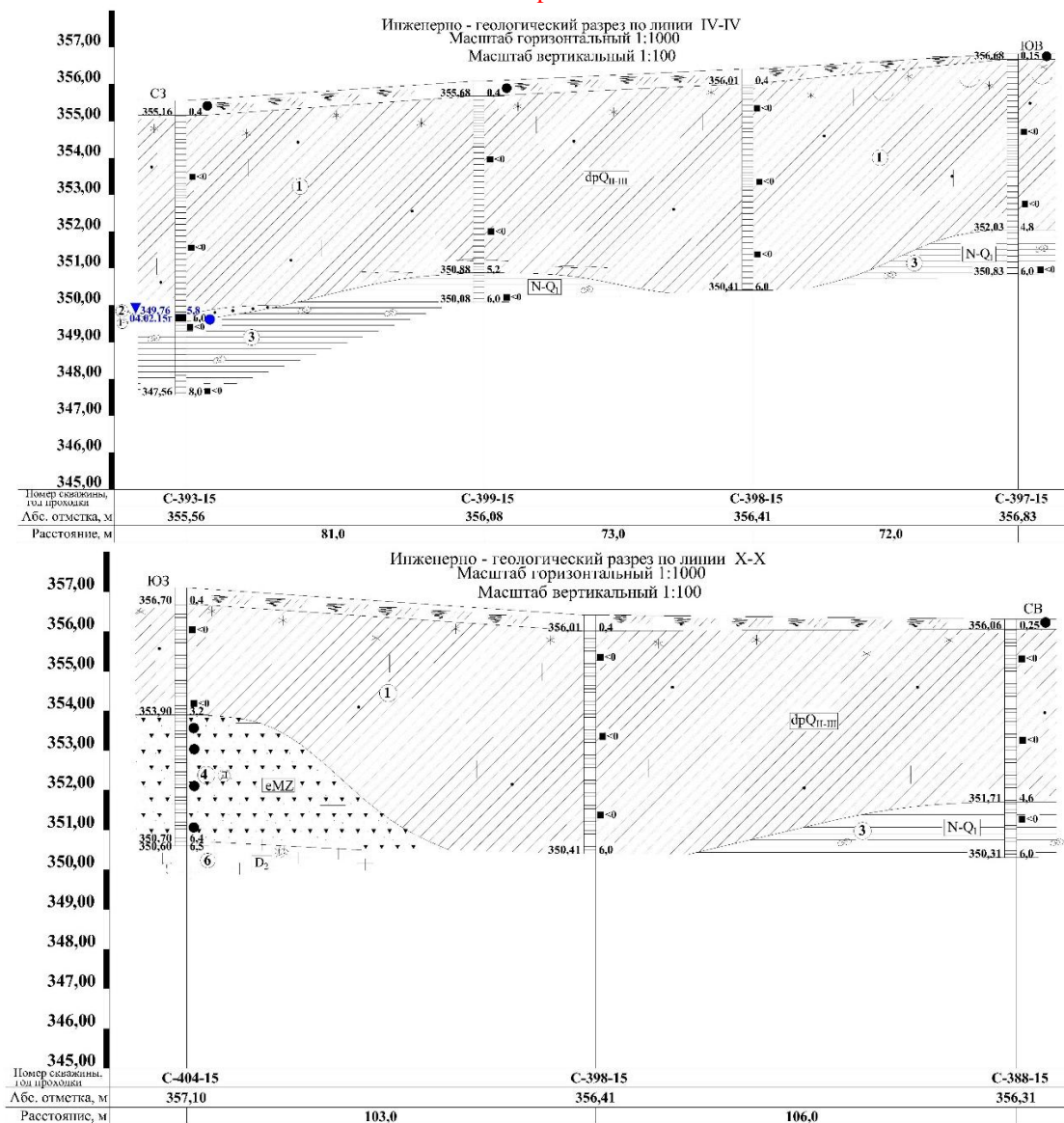


Figure 5-10 Geological Profile of Broiler House 5

Объект: Площадка для выращивания бройлеров №5 Object: Ground for breeding broiler chicken №5

Геологическое строение: geological structure:

1. суглинок бурого цвета, (dpQп-ш); brown loam
2. песок средней крупности, (dpQп-ш); sand medium size
3. песок гравелистый, (dpQп-ш); sand
4. суглинок, (N-Q1); loam
5. глина, (N-Q1); clay
6. суглинок, (eMZ); loam
7. глина, (eMZ); clay

Установившийся уровень подземных вод на 04.03.15г зафиксирован на глубине 2,4-5,2м от дневной поверхности земли. Groundwater level recorded on 04 March 2015 at a depth of 2.4-5.2m from the surface of the earth.

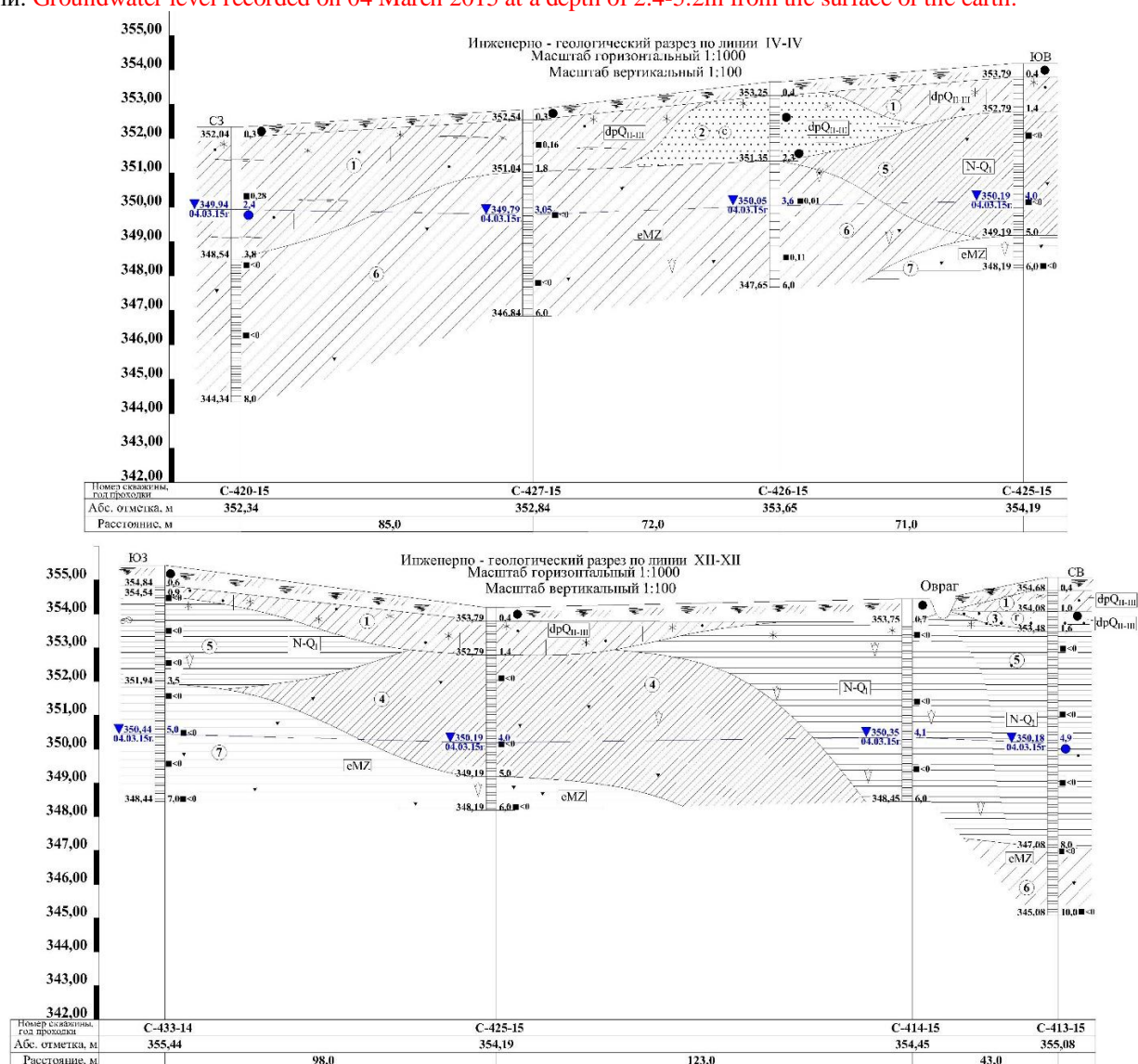


Figure 5-11 Geological Profile of Broiler House 6

Объект: Площадка для выращивания бройлеров №6 Object: Ground for breeding broiler chicken №6

Геологическое строение: geological structure:

1. суглинок бурого цвета, (dpQп-ш); brown loam
2. суглинок, (N-Q1); loam
3. суглинок, (eMZ); loam
4. песок дресвянистый, (eMZ); sand
5. дресвяно-щебенистый грунт; priming material
6. гранит крупнозернистый, (D)2. granite large size

Установление уровня воды зафиксировано на глубине 4,2м (на 24.12.14г) и 4,5м (на 07.02.15г) Groundwater level recorded on 24 December 2014 at a depth of 4.2m and on 07 February 2015 at a depth of 4.5m from the surface of the earth.

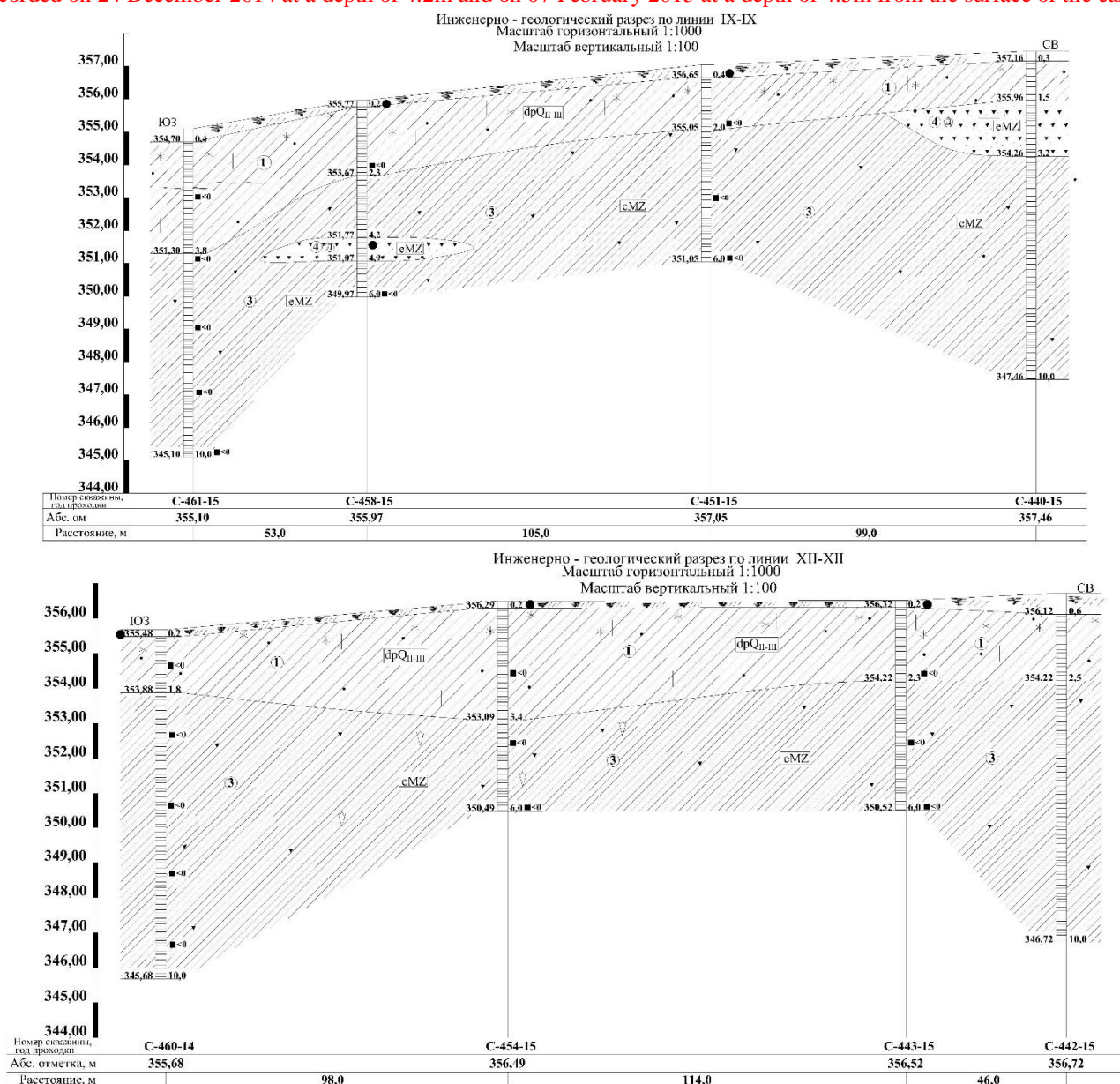


Figure 5-12 Geological Profile of Broiler House 7

Объект: Площадка для выращивания бройлеров №7 Object: Ground for breeding broiler chicken №7

Геологическое строение: geological structure:

1. суглинок бурого цвета, (dpQп-ш); brown loam
2. глина бурого цвета, (dpQп-ш); brown clay
3. песок средней крупности, (dpQп-ш); sand large size
4. песок крупный, (dpQп-ш); sand large size
5. песок гравелистый, (dpQп-ш); sand
6. суглинок, (eMZ); loam
7. песок дресвянистый, (eMZ); sand
8. дресвяно-щебенистый грунт, (eMZ); priming material
9. гранит крупнозернистый, (D)2). granite large size

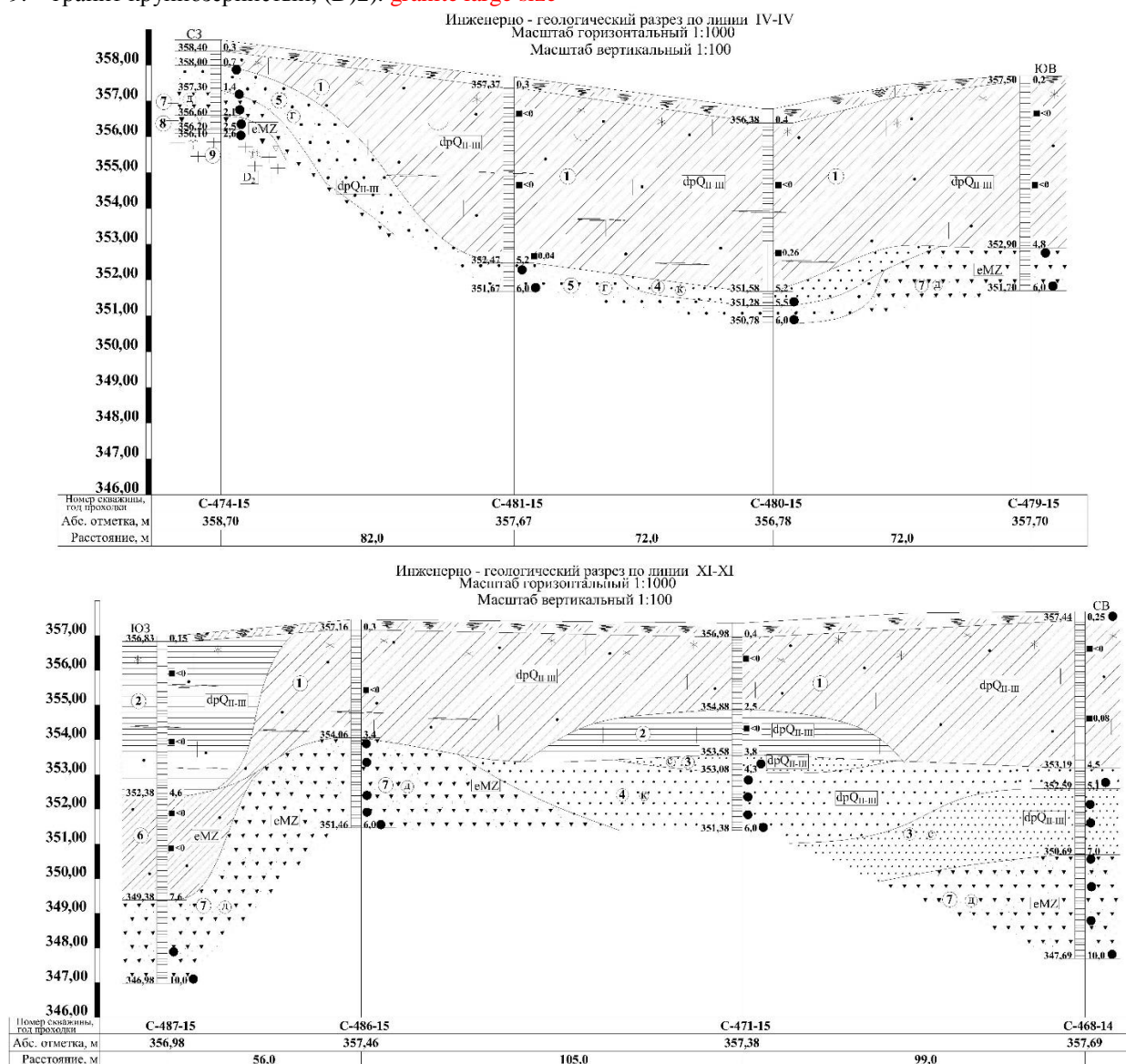


Figure 5-13 Geological Profile of Broiler House 8

Объект: Площадка для выращивания бройлеров №8 Object: Ground for breeding broiler chicken №8

Геологическое строение: geological structure:

1. суглинок бурого цвета, (dpQп-ш); brown loam
2. глина бурого цвета, (dpQп-ш); brown clay
3. песок средней крупности, (dpQп-ш); sand medium size
4. песок гравелистый, (dpQп-ш); gravelly sand
5. глина, (N-Q1); clay
6. песок дресвянистый, (eMZ); sand
7. дресвяно-щебенистый грунт, (eMZ). priming material

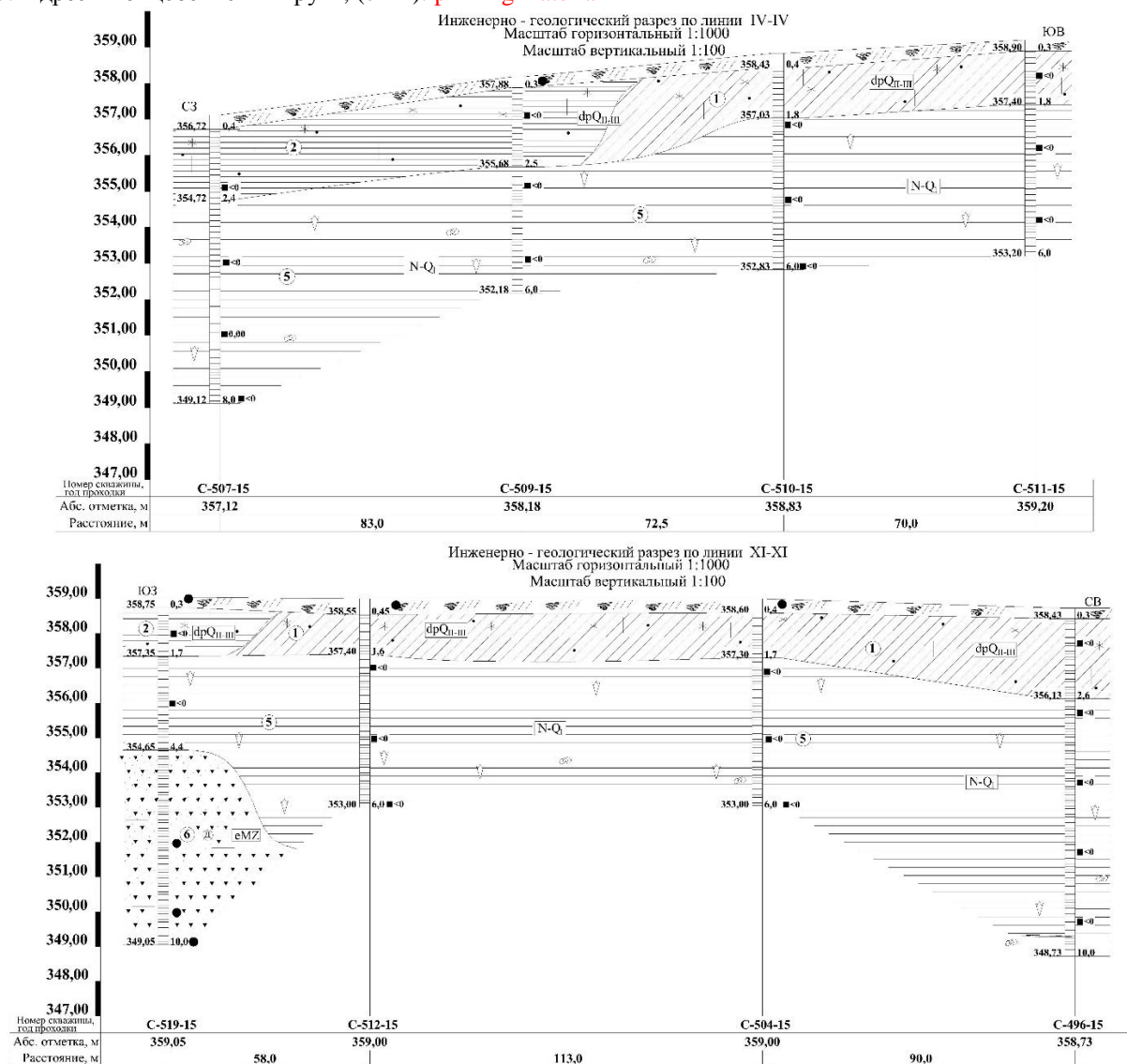


Figure 5-14 Geological Profile of Poultry Processing Farm

Объект: Завод по переработке птицы **Object: poultry processing farm**

Геологическое строение: **geological structure**

1. суглинок бурого цвета, (dpQп-ш); **brown loam**
2. песок средней крупности, (dpQп-ш); **sand medium size**
3. песок крупный, (dpQп-ш); **sand**
4. песок гравелистый, (dpQп-ш), (N-Q1); **gravelly sand**
5. песок дресвянистый, (eMZ); **sand**
6. дресвяно-щебенистый грунт, (eMZ); **priming material**
7. гранит крупнозернистый, (D2). **granite large size**

Установление уровня воды зафиксировано на глубине 4,5-4,7м **Groundwater at a depth of 5.8 to 7.0 m.**

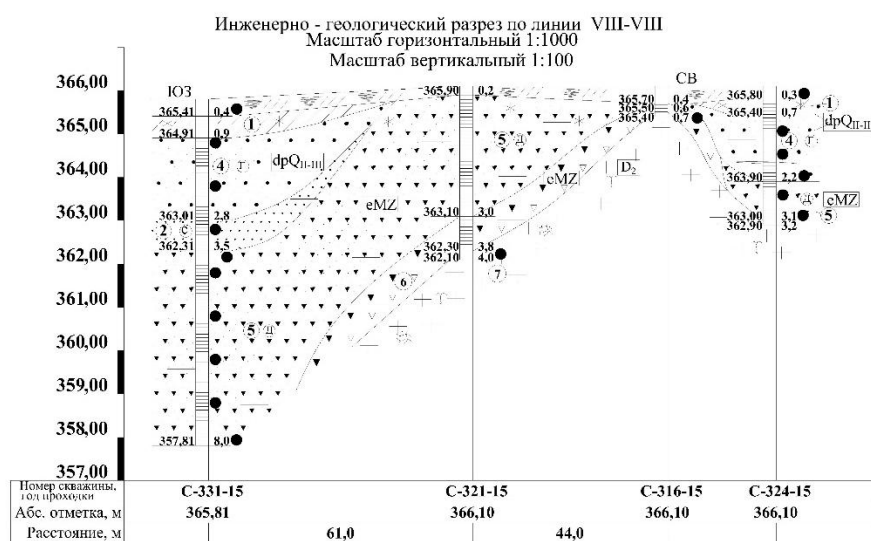
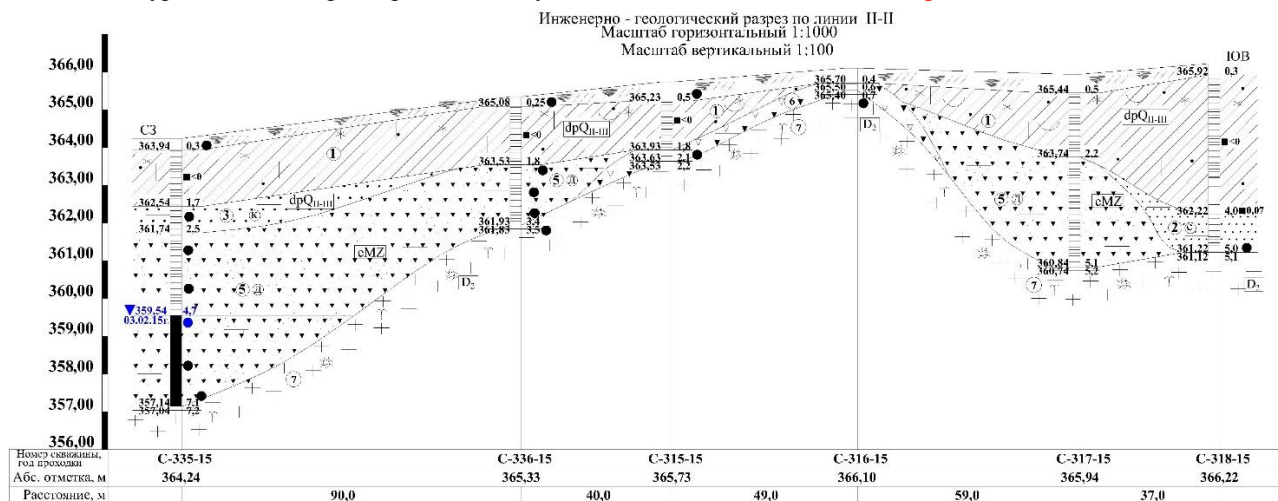
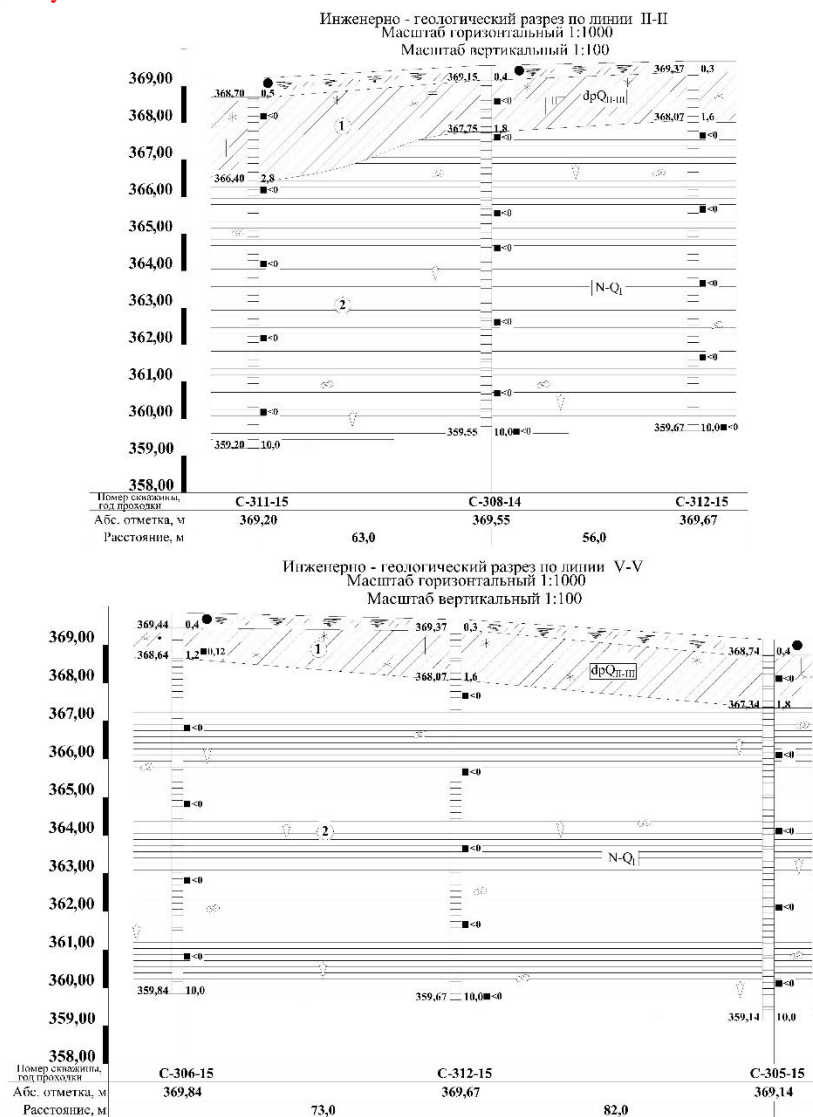


Figure 5-15 Geological Profile of Composting Ground

Объект: Площадка компостирования помета **Object: ground for composting**

Геологическое строение: **geological structure:**

1. суглинок бурого цвета, (dpQп-ш); **brown loam**
2. глина, (N-Q1). **clay**



No baseline environmental noise and vibration monitoring data was provided in the OVOS to enable any relative noise assessments to be completed in accordance with standard EIA or IFC requirements.

HYDROGEOLOGY

The main aquifer system beneath the potential development area appears to comprise the superficial alluvial deposits. The upper sections of these deposits (loams, sands and gravel deposits) would appear to be the most transmissive, with the older underlying Loams and Clays, apparently considered as aquitards. It is not clear how thick these superficial deposits are with reference to what I have seen. It may only be of the order of 6-7m. Groundwater levels are typically 1-4m bgl and show relatively pronounced fluctuation in the order of 2m.

There is deeper groundwater within the upper weathered Granite horizons, with a deeper groundwater table typically about 6-8m bgl - although this is apparently not contiguous across the development area, and strongly dependent on predominance of fracturing. It is unclear whether the lower permeability Loams and Clays of the alluvial deposits confine this deeper groundwater body and therefore whether it is hydraulic connection within the upper more transmissive superficial deposits.

It is likely that the transmissive horizons within the superficial deposits are in good hydraulic connection with the Kairakty River and respond quickly to seasonal input/output variations, indicated by groundwater level variations.

HYDROLOGY

The hydrographic network (the configuration or arrangement in plan view of the natural stream courses in an area) is underdeveloped across the area. Kairakty River originates in the southern part of Burabay district, Akmola region, East of the village of Klimovka. The length of the river is 171 km of them 150 km for Akmola region, the total catchment area of 4930km².

5.7

SURFACE WATER

No data is available for the Sukhaya nor Kayrakty rivers water in terms of flow data but some water quality data was gathered during the EIA process. The Sukhaya and Kairakty rivers originate from springs 17 km northeast and 30 km north from the discharge respectively. Kairakty has another large irrigation impoundment 9km upstream that can regulate water level at the discharge pipe entry.

Table 5-8 shows the existing background water quality data. This shows that no priority substances are released and the background data shows that chloride and phosphate levels in the river would likely exceed annual average environmental quality standards if the river was in the UK.

Table 5-7 Background Water Quality Data

PARAMETER	BACKGROUND DATA IN RIVER KAIRAKTY
COD	-
BOD	-
Total nitrogen	-
Suspended solids	36.75 mg/l
Total phosphates	0.25 mg/l
Chlorides	300 mg/l
Fats and oils	-
pH	-
Temperature	-
Nitrates	40 mg/l
Nitrites	0.08 mg/l
Sulphates	100 mg/l
Hydrocarbons	0.05 mg/l

5.8 TERRESTRIAL AND AQUATIC ECOLOGY

OVERVIEW

The current baseline of the site is likely to be one of long-term disturbance, with original steppe habitat (and likely forest-steppe before this) having been lost or significantly altered as a result of agricultural, municipal, transportation and construction activities. The biodiversity of the area will be markedly reduced from its previous character; this is detailed below.

In general, the habitats across the site comprise a network of agricultural fields, with scattered scrub (including hedgerows) and some remnant steppe areas.

FLORA

The large extent of land under agricultural tenure will likely be typically very species-poor; there are no notable areas of set-aside land within these areas.

The undisturbed areas of the territory appear typical of such habitats across the region, and are likely to be dominated by a feather grass *Stipa lessingiana* – fescue *Festuca valesiaca* community, which includes herbs. Species typical of this community include prairie wormwood *S. frigida*, oatgrass *Helictotrichon desertorum*, fescue *Festuca sulcata*, crested hair-grass *Koeleria gracilis*, red feather grass *Stipa rubens*, saltwort *Suaeda corniculata* and common glasswort *Salicornia europaea*. Overall the diversity is very low.

Pockets of scrub and woodland are scattered across the site and wider area, with the largest such example located in the east of the site. To the immediate south a more extensive woodland/scrub habitat prevails. The species composition is likely to be typical of the region, with oak *Quercus* sp., lime *Tilia* sp., aspen *Populus tremula* and ash *Fraxinus* sp. all being common.

The River Kairakty flows to the north-west of the site, and is ca. 300m away at its closest point.

No specific records of Red Book flora have been obtained as part of the original study.

FAUNA

As would be expected given the disturbed/altered nature of the habitat as described above, the faunal composition has been similarly affected. A review of faunal data collected from within the Bulandy Nature Preserve (ca. 7km east of the site) suggests that the following mammals may have once been present across the site and the wider area:

- Roe deer *Capreolus capreolus*
- Boar *Sus* sp.
- Lynx *Lynx* sp.
- Wolf *Lupis* sp.
- Fox *Vulpes vulpes*
- Steppe fox *Vulpes corsac*
- Hare *Lepus* sp.
- Badger *Meles meles*
- Weasel *Mustela* sp.
- Marten *Martes* sp.
- Stoat *Mustela* sp.

- Marmot *Marmot* sp.
- Muskrat *Ondatra* sp.
- Polecat *Mustela* sp.

Given the aforementioned disturbance, this assemblage is likely to be much reduced, and dominated by mammals with a greater capacity for adapting to the influences of anthropogenic interference. As an illustration of this, the following suite of mammals has been recorded commonly amongst urban/suburban areas of Makinsk, as follows:

- Little ground squirrel *Spermophilus pygmaeus*
- Pallas vole *Microtus arvalis*
- Water vole *Arvicola amphibious*
- Steppe lemming *Lagurus lagurus*
- Striped field mouse *Apodemus agrarius*
- Wood mouse *Apodemus sylvaticus*
- House mouse *Mus musculus*
- Rat *Rattus* spp.

Although no records have been obtained as part of this study, it is considered possible that bat species will make use of the site for foraging, and potentially roosting purposes (amongst mature trees and suitable buildings).

In terms of ornithological interest, observations and published data (Giscov, Gavrilov, Erokhov, Žulij, Hrokov 1970-1997) related to territories adjacent to Astana recorded 176 species of bird, 99 of which are wetland birds, 51 were passerines, with the remaining birds comprising game species and birds of prey. Whilst it is unlikely that these species occur on the site with any great regularity, the presence of open water within 2km of the site may provide suitable habitat for the wetland species and thus their occasional presence closer to the site is possible. The most common anticipated bird assemblage is considered to be as follows:

- Hooded crow *Corvus comix*
- Rook *C. frugilegus*
- Jackdaw *C. monedula*
- Magpie *Pica pica*
- House sparrow *Passer domesticus*
- Field sparrow *Passer montanus*
- Rock dove *Columba livia*

In addition, the abundance of suitable prey species (both in terms of the above birds and aforementioned mammals) means that a number of predatory birds are likely to be found in the area, as follows:

- Common kestrel *Falco tinnunculus*
- Lesser kestrel *F. naumanni*
- Sparrowhawk *Accipiter nisus*
- Black kite *Milvus korschun*

Although no records were obtained as part of this study, the presence of a common reptile and amphibian assemblage is considered likely.

It is likely that an abundant insect assemblage is present at the site, including numerous fly species (many of which are either synanthropic, associated with standing water, or both), ground beetles and ants.

It is likely that the majority of the species/faunal groups listed above are absent here due to the ongoing influence of human interference. There are however a number of animals that will be sufficiently tolerant of increased levels of disturbance in order to remain at the site (e.g. rats, ground squirrels etc.); additionally, some species are sufficiently adaptive to exploit the conditions (e.g., fox).

No specific records of Red Book fauna have been obtained as part of the original study.

SPECIALLY PROTECTED NATURE AREAS

There are no Specially Protected Areas of Nature (SPANs) near to site, the closest protected area is Bulandy Nature Preserve (7 km east) from the project location. The preserve protects moose but also has deer, roe, boar, lynx, wolf, fox, steppe fox, hare, badger, weasel, marten, ermine, marmot, muskrat, polecat and large birds partridge, grouse and wood and black grouses, quail, duck, coot and sandpiper for which limited hunting is allowed.

5.9 SOLID WASTE MANAGEMENT

INTRODUCTION

The ESDD assessment and OVOS gap analysis has identified gaps within the current assessment of environmental effects of the poultry farm on solid waste and its management. Although there is some coverage with regards to estimations of waste generation during construction and operational phases of the project, there are no details with regards to the offsite disposal routes described in the impact assessment. The assessment also omits details on manure management.

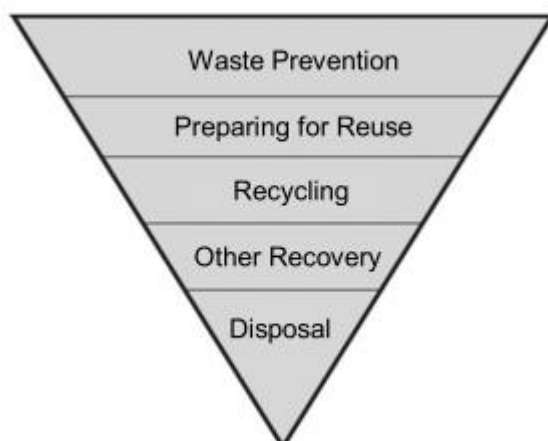
National Regulations of the Republic of Kazakhstan requires that those who generate waste as a result of their activities are responsible for the safe management and movement of wastes in a way that complies with environmental and sanitary requirements. Waste must be assigned a status of either hazardous, non-hazardous or inert.

In accordance with the national legislative requirements in Kazakhstan, the predicted waste generation figures will be reported and detailed in a Permit, to be obtained prior to commencing operations.

The EBRD's ESP also requires waste minimisation techniques to be assessed and, where possible, waste to be minimised, recovered and reutilised. Adoption of the waste hierarchy is required:

The *Waste Hierarchy* requires avoidance of waste in the first instance and reducing, as far as possible, the volume of waste requiring disposal once it has been generated. It gives an order of preference for waste management options to minimise the volume for disposal, as shown in Figure 5-16

Figure 5-16 Waste Hierarchy



The main principles of the Waste Hierarchy are:

- Waste should be prevented or reduced at source as far as possible;
- Where waste cannot be prevented, waste materials or products should be reused directly or refurbished and then reused;
- Waste materials should be recycled or reprocessed into a form that allows them to be reclaimed as a secondary raw material;
- Where useful secondary materials cannot be reclaimed, the energy content of the waste should be recovered and used as a substitute for non-renewable energy resources; and
- Only if waste cannot be prevented, reclaimed or recovered, should it be disposed of into the environment and this should only be undertaken in a controlled manner.

Where waste is generated the EBRD require wastes to be appropriately stored and disposed of in an environmentally sound manner, considering the limitations applicable to transboundary movements and other legal requirements.

When waste is transferred offsite it is required that MPF obtains chain of custody documentation to the final destination. It is also required that MPF determine whether reputable and legitimate and licenced enterprises are being used and operated to acceptable standards. Where this is not the case MPF should consider alternative disposal routes including the possibility of developing recovery and disposal facilities on site.

THE MAKINSK POULTRY FACILITY – WASTE MANAGEMENT BASELINE

The proposed new integrated poultry farm has the potential to give rise to significant levels of construction and operational waste streams.

Construction waste has been assessed as part of the OVOS and details waste streams and the potential generation figures.

Table 5-8 Construction Waste Figures

WASTE	TONNES/YEAR
Municipal solid waste	65.32
Construction waste (rubble, glass, bricks, sand, wood, tiles, soil)	1,135.79
Scrap welding electrodes	11.52
Ferrous and nonferrous metal	100
Paint containers and residues	37.8

Storage arrangements are discussed at a very high level, detailing metal containers that the waste will be stored in. It is also reported that specialised organisations will transport the waste off site. It is proposed that the MSW and construction waste will be disposed of at a MSW landfill. The disposal routes for the other waste streams are not detailed.

Waste streams and the estimated generation weights, during the operational phase of the project, are presented below:

Table 5-9 Waste Predicted to be Generated at Makinsk Poultry Farm (tonnes/year)

WASTE	TONNES/YEAR
Municipal solid waste	678.7
Scrap welding electrodes	0.024
Sludge from WWTP	2,339
Litter	73,727
Spent automotive filters	0.1782
Lead acid accumulators	0.648
Spent tyres and casings	1,312
Waste oils	6.35
Ferrous metal	5.91
Scrap waste abrasive wheels	0.0198
Mercury containing lamps	0.50
Solid residue	1.787

Hatchery waste has been estimated, however this is considered indicative as variations will occur from breed to breed and will also depend on other factors.

Table 5-10 Waste predicted to be generated at the Hatchery of Makinsk Poultry Farm (tonnes/year)

WASTE	KG/WEEK
Eggs (embryo died)	4,926.9
Eggs (embryo died in shell or immediately after pecking)	2,164.8
Egg shells	6,270.6

It is reported that incubation eggs are taken for composting.

A high level description of storage and disposal arrangements are described within the OVOS, however it is not considered to be of adequate detail. As shown above, hazardous waste streams will be generated during the operational phase, which pose a higher risk of pollution and health related incidents. Therefore, it is especially important that appropriate storage and disposal routes will need to be identified and implemented.

It is considered that the litter from the poultry houses will be transferred, using dump trucks, to a composting pad. The frequency of this movement is to be scheduled in accordance with the production figures at MPF.

The litter will be stored in windrows, with a height of 2.6m and a width of 6m (this is in accordance with the terms and conditions of the manufacturer of equipment for turning clamp); the length has been selected at 100m based on the estimated waste generation at the facility. The litter will be mixed with water and allowed to compost. The composting period is 42-55 days. The compost will then be sold as a fertiliser. It is then anticipated that the compost will be spread by a subsidiary company on consumer fields (Not MPF owned fields). The spreading period will be approximately 60 days within the year; from the harvest season (August – Sept) to when the ground freezes. Two compost spreaders will be used, with a capacity of 20 tonnes per hour (based on one tractor and forklift carrying load of compost in the spreader on the edge of the field).

Currently there are no procedures or plans in place for the safe management of waste/ litter and slurry.

Odour and nuisance related impacts are associated with the transport of litter and hatchery waste to the composting site. Currently the OVOS does not detail the specific routes of transport or the vehicles to be used to carry the waste materials to the composting site.

5.10 CULTURAL HERITAGE

CONTEXT

Historic and cultural resources include monuments, structures, works of art and sites of outstanding universal value from historical, aesthetic, scientific ethnological and/or anthropological points of view, including graveyards and burial sites. The Ministry of Culture has responsibility for the preservation, maintenance and assessment of historical and cultural monuments in the Kazakh Republic.

The main legislation relating to cultural resources comprises:

- The Law of the Republic of Kazakhstan "About Culture", dated 15.12.2006
- The Law of the Republic of Kazakhstan "On Protection and Use of the Historical Cultural Heritage", dated 2.07.1992 (amended on 29.09.2014)
- The Land Code of the Republic of Kazakhstan, dated 20.06.2003

For the purposes of recording and protecting historical and cultural monuments, they are divided into the following categories:

- Historical and cultural monuments of international status representing the historical, scientific, architectural, artistic and memorial objects included in the UNESCO World Heritage List;
- Historical and cultural monuments of national status representing the historical, scientific, architectural, artistic and memorial objects, having the special significance for the history and culture of the whole country;

- Historical and cultural monuments of local significance representing the historical, scientific, architectural, artistic and memorial objects, having the special significance for the history and culture of the oblasts (city of republican status, capital), regions (cities of oblast sub ordinance).

According to Article 39 of The Law of the Republic of Kazakhstan “On Protection and Use of the Historical Cultural Heritage”, development and use of any allocated lands shall be made only after archaeological research. Any works that may endanger the existence of monuments are prohibited. Businesses, organizations, institutions, public associations and citizens in case of detection of archaeological and other sites of historic, scientific, artistic, and other cultural value, are obliged to inform the authorized body for the protection and use of historical and cultural heritage, and to suspend any works that may affect them immediately.

BASELINE

There are no internationally⁶, nationally⁷ or locally⁸ designated historical and cultural monuments in the project area. However, two monuments and three churches were identified within a 15km area surrounding the site and are assessed to be of cultural or religious value:

- A monument of a prominent Kazakh fighter and poet Baluan Sholak, ‘Atatobe’, situated at 1km east of Voznesenka Вознесенка (approximately 13km from the site);
- A monument of Lenin on ул. Пристанционная (approximately 2km from the site);
- A Mosque on ул. 1-мая (approximately 3.5km from the site);
- A Catholic Church on октябрьский пер. (approximately 350m from the site);
- The Orthodox Church of St. Nicholas on ул. Кима М. (approximately 2.3km from the site).

⁶ UNESCO Kazakhstan [online] available at: <http://whc.unesco.org/en/statesparties/kz> (Accessed January 2016).

⁷ Culture Legacy – Akmola region [online] available at: http://www.madenimura.kz/en/culture-legacy/memorials/region/akmola_oblast (Accessed January 2016).

⁸ State list of historical and cultural monuments of local importance [online] available at: http://tengrinews.kz/zakon/gosudarstvennyie_organyi_akmolinskoy_oblasti/kultupa/id-V10B0003364/ (Accessed January 2016).

Figure 5-17 Atatobe Monument (left) and Lenin Monument (right)



There are 82 archaeological areas of local significance in the Bulandy District. Two of them are in Makinsk and are located 26km from the project area. They are identified as burial grounds from the middle-age period.⁹

⁹ State list of historical and cultural monuments of local importance [online] available at: http://tengrinews.kz/zakon/gosudarstvennyie_organy_i_akmolinskoy_oblasti/kultupa/id-V10B0003364/ (Accessed January 2016).

6 CONSULTATION WITH STAKEHOLDERS (PUBLIC CONSULTATION)

6.1 BACKGROUND

As a requirement under the Environmental Code the project falls under the category of projects that required an expert review. According to the legal requirements the competent authority should announce public hearings for the local community and the general public in the area. In line with national and international requirements a stakeholder engagement program has been developed as part of the Environmental, Health and Safety and Social Due Diligence assessment in the Stakeholder Engagement Plan (SEP). The program is aimed at providing information on the Project and an opportunity to participate for local communities, affected and interested stakeholders from the wider Project area of influence.

Stakeholder engagement activities started in 2015 during the impact assessment stage of the Project. A Project related meeting was organised with relevant national, regional and municipal authorities.

The EIA consultation was in line with national legislation and the requirements of the national EIA processes. The methodology and outcome of past consultation events and the future stakeholder engagement plans are summarised in this chapter.

6.2 METHODOLOGY

The consultation and stakeholder engagement activities was designed to reach out for all affected communities in the wider Project area of influence. This included not only the residents of local communities but also government authorities and organisations as well as the general public in the Bulandy District, and Makinsk town. This methodology for outreach will continue to be used for further consultation activities.

Several channels are provided to disclose information and ensure that there is a dialogue with the stakeholders. The internet, brochures, information boards, newspaper advertisements, TV news, consultation and public hearing events have been used to disseminate Project information and engage with stakeholders. There has been a public hearing organised as part of the national EIA procedure where detailed information on the Project design and impacts were shared with participating stakeholders. Contact details to the MPF were provided to stakeholders who were interested to find out more about the Project, had specific questions or comments that they wanted to share.

6.3 OUTCOME OF STAKEHOLDER CONSULTATIONS

The stakeholder consultation was undertaken in December 2015 disclosing information about the Project, its impacts and timeframes for implementation. Project information including the stakeholder engagement plan, ESIA SIR will be uploaded to the website of the MPF and the EBRD Russian versions of the NTS will be available in hard copies throughout the municipal offices in the town of Makinsk. The draft national EIA was presented to the public in December 2015. A Project grievance mechanism has been set up and publicised during the consultation events.

There were questions about the size of the sanitary protection zone, location of the nearest residence, where wastewater will be discharged and to what quality as well as what decisions had been made with regards to waste disposal.

Based on the meeting in December 2015 details were given to the stakeholders present at the meeting with regards the Project and its potential impacts. There seems to be no further questions or comments from stakeholders.

6.4 FUTURE PUBLIC PARTICIPATION

The SEP has been developed to reflect the Project design and to provide tailored stakeholder and public consultation activities focusing on the pre-construction and construction phases. The SEP and the supplementary documentation will be available through the designated websites and hard copies will be available in regional municipal offices. Prior to construction activities a number of awareness raising meetings will be organised with governments and affected people and information leaflets will be distributed in libraries and other public places. Consultation activities will discuss construction impacts and will provide updated timescales for Project implementation. Local and regional newspapers will be used to disseminate Project information and raise awareness of construction works and potential impacts on traffic and noise. Bulletins with vacancies will be distributed in the town of Makinsk to ensure that local people are informed about Project related employment opportunities. The SEP requires that MPF designates a contact person responsible for the Project in general, appoint a community liaison representative who is responsible for SEP activities and provide updated contact details for the grievance mechanism.

7 IMPACT ASSESSMENT

7.1 INTRODUCTION

This Chapter sets out the potential and predicted environmental and social impacts of the Project in all its phases (construction, operation and closure). It identifies the sources of the impact associated with the Project's infrastructure and activities as set out in Chapter 2, and describes the potential impacts of these and the mitigation measures needed.

The Project-affected area includes the Project footprint together with the surrounding areas that would potentially be affected by impacts associated with the construction, operation and closure of the proposed poultry farm. It is anticipated that many of the impacts identified related to final decommissioning of the poultry farm are expected to be similar to the impacts posed by the poultry farm during the construction and operation phases.

7.2 IMPACT ASSESSMENT METHODOLOGY

The methodology developed and adopted for the assessment provides a tool for assessing and evaluating the significance of impacts. The identified potential impacts of the proposed Project include positive and negative impacts of higher or lower significance. Impact significance is based on the following criteria.

- Magnitude of impact – the level or intensity of changes caused by the project activities with regard to baseline conditions. An impact of high magnitude would mean major changes for large amount of biophysical resources and/ or people.
- Area of impact – the area where the changes occur.
- Duration of recovery – estimated time required for returning to pre-impact conditions after the impact has ceased.

From the viewpoint of significance, the impacts can be negligible, minor, moderate or major. Definitions of these levels of significance are described in Table 7-1 below.

Table 7-1 Impact Significance Levels

LEVEL	IMPACT ON BIOPHYSICAL RESOURCES	IMPACT ON SOCIO-ECONOMIC CONDITIONS
Negligible	Almost no changes in the environment; the effects can be recovered within a few days.	Almost no changes in socio-economic conditions or commercial activities, the effects can be recovered within a few days.
Minor	Isolated change in biophysical conditions within a limited area (radius of 100m or so); the recovery takes a few months; no residual effects observed.	Isolated change in socio-economic conditions and/ or commercial activities lasting for a few days to a few months with no residual effects,
Moderate	Observable change in biophysical environment lasting for a few months to a few years before recovery. Considerable affected area is within a radius of 0.5 km or a lesser impact over a larger area.	Considerable change in socio-economic conditions and/ or commercial activities of up to 10% of present in Bulandy District and Makinsk town or lesser change for 50% of persons.

LEVEL	IMPACT ON BIOPHYSICAL RESOURCES	IMPACT ON SOCIO-ECONOMIC CONDITIONS
Major	Changes in biophysical conditions observable within a radius beyond 0.5 km or a considerable change in a smaller area not recoverable within a few years.	Considerable changes in socio-economic conditions and/ or commercial activities of more than 50% of persons present in Bulandy District and Makinsk town or noticeable changes for persons outside Bulandy District and Makinsk town.

RESIDUAL IMPACTS AFTER MITIGATION

Adverse effects rated as “significant” must be mitigated in order to reduce the level of significance of the residual impact. Monitoring measures must also be defined to assess the efficacy of the mitigation measures.

The potential impacts, with mitigation imposed, have then been reassessed to derive residual effects as a result of Project activities. This assessment is based on the same Impact Significance Matrix (Table 7-1) as used to assess unmitigated impacts. The residual effect is determined as a result of the impact and implemented through appropriate risk analysis based on the monitoring programme targeted to audit the effectiveness of the mitigation measure targeted on the potential impact. The residual impacts of the new poultry farm in the majority of cases are considered to be Negligible.

APPLICATION OF THE METHODOLOGY FOR SPECIFIC ENVIRONMENTAL AND SOCIAL ASPECTS

Defining the significance of the effects has been used as the basis for determining the appropriate mitigation strategies in combination with identifying the need and scope of management plans.

FORECAST OF SOCIAL AND ECONOMIC CONSEQUENCES

In addition to the above approach, prospective harmful substances to land, water and air have been calculated to the extent possible based on current information/ data in the previous studies undertaken by MPF. This is to inform the forecast of social-economic consequences as legally required in RoK and is presented in Chapter **Error! Reference source not found..**

7.3 AIR QUALITY

Emissions to atmosphere will occur at all stages of the proposed Project lifecycle, including construction, operation and decommissioning. Such emissions include release of air quality pollutants and greenhouse gases (GHG). Impacts on the environment from atmospheric emissions during each stage of the project lifecycle differ significantly in duration, scale and magnitude.

ODOUR

CONSTRUCTION

Earthworks and civil works are not among the activities considered likely to generate significant odour emissions. It is considered unlikely that activities associated with the construction phase would result in the generation of odours other than odours from vehicles and construction machinery/ equipment exhausts. The closest residential properties which may be subjected these odours are located approximately 125m northeast of the proposed hatchery building. At this distance, it is considered unlikely that any odours generated by exhaust emissions will be detectable. All other properties are located further from the Site and it is therefore considered that the odour impact during the construction phase would be of **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to odour are described in Chapter 10.

OPERATION

Due to the nature of the proposals, once operational, a number of processes on the Site will have the potential to be sources of odour nuisance. These include:

- Waste Water Treatment Plant;
- Composting pad;
- Slaughter / processing plant;
- Broiler sheds; and
- Movement of waste from broiler sheds to composting pad at end of growing cycle.

The likelihood of odours generated by the Site once operational causing a nuisance depends on a number of factors, including the frequency, intensity, duration, unpleasantness and location of human receptors in relation to the odour. This can be judged by taking into account the location of the source relative to sensitive receptors (distance and direction), and the effectiveness of dispersion / dilution. Meteorological conditions play an important part in whether or not offensive odour will be experienced (wind direction and speed being particularly important), and available local meteorological data (Makinsk) have therefore been considered (Table 7-2).

Table 7-2 Average Annual Wind Direction Frequency

DIRECTION	FREQUENCY OF OCCURRENCE (%)
North	4
Northeast	3
East	5
Southeast	7
South	19
Southwest	45
West	7
Northwest	9

The Site will be operational throughout the year, and therefore there is a risk of odours to be generated at all times. The wind direction data indicate that the predominant wind direction in the area is from the south through south-western sector (64%). Therefore, for the majority of the time, the greatest potential for any odours generated to be detected will be at the receptors located to the north through to the northeast. The closest property lies approximately 125m from the proposed hatchery building, however this is unlikely to be a significant source of odours given the nature of the activities. The closest properties to the site (excluding the hatchery) are at least 1.5km away, in Makinsk (to the northeast of the Site).

How offensive an odour is perceived to be is subjective, and varies from person to person. Odours associated with waste water, faeces, and rendering activities are considered to be highly unpleasant, whilst odours from composting are considered as moderately unpleasant. Odour emissions from composting are an indication of suboptimal conditions, and will be controlled through regular turning of composting matter.

Based on the distance between the potentially odorous activities and the sensitive receptors, there is the opportunity for significant dispersion and dilution by the wind, and it is considered unlikely that significant odours will be perceived by residents in the area surrounding the Proposed Development. This being the case, odour impacts are considered to be of **Negative Minor** significance prior to mitigation. A summary of proposed mitigation measures related to odour are described in Chapter 10.

DECOMMISSIONING

The environmental impacts associated with the closure the Site will be similar to the impacts that occur during the construction of the Project. Accordingly, impacts are considered to be Negligible significance prior to mitigation. A summary of proposed mitigation measures related to odour are described in Chapter 10.

DUST AND SMOKE GENERATION

CONSTRUCTION

Dust comprises particles typically in the size range 1-75 micrometres (μm) in aerodynamic diameter. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused.

Construction activities associated with the Proposed Development that have the potential to generate and/or re-suspend dust are likely to include:

- Preparation of access routes and internal road network;
- Earthmoving and drilling;
- Demolition of existing buildings on Site;
- Materials handling, storage, stockpiling, spillage and disposal;
- Grinding, sanding and sandblasting of surfaces;
- Movement of vehicles and construction traffic within the Site; and
- Construction of new buildings and structures.

The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place. The construction will involve potentially dusty materials such as concrete, crushed stone, and gravel.

The highest risk of dust exposure is to regular staff and informal workers on site. The closest off-site receptors, and the closest to dust generated by activities carried out during construction, are located in Bajsuat; the closest property within Bajsuat is approximately 125m from the proposed hatchery building. Besides the properties in Bajsuat, all others are located over 1.5km from the Site. Ecological habitats which are sensitive to dust deposition within 50m of dust generating activities may be at risk of impacts during construction, however, the majority of construction activities will take place more than 50m from the Site boundary. The area surrounding the Site is therefore considered to be of low sensitivity to dust generated by construction activities, and therefore low risk of experiencing significant dust impacts during construction. Consequently, dust generation impacts during construction on ambient air quality are considered to be of **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to dust are described in Chapter 10.

OPERATION

During operation, dust may be generated as a result of a number of processes carried out on Site. These include:

- Feed mill operations;
- Preparation of litter (chopped straw);
- Litter spreading within broiler sheds pre-cycle; and
- Removal of waste from broiler sheds at end of cycle and transportation to composting pad.

On a daily basis, dust emissions originate from the feed, bedding material and from the animal activities. Waste removal occurs after each (roughly 8 week) cycle. The amount of airborne dust will vary significantly throughout the day depending on:

- The amount of ventilation;
- The activity of the birds;
- Type and quantity of litter;
- The type and the consistency of feedstuff; and
- The humidity in the broiler shed.

The proposed feed mill is located approximately 150m south of Makinsk. There is therefore a risk that dust generated and emitted from the processes associated with the feed mill will affect the closest residential properties. However, the exhaust will be fitted with bag filters; these filters, fitted in line with BAT, will significantly reduce the risk of dust impacts in the surrounding area.

The ventilation regime is controlled in order to ensure optimal growth conditions are maintained within the house (and varies throughout the day and depending on season / external conditions to ensure the internal temperature is maintained appropriately). Fine litter material (e.g. the chopped straw proposed) is considered highly dusty, however the proposed feeding regime (constantly available to the birds) is considered most favourable in terms of dust generation.

The highest risk of dust exposure is to regular staff on site. Measures put in place to protect on-Site staff will ensure that the risk of impacts off-Site are smaller. The closest off-Site receptors are located in Bajsuat, approximately 125m from the proposed hatchery building, however, activities associated with the hatchery are unlikely to generate significant dust emissions. Besides these properties, all others are located over 1.5km from the Site. The area surrounding the Site is therefore considered to be of low sensitivity to dust generated by the identified operational phase activities, and therefore low risk of experiencing significant dust impacts.

Consequently, dust impacts during operation on ambient air quality are considered to be of **Negative Minor** significance prior to mitigation. A summary of proposed mitigation measures related to dust are described in Chapter 10.

DECOMMISSIONING

The environmental impacts associated with the closure the Site will be similar to the impacts that occur during the construction of the Project. Accordingly, impacts are considered to be **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to dust are described in Chapter 10.

EMISSIONS TO AIR

CONSTRUCTION

The greatest potential impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the Site access and the Site boundary. The number of construction vehicles likely to be generated is not known, however, given that existing air quality within the vicinity of the Site is likely to be good, and that there are limited residential properties in the vicinity of the Site, there are unlikely to be any significant changes in air quality at residential properties.

Final details of the exact construction plant and equipment likely to be used on the Site will be determined by the appointed contractor, it is considered likely to comprise bulldozers, road rollers, cranes, and excavators. The number of plant and their location within the Site are likely to be variable over the construction period. There will also be emissions relating to welding, roofing and painting, however, these are unlikely to be released in significant volumes, and will be temporary in nature, and any impacts will be highly localised.

Based on the proximity of sensitive receptors to the roads likely to be used by construction vehicles and the Proposed Development site boundary, the impacts are therefore considered to be of **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to emissions to air are described in Chapter 10.

OPERATION

During operation, emissions of air pollutants may be generated as a result of a number of processes and activities carried out as a result of the Proposed Development. These include:

- Emissions from vehicles operating on-site, as well as vehicles travelling to and from the Site;
- Emissions from on-site energy generating plant (Liquified Petroleum Gas (LPG));
- Emissions from the broiler houses due to physical processes;
- Emissions from composting; and
- Emissions from the disinfection process.

Vehicle exhaust emissions associated with the operation of the Site (deliveries, transportation of produce and staff movements) have the potential to negatively impact on local ambient air quality. It is understood that, once operational, the Site will generate up to 60 vehicle movements per day, associated with deliveries, transportation of the processed product off site, and staff travel. In the UK, criteria have been provided in guidance¹⁰ in order to screen when additional traffic flows have the potential to significantly impact on air quality. In order for a change in traffic flows to have a potentially significant impact on air quality, the total daily flow must increase by 1,000 vehicles per day, or Heavy Duty Vehicles (HDV; >3.5 tonnes) must increase by 200 vehicles per day, on roads where the existing traffic flows exceed 10,000 vehicles per day. Where the increases in traffic flows do not exceed these thresholds, impacts on air quality can be judged to be insignificant. The estimated traffic flows associated with the operation of the Site are significantly below the threshold.

In addition to electric boilers, a number of boilers operating on LPG will be installed across the Site. Each broiler house will have a 100kW boiler installed, with larger boilers provided in each of the other buildings on the Site (office, feed mill, processing plant and hatchery). Emissions associated with combustion of LPG include oxides of nitrogen (NO_x), carbon monoxide (CO), SO₂ and particulate matter. Given the small scale of the proposed boilers, it is considered unlikely that these emissions will have a significant impact on concentrations at the closest residential properties (located some distance from the majority of boilers proposed). It is intended that the source of fuel will change to natural gas (timescales unknown); this will reduce the risk of SO₂ and particulate matter emissions (which are negligible from natural gas). Impacts on air pollution related to the boilers are judged to be insignificant.

The key emission to air produced in animal housing systems is ammonia, the main source of which is the rapid hydrolysis of urea contained in urine by the urease; within broiler houses, optimal conditions (temperature and moisture content) arise for ammonia production. Due to its reactive nature, ammonia is rapidly deposited and therefore ammonia concentrations rapidly decrease with distance from the source. Ammonia is not a human health issue unless at very high concentrations; concentrations are unlikely to reach these levels even within the broiler sheds, as this would be harmful to both on site staff and the health / growth of the broilers themselves. The ventilation management ensures that concentrations do not reach levels which are harmful to human health. After emission from the broiler sheds, the ammonia concentrations will rapidly decrease. Consequently, concentrations are unlikely to be significant at the closest residential properties to the broilers sheds, which are located over 1.5km away.

Ammonia deposition can lead to eutrophication (increased nitrogen) and acidification of water and soil, which can lead to changes in species diversity. The impact of these processes on the surrounding area in relation to potential habitat impact, is considered within the habitat / ecology assessment.

¹⁰ Highways Agency, 2007. Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 HA207/07 Air Quality. Available at: www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf

Additionally, there is a risk of ammonia production during composting. There is also a risk of methane (CH₄) and nitrous oxide (N₂O) emissions where the compost is allowed to develop anaerobic conditions; this will be minimised by regular turning. The composting will take place over 1.8km from the nearest residential property, and therefore for the same reasons as described above for emissions from the broiler houses themselves, concentrations are unlikely to be significant at the closest residential properties.

Formaldehyde is also produced during disinfection. It is considered unlikely that emissions will be significant beyond the buildings being disinfected as there would be an unacceptable risk to on site workers in these circumstances. Consequently, formaldehyde emissions are unlikely to have a significant impact off site including at the closest residential properties.

Overall, the potential impact of emissions to air during the operation of the Site is considered to be of **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to pollutant emissions are described in Chapter 10.

DECOMMISSIONING

The environmental impacts associated with the closure the Site will be similar to the impacts that occur during the construction of the Project. Accordingly, impacts are considered to be **Negligible** significance prior to mitigation. A summary of proposed mitigation measures related to pollutant emissions are described in Chapter 8.

EFFECTS FROM EMISSIONS OF GREENHOUSE GASES (GHG)

CONSTRUCTION

During the construction phase, the primary sources of greenhouse gases are CO₂ generated from combustion sources. However, there could potentially be limited GHG releases from the site associated with:

- On-site use of temporary construction facilities (office , engineer's facilities and associated amenities);
- Extraction and manufacture of materials required to construct the proposed development;
- Transport of materials and labour from the assumed point of production to the poultry farm locations;
- On-site use of plant and equipment; and
- Indirect impact of grid electricity generated by fossil fuels.

Overall, the potential impact of greenhouse gas emissions during construction is considered to be of **Negative Minor** significance prior to mitigation. A summary of proposed mitigation measures related to GHGs are described in Chapter 10.

OPERATION AND MAINTENANCE

During the operation of the site GHG emissions will be generated from the following activities:

- The poultry farm broiler houses and hatchery;
- Transport of raw materials and labour to the farms and associated waste and products from the farms;
- On-site use of associated liquid petroleum gas fired boiler plant and other equipment;
- Composting of the chicken litter and subsequent landspreading;

- Wastewater treatment process; and
- Indirect impact of grid electricity generated by fossil fuels.

Greenhouse gases have an effect on global warming in relation to their potential for trapping heat in the atmosphere. Methane (CH_4) and nitrous oxide (N_2O) are the most important greenhouse gases associated with animal farming and their GWP for a time horizon of 100 years is 25 (CH_4) and 298 (N_2O) times greater than CO_2 .

When manure is stored or treated as a liquid (e.g. in lagoons, tanks, or pits), it decomposes anaerobically and can produce a significant quantity of CH_4 . The amount of methane generated is affected by the extent of anaerobic conditions present, the temperature of the system, and the retention time of organic material in the system. The liquid effluent from the slaughterhouse and rendering plant will be treated in the wastewater treatment plant and should not be retained in the reception chambers for long periods of time in order to generate anaerobic conditions.

When manure is handled as a solid (like the windrows proposed at the site) or when it is deposited on agricultural land as proposed, it tends to decompose under more aerobic conditions and less CH_4 is produced.

Most of the nitrous oxide in livestock systems occurs through the microbiological transformation of nitrogen and this involves three main processes:

- Nitrification under aerobic conditions;
- Denitrification under anaerobic conditions; and
- Autotrophic nitrifier denitrification is believed to be similar to denitrification.

Under partial or transient anaerobic conditions, the denitrification reaction is uncompleted, resulting in the production of NO and N_2O . Apart from the lack of oxygen availability, denitrification is also favoured by the presence of an available carbon source and warm temperatures, among others. Because of this dependence upon such site-specific factors, emissions of N_2O exhibit a rather high degree of spatial and temporal variability.

Soil microbial processes (denitrification processes) produce nitrous oxide from the breakdown of nitrate in the soil, whether derived from manure, mineral fertilisers or the soil itself, but the presence of manure encourages this process. Livestock housing itself, particularly littered systems, is an additional source of N_2O emissions

The European Guidance Note Best Available Techniques (BAT) Reference Document for the Intensive Rearing of Poultry or Pigs Final Draft - August 2015 provides emission data for the production of poultry which can be seen in Table 7-3 below.

Table 7-3 Greenhouse Gas Emissions

PARAMETER	KG CO ₂ -EQ/KG OF PRODUCED POULTRY MEAT	RELEASE FROM MPF IN TONNES OF CO ₂
CH ₄	0.04	2,400
N ₂ O	1.1	66,000
CO ₂ related to energy consumption	1.4	84,000
CO ₂ related to land use and land use change	2.4	144,000
Total	4.94	296,400

From the above we can see that the total release would be 296,400 tonnes of CO₂ which would categorise it as a medium-high GHG emitter based on EBRD Methodology for Assessment of Greenhouse Gas Emissions. However, this guidance is just for the poultry farm where the project also incorporates a slaughterhouse, rendering facility, wastewater treatment plant, feed mill and composting facility as part of the wider project. Therefore, the GHG emissions are likely to be higher than those described above.

The EBRD Methodology for Assessment of Greenhouse Gas Emissions states that industrial waste water treatment is categorised as having a negligible GHG impact and has therefore not been considered further.

The fuel use for the project is 12.64MW electricity and 18.86MW installed LPG fired gas boilers across the broiler houses, offices, slaughter house and rendering plant and hatchery. This would calculate as 12.64MW x 8760 hours x 1.506 emission factor for grid produced electricity in Kazakhstan for a total of 166,753 tonnes of CO₂. The Environment Agency guidance note H2 Integrated Pollution Prevention and Control (IPPC) Energy Efficiency has an emission factor of 240kg CO₂ per MWh for LPG. Given that heating is required for less than 50% of the year which comprise 9.6MW of the total and the slaughterhouse and rendering plant are not 24 hour 7 day a week operations a factor of 40% of the total has been used as a conservative worst case. This would calculate as 18.86MW x 3,504 operational hours x 240kg per MWh = 15,860 tonnes of CO₂. Therefore the calculated usage from the fuel use is excluding transport of 182,613 tonnes of CO₂. This is substantially higher than the BREF guidance but incorporates all of the other facilities in the wider project over and above just the poultry farm but excluding the feed mill.

If we take the value from table 7-3 above for CH₄ and N₂O generation from the poultry houses and CO₂ from land application and land use changes and add the calculated energy use then the estimated total GHG are 395,013 tonnes. This excludes the composting process, feed mill and transport.

The 2012 Guidelines to Defra / DECC's (UK Government Departments) GHG Conversion Factors for Company Reporting has an emission factor of 3,164kg CO₂ per tonne of diesel. Given that diesel is 850 kg per m³ and the usage of 173 m³/year would be 147 tonnes of diesel producing 465 tonnes of CO₂.

It is recommended as part of the ESAP that when the poultry farm and associated infrastructure is operational, a greenhouse gas inventory be calculated using actual data and monitored and reported to EBRD on an annual basis.

From the above the impact of greenhouse gas emission during the operation of the poultry farm and associated infrastructure is considered to be of **Negative Moderate** significance prior to mitigation. A summary of proposed mitigation measures related to GHGs are described in Chapter 8.

DECOMMISSIONING

Greenhouse gas emission impacts associated with the closure of the poultry farm will be associated with the decommissioning and removal of the facilities and would be similar in nature to those during construction although it would be expected that it would be for a shorter duration.

Accordingly, impacts are considered to be **Negative Minor** significance prior to mitigation. A summary of proposed mitigation measures related to GHGs are described in Chapter 10.

CLIMATE CHANGE AND ADAPTATION

CONSTRUCTION

The construction works are planned to be carried out during summer months, and as such the probability of extremely hot temperatures should be considered during planning of the works. In addition, the possibility of severe winter frosts and heavy snow should be addressed during the planning of equipment and construction site maintenance. The impact of construction of the Project to climate change and adaptation is considered to be **Negligible**.

OPERATION AND MAINTENANCE

Operation of poultry farm will be carried out according to procedures developed for the climate conditions during its design. However, the poultry farm design and development based on the best international practice will allow for mitigation of the impacts of extreme temperatures (e.g. lengthy too hot or too cold periods) or precipitation pattern (e.g. heavy rain, thick snow, drought), so that they are negligible for areas adjacent to the poultry farm. The poultry farm operational procedures will be updated, if necessary, according to the climate change trends eg for back-up heat supply and feed movements during extended periods of inclement weather. This being the case, the impact of operation and maintenance of the poultry farm to climate change and adaptation is considered to be **Negligible**.

DECOMMISSIONING

Climate change and adaptation impacts associated with the closure and decommissioning of the poultry farm will be similar to the impacts that occur during the construction and operation of the Project, and on this basis are considered to be **Negligible**.

7.4

NOISE IMPACTS

CONSTRUCTION

The primary source of noise during construction will be heavy equipment (e.g. bulldozers, graders, excavators, dump trucks, etc.) and vehicular traffic. The magnitude of construction noise impacts depend upon the specific plant used, its duration of use during a typical day and the distance between construction works and sensitive receptors.

The OVOS has identified the following construction plant that is likely to be used:

- Bulldozers, 79 kW/HP/108
- Diesel hammers,

- Self-propelled road rollers are smooth,
- 8 t mobile compressors with internal combustion engine pressure up to 686 kPa
- Gantry cranes at work on the installation of technological equipment,
- Various mobile/crawler cranes from 10t to 100t
- 35 t (tractors, crawler, q/t) self-propelled scaffoldings, lifting height of 12 m (tractors, crawler, d/ton)
- Excavators diesel Caterpillar
- Wheeled 25 t. tractors

The closest residential receptor from any part of the Proposed Development is Baysuat village, which is approximately 125m from the Incubator site. All other surrounding villages are at least 1250m from any part of the development.

In the absence of a specific construction program, it is not practicable to determine accurate noise level predictions at the residential receptors, however, construction noise levels are only likely to cause isolated changes to the existing environment within a distance of 1km from the works and when all construction plant is operating at the same location simultaneously.

Given the distances to the surrounding residential areas and the fact that construction noise impacts would cease as soon as the works have been complete, any potential noise impacts would be temporary and therefore considered to be of Negative Minor significance at receptors in Baysuat village and Negligible significance at all other residential receptors, prior to mitigation.

Construction noise can be managed with proper planning and a summary of proposed mitigation measures related to noise are described in Chapter 8.

OPERATION AND MAINTENANCE

The primary noise sources during operation are assumed to be mechanical services equipment and vehicular traffic on the internal 'clean' and 'dirty' road networks.

It is understood that under Kazakh law, noise calculations are not required during the design development stages and that exact locations and specification of mechanical services equipment are therefore not provided until after the commissioning stage.

For the purpose of the noise impact assessment, mechanical services equipment noise levels have been assumed, based on similar facilities in the UK and are summarised below in Table 7-4:

Table 7-4 Assumed Noise Generating Equipment

SITE	IDENTIFIED NOISE GENERATING EQUIPMENT	ASSUMED NOISE LEVEL (SOUND POWER)
Incubator/Hatchery Site	Ventilation fans on Hatchery Building	12 No per building at 84 dB(A) each
	Air conditioning plant for Hatchery Building	2 No at 78 dB(A) each
	1900kW Boiler	85 dB(A)
	Stand-by Diesel Generator	102 dB(A)*
Administrative and service building	Ventilation fans for ABK Building	3 No at 84 dB(A) each
	Ventilation fans for Garage	6 No at 84 dB(A) each
	Ventilation fans for Workshop	4 No at 84 dB(A) each

	560kW Boiler	80 dB(A)
	Forklift (assume 50% on-time)	104 dB(A)
Broiler Farms	Ventilation fans for Broiler houses (12 houses per farm)	16 No per house at 84 dB(A) each
	Transformers (2 No per farm)	60 dB(A) each
	Stand-by Diesel Generators (2 No per farm)	102 dB(A) each*
	Boilers for Broiler houses	1 No per house – 76 dB(A) each
poultry processing	Ventilation fans for process building	12 No at 84 dB(A) each
	Air conditioning plant for process building	4 No at 78 dB(A)
	Ventilation fans for Laboratory	2 No at 84 dB(A) each
	Ventilation fans for Warehouse	4 No at 84 dB(A) each
	Ventilation fans for Garage and workshop	7 No at 84 dB(A) each
	Compressor house	102 dB(A)
	6800kW Boiler	100 dB(A)
	Transformer	60 dB(A)
	Forklift (assume 50% on-time)	104 dB(A)
Feed Mill Very limited information available on the Feed Mill but will incorporate a number of grinders, mixers and conveyor belt systems with 36 internal silos, assumed to include mechanical ventilation.	Grinders/mixers/conveyors	6 No at 97 dB(A) each
	Silo loading/unloading	36 No at 95 dB(A) each
	Ventilation fans	36 No at 84 dB(A) each
Composting Pad	Front loader (2 No)	110 dB(A)
	Windrow turner	97 dB(A)
Wastewater Plant	Pumps	90 dB(A)
Clean Road Network	Light-Medium Goods Vehicles	Approx 24 movements per hour
	Heavy Goods Vehicles	Approx 4 movements per hour
Dirty Road Network	Heavy Goods Vehicles	Approx 14 movements per hour

*Note : For the purpose of the assessment, stand-by generators are assumed to operate for 10% of the day

The equipment and vehicular movements scheduled above have been incorporated into a 3-D computer noise model using CandaA environmental noise modelling software in order to predict indicative operational noise levels from the Site to the surrounding residential areas. Output from the noise model is shown in Figure 7-1 and summarised in Table 7-2, below.

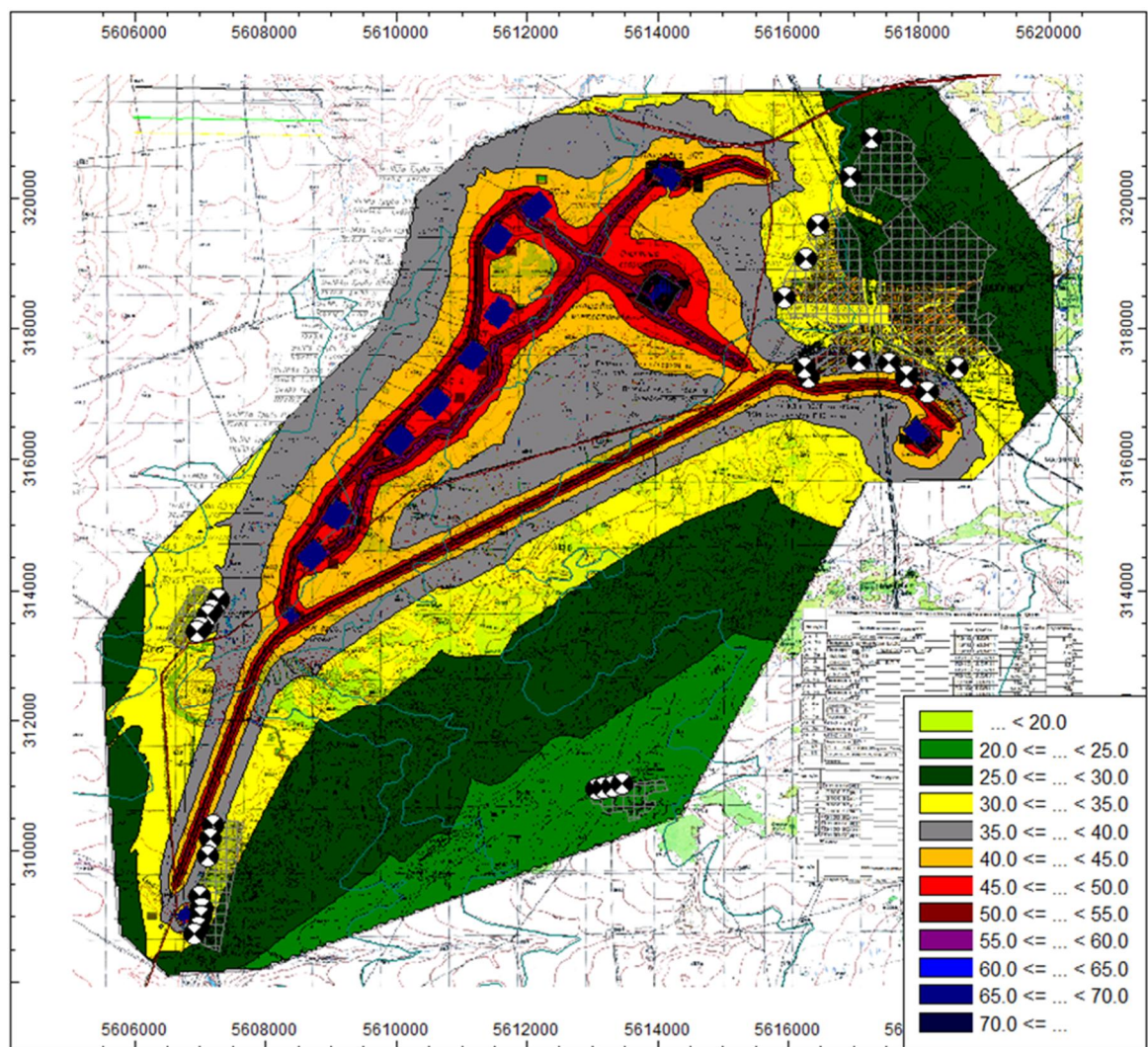


Table 7-5 Predicted Indicative Operational Noise Levels

RECEPTOR LOCATION	INDICATIVE OPERATIONAL NOISE LEVELS
Makinsk City	30-44 dB $L_{Aeq,T}$
Karaozek village	34-36 dB $L_{Aeq,T}$
Baysuat Village	32-40 dB $L_{Aeq,T}$
Bulandy District	<25 dB $L_{Aeq,T}$

The predicted noise levels quoted above are considered to be indicative, due to the lack of technical data and design detail available for the Proposed Development, and could therefore be subject to tolerances of up to ± 10 dB, depending on the source.

Allowing for a worst case scenario (i.e. 10 dB above the predicted noise levels quoted in Table 7.5), the likely noise levels all fall below the day-time criteria stipulated by the WHO for impacts at residential receptors but could exceed the night-time limit of 45 dB(A). The upper range of the predicted noise impacts are at the residential receptors that are closest to the road network used by vehicles associated with the Proposed Development and are therefore only likely to be reached during the more active daytime shifts.

Considering the threshold of significant impacts as being the levels presented in Table 5-7, the areas in which these levels are predicted to arise are limited to residential receptors within 500m of active parts of the Proposed Development.

The magnitude of likely noise impacts during operation and prior to mitigation, are therefore considered to be of Negative Moderate significance at residential receptors in Makinsk and Baysuat that are closest to the road network and of Negative Minor significance at all other residential receptors. A summary of proposed mitigation measures related to noise are described in Chapter 8.

DECOMMISSIONING

Noise impacts generated during decommissioning of the development are anticipated to be predominantly associated with use of heavy machinery and vehicles, similar to the construction process.

Accordingly, potential noise impacts would be temporary and of Negative Minor significance at receptors in Baysuat village and Negligible significance at all other residential receptors.

7.5 POTENTIAL LANDSCAPE AND VISUAL IMPACTS

The assessment of landscape and visual impacts is broadly based on the UK Guidelines for Landscape and Visual Impact Assessment (GLVIA)¹¹ and professional judgement.

CONSTRUCTION

Visual impacts during the construction period will result from on-site machinery, hoardings, scaffolding, ground formation works, construction works for foundations and buildings, traffic and lighting on site.

The Proposed Development is likely to have short term direct effects on the views from Makinsk town, Baisuat village, Karaozek village, Sukhaya River, Kayrakty River, and the pond on Kayrakty River. Specifically, works during construction phase could have a **minor to moderate adverse** impact on the views from Baisuat village, since it is located at a distance of 125 m to the east of the site. Similarly, a **moderate adverse** impact on the views from Sukhaya River is likely due to its close proximity to the site boundary. Therefore, mitigation measures, such as visual screening, are recommended during construction phase.

¹¹ Landscape Institute and Institute of Environmental Management & Assessment, (2013). UK Guidelines for Landscape and Visual Impact Assessment. 3rd Edition, London: Routledge.

OPERATION

Visual impacts during the operation phase will mainly result from on-site buildings and farm facilities, traffic and lighting on site. The proposed farm will comprise approximately 140 structures. The height of the structures on site will vary from 2.5 m to 12.6 m. The buildings will be widely spread across the farm. The spacing between the eight individual farm units for breeding broiler chickens (BP1 to BP8) will be of approximately 300 m – 1,000 m.

The wider project is not expected to have adverse impacts on sensitive visual receptors. However, the incubator building (proposed height of 9.18 m) could have a permanent **minor adverse** impact on the views from Baisuat village and Sukhaya River due to its close proximity to each of these receptors. Similarly, the incubator building and the 12 buildings on farm unit BP1 (proposed height of 5.20 m) could have a permanent **minor adverse** impact on the views from pond on Kayrakty River. Therefore, mitigation measures are recommended during the operation phase.

Other higher buildings (up to 12.6 m) within the proposed site are not expected to have an adverse impact on the identified visual receptors, since they will be located more than 1 km from any visual receptors.

While some planting will tempt to integrate the development into the wider landscape, overall the scale of the development and the relatively flat terrain means that the farm would result in a **moderate adverse** impact on the local landscape character.

DECOMMISSIONING

The environmental impacts associated with the closure of the Proposed Site will be similar to the impacts that occur during the construction of the Project. Accordingly, works during the decommissioning phase would result in **minor to moderate adverse** impact on local landscape and visual amenity. A summary of proposed mitigation measures related to closure of the Proposed Site are described in Chapter 10.

MITIGATION

All practicable measures should be implemented to avoid or effectively control potentially adverse construction and operation effects on existing landscape character and visual receptors.

Installation of 2 m high fence with checkpoint is planned for the construction and operation phase in order to protect the site and to screen the development from nearby sensitive receptors.

Visual impacts of the poultry farm facilities during operation phase can be reduced by painting the buildings in a colour that is sympathetic with the surrounding environment.

Mitigation planting of local tree species on site is planned to reduce the landscape and visual impacts of the farm. Within each farm unit, planting of two rows of trees is planned between the buildings used to breed broiler chickens. Similar planting will be undertaken around veterinary, composting and clearance facilities as well as along the site boundary. This mitigation planting would improve integration of the development into the local landscape and reduce the visual impact of the development, particular when viewed from residential areas such as Baisuat village.

In particular, to avoid adverse impacts on the visual amenity, planting of trees should be undertaken around the incubator building and along the south-west and south site boundaries to screen Baisuat village, Karaozek village, Sukhaya River, Kayrakty River, and pond on Kayrakty River from the proposed farm.

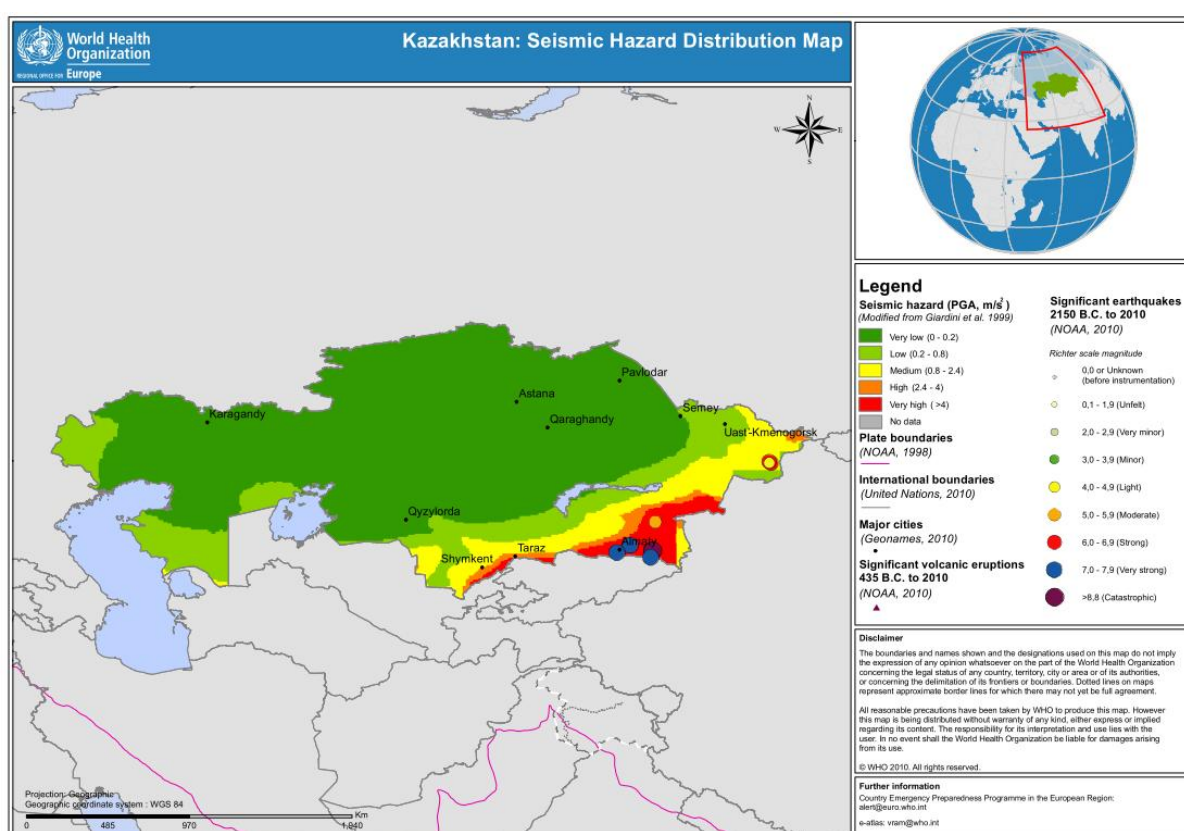
7.6 GEOLOGY AND SOIL

Impacts relating to geology are unlikely to arise during the construction, operation or decommissioning of the project. Impacts on soil may arise during construction when topsoil is displaced to construct the buildings.

SEISMICITY

The majority of Kazakhstan lies in a very low risk hazard zone. Towards the south and southwest lie incrementally higher hazard zones with the most southeastern areas of the country susceptible to very high seismic hazards. The project site in Makinsk lies approximately 1000km away from increasing seismic hazards (see Figure 7-1 below). Impacts on and from the project at any stage relating to seismic hazards are very unlikely to arise.

Figure 7-1 WHO Seismic Hazard Distribution Map of Kazakhstan



In the very unlikely event of major earthquake activity in the proximity of the site, it could result in ground shaking and shearing-induced displacements along pre-existing faults. In such circumstances the potential impacts could include damage to integrity of project buildings including rupture of pipework and breach of containment measures from storage of any hazardous materials on site. Release of general waste from site is unlikely to have a significant environmental impact. The impacts resulting from seismic activity are considered **Negative** and considered to be of **Minor** significance prior to mitigation.

The impact on topsoil resulting from clearance during construction and reinstatement during operation and decommissioning has the potential to cause soil erosion and soil degradation. These potential impacts are considered **Negative** and considered to be of **Minor** significance during construction, operation and decommissioning prior to mitigation. A summary of proposed mitigation measures related to geology and soil are described in Chapter 8.

7.7 HYDROGEOLOGY, HYDROLOGY AND WATER QUALITY

This section discusses the significance of potential hydrogeological, hydrological and water quality impacts associated with the Project. There are four potentially significant impact areas associated with the construction and operation of the new poultry farm:

- Contamination of ground and surface water resources by wastewater from the process and leachate from the composting area;
- Landspreading of the manure on agricultural land;
- Changes to surface water regime; and
- Wastewater generation and disposal.

CONTAMINATION OF GROUND AND SURFACE WATER RESOURCES FROM LEACHATE EMISSIONS

CONSTRUCTION

Pollution of surface water and groundwater resources during construction is usually related to improper storage of construction materials, construction waste and excavated materials, spillage of fuel, oil and other hazardous substances during construction activities. The potential impact would be **negative moderate** without mitigation but with appropriate spillage controls and procedures it would be **negative minor**.

OPERATION

During poultry farm operations pollution of groundwater resources may be caused by uncontrolled discharge of run-off or leachate and leakage from blocked drainage systems at the composting process area or wastewater treatment plant.

Wastes from the production when growing broiler (used litter, manure, sewage sludge) and waste from the hatchery are routed to the composting pad with a view to producing organic fertilizers for use in agriculture. The choice of technology for the composting process is by a simple aerobic process without adding enzymes.

The delivered litter is stored in windrows 2.6 m high and 6 m in width and length of the pile selected is 100 meters. The composting period is 42-55 days. The final compost is stored until it is required to be landspread during the growing period for crops which lasts 60 days in August and September to the first snow fall.

The composting process will take place on hardstanding in a hangar which helps to control the moisture content of the compost and prevent any contaminated run-off. There is an additional asphalt storage area for the storage of treated litter once it has been converted to compost.

Drainage systems to and from the compost area and to and from the wastewater treatment pad will be newly constructed to RoK construction standards and should ensure that there are no sub-surface discharges. Composting will be arranged on an open water impermeable pad inclined to the edges towards the drainage troughs. The compost row watering is made with the WWTP treated water which is collected in a sedimentation tank from where it is reused. The excess water runs back to the WWTP for treatment. i.e. there is not risk of wash off running to the ground even during extreme weather events.

All wastewater produced in farm units, slaughterhouse and rendering plant as well as garage with car wash take place in enclosed buildings (with the exception of the garage) which will contain any water and direct it to the foul drainage system and to the wastewater treatment plant. These building and their associated drainage infrastructure will be newly constructed to RoK construction standards and should ensure that there are no sub-surface discharges.

The wastewater treatment plant is detailed in a following section and comprises a series of treatment processes that will be subject to flow control

Rainfall directly on to roadways will be directed to on-site surface water drainage systems and will not contain any contaminants as the roadways will be kept clean.

The composting process is several kilometres away from the River Kayrakty which will ensure there is no impact with regards to surface water contamination by leachate.

Potentially polluting substances impacting land and surface water during construction, operation and decommissioning is considered to be of **Negative Minor** significance prior to mitigation. A summary of proposed mitigation measures related to water are described in Chapter 8.

DECOMMISSIONING

The potential impacts and mitigation would be the same as for construction.

LANDSPREADING OF THE MANURE ON AGRICULTURAL LAND

CONSTRUCTION

Land spreading would only take place after the poultry farm is operational.

OPERATION AND MAINTENANCE

MPF is to spread manure on the fields of the consumer who purchases and requests it. This spreading period lasts approximately 60 days a year, from the moment of the harvest season (August-September) to when the snow falls. In order to undertake spreading operations MPF will have two spreaders with a capacity of 20 tons per hour, based on one tractor and forklift carrying the load of compost in the spreader to the edge of the field.

No procedures with regard to land spreading have been developed. It is important for this to be the case as the problems that could occur from over spreading are:

- Over nutrition of the land with the excess nitrogen and phosphate entering groundwater or surface water;
- Spreading too close to the edge of rivers near to the wetted area or after periods of heavy rainfall which means that the manure could be easily washed off;
- Not incorporating into the ground quick enough allowing odour to be a nuisance to local residents; and

- Spreading at the wrong time for crop growth which would not utilise the nutrients spread.

This being the case, the operation of the poultry farm is anticipated to have a **Negative Moderate** impact from landspreading if mitigation measures are not developed.

The Environmental and Social Action Plan (ESAP) has included an action to develop procedures to ensure that the appropriate measures below are considered before landspreading.

The principle of BAT is based on doing all the following four actions:

1. Applying nutritional measures

BAT is to minimise the emissions from manure to soil and groundwater by balancing the amount of manure with the foreseeable requirements of the crop.

BAT is to take into account the characteristics of the land concerned when applying manure, in particular soil conditions, soil type and slope, climatic conditions, rainfall and irrigation, land use and agricultural practices, including crop rotation systems.

Not applying manure to land when the field is: water-saturated, flooded, frozen, snow-covered

Not applying manure to steeply sloping fields

Not applying manure adjacent to any water course

Spreading manure as close as possible before maximum crop growth and nutrient uptake occur.

2. Balancing the manure that is going to be spread with the available land and crop requirements and, if applied, with other fertilisers.

3. Managing landspreading of manure to minimise odour problems.

Spreading during the day when people are less likely to be at home and avoiding weekends and public holidays

Paying particular attention to wind direction in relation to neighbouring houses

Manure can be treated to minimise odour emissions which can then allow more flexibility for identifying suitable sites and weather conditions for land applications.

4. Only using the techniques that are BAT for the spreading of manure on land.

If procedures are implemented to manage the issues above then this activity will have a **Negative Minor** impact.

DECOMMISSIONING

Decommissioning will mean that land spreading operations cease and there will be no further impact from this activity.

ALTERATION OF SURFACE WATER REGIME

No major changes in drainage pattern will be caused during construction or operation of the poultry farm. Some of the land taken will be from irrigation fields which would have been used to irrigate the land that will now form part of the poultry farm and no longer used for agricultural use.

CONSTRUCTION

According to Project proposals, alterations in the local drainage systems during establishment of the poultry farm will be related to construction of surface water run-off management system and leachate management system from the composting pad. The run-off collection system from the poultry farm is designed to keep clean surface water run-off separate from the contaminated run-off, leachate and wastewater.

During construction, the water will mostly be used for dust suppression during soil moving works and top soil storage; when clearing vegetation and grading; for unpaved road traffic; for making concrete for foundations; and for consumption by construction workers.

Construction activities for the proposed new poultry farm development may have a **Negative Minor** impact on hydrology and water quality of the local area as the construction waste will not be leached into groundwater or to any surface water body.

The area is designated as acceptable for location of the poultry farm as it is relatively flat, and therefore minor changes in grade could alter the direction of surface water run-off. Grading associated with earthworks could cause run-off to be directed away from the site. In addition, rain falling directly on the poultry farm area will flow under gravity to site drainage gullies and may discharge into a surface water feature potentially affect the water quality. Overall, the impacts on surface water resources are related to the project footprint (e.g. land disturbance, erosion, changes in run-off patterns and hydrological changes, etc.).

Site specific drainage control is required to ensure that surface water run-off is properly managed and the potential for flooding is **Negligible**.

OPERATION AND MAINTENANCE

The majority of water used during operation and maintenance of the new poultry farm will comprise poultry farm cleaning, use in the slaughterhouse of hot water and steam in the rendering facility as well as minor usage such as washing vehicles wheels, sprinkling the earth access roads and in the administration building. Wastewater will be treated in the wastewater treatment plant as described below before discharge to the River Kayrakty. Surface water run-off within the site will be managed and allowed to naturally discharge via soakaway. This being the case, the operation of the poultry farm is anticipated to have a **Negligible** impact on hydrology flooding.

DECOMMISSIONING

The impact of the closure of the poultry farm and associated infrastructure on hydrology, water quality and flooding potential in the area is anticipated to be **Negligible**.

WASTEWATER GENERATION AND DISPOSAL

CONSTRUCTION

During construction water will be used at the construction camp for drinking, cooking and washing in addition to construction activities such as dust suppression, wheel wash facility, etc. The facilities for the workers will be provided with a water supply and a sewerage collection system. The wastewater from the construction camp will be collected in a septic tank (5 m³ capacity) constructed of impermeable material. The tank will be emptied appropriately and transported to a centralised wastewater collection facility in accordance with prior agreement with the local authorities. Wastewater volume will amount to 3.3 m³/day, 1204.5 m³/year.

Improper operation of the sewerage system and wastewater collection tank may have **Negative Minor** impacts prior to mitigation on the site in the event of pollution. Mitigation measures will be adopted to minimise the negative impacts as described in Chapter 8 from wastewater generation and discharges from the site.

OPERATION

Water will be used during operation of the new poultry farm for operations such as drinking for the poultry, cleaning of the buildings and equipment, for canteens and toilets, vehicle washing and steam generation for use in the rendering process. Grease traps will be installed at the discharge points where grease can form including car washes.

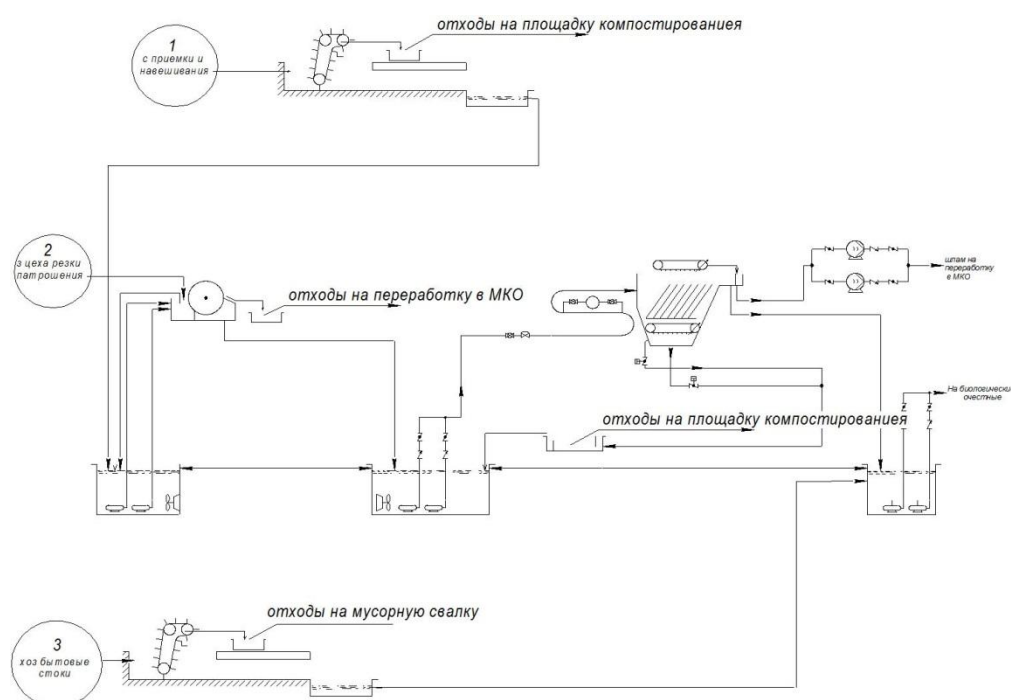
Wastewater generation from the process is subject to mechanical cleaning and then biological treatment using dissolved air flotation equipment.

Mechanical cleaning is separated into three wastewater flows.

- Domestic waste water, pass through the screens and the filtrate are routed to biological treatment facilities. Selected screened material such as solid household waste and disposed of in landfills.
- Wastewater from the arrival area is weighed, passed through the screen and the filtrate enters the first pit. Screened material at this stage are solid wastes which are exported by truck to the composting process.
- Runoff from screening effluent from the first pit is added to the rotating drum sieve from the inside. Filtered waste is sent for recycling.

The process is constantly circulating, self-cleaning filter tape. The circulating tape transports suspended solids over the channel and dumps them into the container the rotating drum screen with internal feeding is a self-cleaning drum filter, used as a prefilter before applying water on flotation devices or as a separate filter. See Figure 7-X below.

Figure 7-2 Mechanical Treatment Process



From here the effluent then goes to the flotation system. Waste water comes into the flotation system which represents a high frame structure with an open reservoir and designed for separation of solid particles from water using air. Flakes float to the surface of the reservoir and are automatically removed by the drag mechanism. Flotation is aided by plastic plates which increase the surface area and guarantees that even the smallest flakes are removed from the wastewater. Built-in recirculation/aeration ensures the required air-water mixture.

Physico-chemical cleaning methods at the flotation stage are by coagulation. As a result of physico-chemical treatment there are three waste streams:

- Treated for construction of sewage water is sent into the buffer capacity before biological treatment facilities in number 1590 m³/day.
- Organic material is sent for recycling in the shop on manufacture of meat and bone meal.
- Sludge removed by mechanical strainer transported by truck to the composting process.

Table 7-6 Effluent Parameters

PARAMETER	INCOMING EFFLUENT	TREATED EFFLUENT	BEST AVAILABLE TECHNIQUES ¹	BEST AVAILABLE TECHNIQUES ²
COD	8000 mg/l	up to 80 mg/l	25-125 mg/l	<30-100 mg/l
BOD	4000-5000 mg/l	to 10 mg/l	10-40 mg/l	-
Total nitrogen	250 mg/l	Ammonia nitrogen-to 0.6 mg/l	15-40 mg/l	5-25 mg/l
Suspended solids	2000-3000 mg/l	to 10 mg/l	5-60 mg/l	5-35 mg/l
Total phosphates	45-50 mg/l	to 4 mg/l	2-5 mg/l	0.5-3.0 mg/l
Chlorides	< 300 mg/l	to 200 mg/l	-	-
Fats and oils	800-1000 mg/l	-	2.6-15 mg/l	-
pH	6-8	-	-	-
Temperature	15 – 25°C	-	-	-
Nitrates	-	to 15 mg/l	-	See total nitrogen
Nitrites	-	to 0.2 mg/l	-	See total nitrogen
Sulphates	-	to 80 mg/l	-	-

Note 1: Integrated Pollution Prevention and Control Reference Document on Best Available Techniques in the Slaughterhouses and Animal By-products Industries May 2005

Note 2: Best Available Techniques (BAT) Reference Document for Common Waste water and Waste Gas Treatment/Management Systems in the Chemical Sector Final draft July 2014

Table 7-X shows that the effluent will be treated in line with best available techniques standards for slaughterhouses for COD, BOD, total nitrogen, suspended solids and total phosphorous. There is no estimation with which to compare fats oils and grease and the nitrite, nitrate and ammoniacal nitrogen values of the treated effluent is not directly comparable to the best available technique associated emission levels (BAT-AELs) detailed in Table 7-6.

Best Available Techniques (BAT) Reference Document for Common Waste water and Waste Gas

Treatment/Management Systems in the Chemical Sector states that the (BAT-AELs) are for direct discharges to a receiving water body whilst Integrated Pollution Prevention and Control Reference Document on Best Available Techniques in the Slaughterhouses and Animal By-products Industries adds that the emission levels given are generally considered to be appropriate for protecting the water environment.

Treated wastewater is discharged via a 3.7 km pipeline into the Sukhaya (stands for dry) River 1.2 km upstream of its mouth where it runs into the Kayrakty River. This part of the river is impounded for wheat fields irrigation. The end of the discharge pipe is positioned to enable wastewater dilution by the impounded water. Drainage from the roofs is not collected.

It should be noted that the Baysuat village water is taken from the Kayrakty River 12.6 km downstream from the WWTP discharge downstream the third irrigation impoundment. The incubator discharges water into a seasonal stream (incidentally also called Sukhaya River) that most of the year stands dry. It discharges spring waters into the Kayrakty River 1.3km downstream of the incubator discharge pipe.

No data is available for the Sukhaya Kayrakty rivers water quality but they originate from springs 17 km northeast and 30 km north from the discharge respectively. Kayrakty has another large irrigation impoundment 9km upstream that can regulate water level at the discharge pipe entry.

Wastewater generated and treated via the WWTP should be within the BAT emission levels for slaughterhouses. The main exception to this are fats oils and grease where there is no defined treatment efficiency although the mechanical treatment at the front end of the treatment process should be effective in reducing the incoming levels significantly and nitrogen where the results are not directly comparable to the total nitrogen limit. However, the ammoniacal nitrogen value, nitrates and nitrites when combined are still significantly below the top of the BAT-AEL range of 40 mg/l. It is therefore considered that discharge of the wastewater water treatment to the River Kairakty can have a **Negative Moderate** impact prior to mitigation. Mitigation measures described in Chapter 8 have been recommended to minimise the negative impacts from the poultry farm and after mitigation are likely to be **Negative Minor**.

DECOMMISSIONING

The impact of the closure and decommissioning of the poultry farm and infrastructure on waste water generation and disposal is anticipated to be similar to those related to the construction phase described above.

7.8 POTENTIAL IMPACTS ON FLORA AND FAUNA

This section comprises a general assessment of overall impacts upon receptors of ecological importance in relation to the poultry farm; a more detailed assessment will be required on completion of the requisite baseline surveys in order to corroborate these findings (as detailed within the ESAP). Given the likely relative lack of valued ecological receptors, the following assessment is necessarily generic in terms of overall impacts to biodiversity; this will be corroborated through further survey and subsequent re-assessment.

CONSTRUCTION

The construction of the poultry farm, associated infrastructure and Sanitary Protection Zone (SPZ) will result in direct habitat loss, fragmentation and displacement of wildlife (through disturbance). Construction activities also have the potential to result in pollution events within the catchment (the River Kairakty is ca. 1km at its closest point), which could result in significant losses to biodiversity over a long period of time. These activities also have potential animal welfare considerations by virtue of the dangers associated with an active work site to local wildlife (i.e. risk of animals becoming trapped etc.). Finally, the influx of works vehicles has the potential to facilitate the spread of non-native invasive plant species.

In light of the limited nature of the baseline data collection, it will be necessary for a more complete review of existing information (or if this does not exist, field survey work) to be undertaken prior to construction in order to confirm this assessment. Each ecological receptor of requisite importance subsequently identified should then be subject to the assessment methods as detailed within the ESIA.

Whilst it is unlikely that the site will support important floral/faunal assemblages, it is possible that the site provides a foraging and localised shelter resource for animals and birds, which may be impacted by the proposed poultry farm. It is plausible that raptor species (e.g. lesser kestrel, black kite) forage across the site on carrion and small mammals and will be displaced from the site. Given the relative abundance of similar habitat across the wider area, and the tolerance of the general prey assemblage to human disturbance, this isn't considered to represent a significant impact. Should field survey identify specific habitat features of importance to fauna (e.g. trees of importance to roosting bats and/or nesting birds), then these features should be retained where possible, or alternative features provided as part of a compensatory measure. Any such measures in this regard should be subject to a monitoring plan in order to inform ongoing management.

In order that the water environment in proximity to the site is protected against adverse effects, a suitably robust pollution prevention plan should be produced and adopted during construction. Similarly, measures should be taken to ensure animal welfare measures are adopted (such as securing work sites when not in use), and invasive species are prevented from colonising (through sufficient cleaning of work vehicles prior to their accessing site).

Given the above, the construction of the poultry farm is considered to have an overall impact that is of **Negative Moderate** significance to biodiversity, which will be reduced to **Negligible** with the implementation of the above mitigation (summarised in Table 8-1), subject to further assessment.

OPERATION

The main potential impact of the operation of the poultry farm is the discharge of pollutants in to the local environment. Specifically, the discharge of nitrogen (through ammonia associated with animal waste) and organic matter (and blood in particular) in to the local environment (both aquatic and terrestrial) can have significant adverse effects through alteration of the water and soil chemistry to the detriment of biodiversity.

The main potential impact of the operation of the poultry farm is the discharge of pollutants in to the local water environment. Specifically, the discharge of organic matter (and blood in particular) can have significant adverse effects through alteration of the water chemistry to the detriment of aquatic ecology.

The other main potential effect is the localised death/injury caused by animals becoming trapped within the SPZ and/or within the vermin traps which will be deployed across the site.

In order to mitigate against the above, a suitably robust pollution prevention plan should be produced and adopted throughout the operation of the poultry farm. Specific traps should be chosen in order to reduce the risk to non-target species.

Given the above, the construction of the poultry farm is considered to have an overall impact that is of **Negative Low** significance to biodiversity, which will be reduced to **Negligible** with the implementation of the above mitigation (summarised in Table 8-1), subject to further assessment.

DECOMMISSIONING

The impact of the closure of the poultry farm on biodiversity is anticipated to be **Negligible**.

ADDITIONAL SURVEY REQUIREMENTS

In order to provide the requisite baseline survey information to complete a sufficiently robust re-assessment of the effects of the poultry farm upon biodiversity, it is recommended that an additional desk-study exercise is completed, drawing upon more detailed information regarding the ecology of the site (e.g. from local gamekeepers, land managers, academic institutes etc.). Beyond this, an ecological walkover should be undertaken during the summer months in order to qualify the usage of the site by nesting birds, roosting bats and other fauna as encountered. Particular attention should be paid to the relatively less-disturbed areas in the eastern half of the site, outwith the agricultural field network (e.g. around buildings 5-8 and the slaughter house), and any pockets of scrub/woodland.

Water quality monitoring should be done pre- and post-construction in order to ensure the efficacy of pollution prevention measures and identify pollution incidents. This is described within the water quality chapter.

7.9 ELECTROMAGNETIC FIELDS

The farm will be connected to two 110kV lines 1 km east of Zavodskaya 110kV substation located at the east of Makinsk. The two lines pass along the regional road at some distance in one right of way and then enter the 110/10 substation in the middle of the farm, 1 km southeast from the nearest broiler house 8. The lines pass 650 m north of the nearest line of residential houses and 150m from the closest construction: a petrol station. The 10kV power cables run from the substation along the roads and cross the Kayrakty River just south of Kolokolovka village 200 m from the nearest house to reach the incubator 10/0.4kV transformer located 300m away from the nearest house in Baysuat. The other farm components have 10/0.4kV transformers too but they are located at greater distance to the residential houses. Thus impact from electromagnetic fields is considered to be **Negligible**.

7.10 GROUNDWATER AND WATER SUPPLY

The main aquifer system beneath the potential development area appears to comprise the superficial alluvial deposits. The upper sections of these deposits (loams, sands and gravel deposits) would appear to be the most transmissive, with the older underlying Loams and Clays, apparently considered as aquitards. It is not clear how thick these superficial deposits are with reference to what I have seen. It may only be of the order of 6-7m. Groundwater levels are typically 1-4mbgl and show relatively pronounced fluctuation in the order of 2m.

There is deeper groundwater within the upper weathered Granite horizons, with a deeper groundwater table typically about 6-8mbgl - although this is apparently not contiguous across the development area, and strongly dependent on predominance of fracturing. It is unclear whether the lower permeability Loams and Clays of the alluvial deposits confine this deeper groundwater body and therefore whether it is hydraulic connection within the upper more transmissive superficial deposits.

It is likely that the transmissive horizons within the superficial deposits are in good hydraulic connection with the Kairakty River and respond quickly to seasonal input/output variations, indicated by groundwater level variations.

The EIA state main water is planned to be supplied from the Kishkentay Aquifer via the StepGeologia water storage. The city plans to fulfil its own needs of 300 000 m³/yr from this new water supply. The 4 wells water intake and the pipelines will be constructed by the local authorities using the State funds of €3.2 million. Thus the main water supply source is considered to ensure sustainable consumption.

Due to its remoteness, the incubator uses a separate source of groundwater from two wells drilled by the Company next to the incubator. The water intake does not affect Baysuat village (Prokhorovka) water supply system. Effluent will be collected in a septic tank that will be regularly transferred to the WWTP.

Both connections was approved by the State Communal Enterprise Makinsk Zylu 26.02.2015 and the Kishkentay Aquifer connection was discussed on the project related public meeting at which two Makinsk residents were present.

Each plant component will have a water pump house with buffer reservoirs, pumps with 210m³/h capacity and ability to develop 30m water head pressure.

Table 7-7 Estimated Water Usage (m³) by the Plant's Components. Fodder Plant is not Included in the EIA

CONSUMER	YEAR	DAY	HOUR	L/SEC
Slaughter House	327 333	1060.7	132.59	36.83
Broiler pads	177627	486.6	35.63	9.9
Broiler Office	7457	20.4	1.7	0.47
Gas storage station	1215	3.3	0.42	0.12
WW treatment plant	912	2.5	0.21	0.06
Composting pad	412	1.1	0.09	0.02
Total from water storage	514 958	1 574.7	170.64	47.40
From Baysuat pipework (incubator)	22 170	60.7	2.53	0.70

A 10% loss is expected in the system. The second phase of the project is expected to have 8 more broiler pads with the same water consumption characteristics as the 8 pads given above. Thus maximum uptake from the water storage is 756, 603m³. Water meters will be installed at each building. The EIA states that water will be reused only at the carwashes located at the broiler office and slaughter house garages and designed to wash 12 and 18 vehicles respectively. However, the design description does not mention water reuse.

Uptake for slaughter house includes the boiler house district heating system replenishment.

Water use during construction is estimated to include 1,204m³ (3.3m³/day) of hygiene and potable water and 4,200 m³ water for concrete making, roads watering etc.

Given the uncertainty with regards to the sustainability of water consumption it is considered to have the potential to be an overall impact that is of **Negative Major** significance, dependent on the findings of a sub-regional water balance and yield assessment, which could be reduced to **Negative moderate** with the implementation of appropriate mitigation measures.

ADDITIONAL SURVEY REQUIREMENTS

- There are a number of additional steps which need consideration: Groundwater pumping test data to assess the potential yields available and the response/impact to superficial aquifer groundwater levels or river stage levels.
- Sub-regional water balance developed to assess whether potential abstractions could be sustained by the local aquifer/river system (basic inflows/ outflows considerations).
- Consideration of the need for groundwater treatment during abstraction. During abstraction the process of degassing may lead to the formation of precipitates which can foul above ground pipework given elevated dissolved mineral content and redox of abstracted groundwater. This needs to be considered because whilst there might be enough water available to meet demands, the chemistry of that water may prohibit its use due to onerous/costly treatment requirements before use.
- There is also reference to hydrocarbons in local groundwater – again, this may relate to broader contamination issues which should be taken into account as abstracted water may not be suitable for potable purposes. This should be clarified.

7.11 WASTE MANAGEMENT

This section details the assessment of effect, mitigation measure and residual effects of waste generation and management of the MPF project on the environment and area of influence.

CONSTRUCTION WASTE

Waste generation from the construction phase will increase the demand for local waste treatment and disposal facilities. The generation of construction waste could also give rise to impacts associate with dust generation. Hazardous waste streams are also generated, which have the potential for pollution incidents to ground and surface water.

Construction waste streams have been identified as well as the expected volumes of waste. Generation and storage of waste materials, if not handled appropriately, have the potential to result in pollution incidents. The waste streams identified in the OVOS are of a low risk; however hazardous waste streams are also generated, with the potential to result in pollution incidents to ground and surface water. Therefore, there is likely to be a direct, temporary medium term effect of **minor negative** significance prior to the implementation of mitigation measures on ground and water quality.

Where possible, waste should be sent to treatment facilities for segregation for recycling in order to reduce the need to send waste to landfill. A review should be undertaken to determine the availability of such sites, it is likely that the key waste streams generated during the construction phase have the potential to be reused / recycled e.g. soils, concrete, bricks, glass etc. Adherence to the Waste Hierarchy by reusing and/or recycling waste materials will reduce the volume of waste transfer off-site or to local waste treatment and disposal facilities. The sensitivity of the waste management infrastructure in Kazakhstan is anticipated to be high and it is unknown whether adequate facilities are readily available to process the expected volumes of waste. The magnitude of effect, prior to mitigation is considered to be medium as the site is unlikely to produce a significant volume of waste. Therefore, there is likely to be a direct, temporary medium-term effect on waste management infrastructure of **negative moderate** significance prior to the implementation of mitigation measures.

MITIGATION

Best practice measures and recommendation for the minimisation and management of waste should be incorporated into a Construction Environmental Management Plan (CEMP).

A waste management strategy is recommended to be developed and implemented to ensure that that waste materials are stored and disposed of appropriately. In developing the waste management plan, safe disposal routes for all waste streams will be identified. Authorised waste disposal facilities and reputable waste transfer companies will be identified and appropriate agreements put in place.

The waste hierarchy will be adopted as far as reasonable practicable. Material deemed suitable for reuse on the project site will be retained and stockpiled where possible to incorporate such materials into the subsequent construction process. If materials cannot be reused on-site, then the feasibility of reusing them off-site will be explored. This involves identifying waste streams which could successfully be used by other businesses or operations. This results in the diversion of waste from landfill and thus presents the potential for cost savings.

RESIDUAL EFFECTS

The effective implementation of a CEMP and waste management strategy will ensure that waste is appropriately segregate, stored and disposed of. The waste streams identified in the OVOS are of a low risk; however hazardous waste streams are also generated, which have a higher magnitude of impact. Following mitigation, there is likely to be direct, temporary medium term effect of **negligible** significance.

The reuse of excavated material will significantly reduce the quantity of such waste requiring off-site disposal. The sensitivity of the waste management infrastructure is high and the magnitude of impact, following mitigation is medium. Therefore, there is likely to be direct, temporary and short-term residual effect on waste management infrastructure of **minor** significance following the implementation of mitigation measures.

OPERATIONAL WASTE

Waste generation from the operational phase will increase the demand for local waste treatment and disposal facilities. The generation of operational waste could also give rise to impacts associated with dust generation. Hazardous waste streams are also generated, which have the potential for pollution incidents to ground and surface water.

Waste streams associated with the operational phase of the project have been identified, as well as the estimated volumes of waste. Generation and storage of waste materials, if not handled appropriately, have the potential to result in pollution incidents. The waste streams identified in the OVOS are of a low risk; however additional hazardous waste streams are also generated, with the potential to result in pollution incidents to ground and surface water. Therefore, there is likely to be a direct, temporary medium term effect of **minor negative** significance prior to the implementation of mitigation measures on ground and water quality.

Where possible, waste should be sent to treatment facilities for segregation for recycling in order to reduce the need to send waste to landfill. A review should be undertaken to determine the availability of such sites, it is likely that the key waste streams generated during the construction phase have the potential to be reused / recycled e.g. soils, concrete, bricks, glass etc. Adherence to the Waste Hierarchy by reusing and/or recycling waste materials will reduce the volume of waste transfer off-site or to local waste treatment and disposal facilities. The sensitivity of the waste management infrastructure in Kazakhstan is anticipated to be high and it is unknown whether adequate facilities are readily available to process the expected volumes of waste. The magnitude of effect, prior to mitigation is considered to be medium as the site is unlikely to produce a significant volume of waste. Therefore, there is likely to be a direct, temporary

medium-term effect on waste management infrastructure of **negative moderate** significance prior to the implementation of mitigation measures.

MITIGATION

The waste hierarchy will be adopted as far as reasonable practicable. Dedicated waste storage areas for waste segregation for recyclable and non-recyclable refuse will be implemented on site. Waste storage will be clearly labelled to ensure that cross contamination is minimised.

A waste management strategy is recommended to be developed and implemented to ensure that that waste materials are stored and disposed of appropriately. In developing the waste management plan, safe disposal routes for all waste streams will be identified. Authorised waste disposal facilities and reputable waste transfer companies will be identified and appropriate agreements put in place.

RESIDUAL EFFECTS

The effective implementation of a waste management strategy will ensure that waste is appropriately segregate, stored and disposed of. The waste streams identified in the OVOS are of a low risk; however hazardous waste streams are also generated, which have a higher magnitude of impact. Following mitigation, there is likely to be direct, temporary medium term effect of **negligible** significance.

Adopting the waste hierarchy will minimise the volumes of waste going to landfill. The sensitivity of the waste management infrastructure is high and the magnitude of impact, following mitigation is medium. Therefore, there is likely to be direct, temporary and short-term residual effect on waste management infrastructure of **minor** significance following the implementation of mitigation measures.

LITTER WASTE AND COMPOSTING

Farm manure, slurry, dirty water, silage effluent and other organic wastes represent one of the most significant risks to the environment across the agricultural industry. They are responsible for odour related issues; and both point source and diffuse pollution of water courses and groundwater. They contribute to nitrates and phosphates in surface waters which lead to eutrophication, excessive aquatic weed growth and the alteration of fish habitats. Manures also contribute to nitrates in groundwater.

Litter from the broiler sites and waste from the hatchery will be transported to the biological treatment site to be stored for composting.

Odour and nuisance related impacts are associated with the transport of litter and hatchery waste to the composting site. There are currently no details with regards to the transportation arrangements and routes when transporting the waste materials to the composting facility. There is likely to be a direct, temporary long term effect of **minor negative** significant prior to the implementation of mitigation measures.

The volumes of litter generated at MPF are significant and have the potential to give rise to impacts such as odour, dust emissions, and pollution related to the run off of effluent, during both the transport of the litter and also during the composting phase.

Litter from the poultry houses and some waste from the hatchery will be mixed with water and then left for composting for a period of 42-55 days, during this period there is the potential for odour related nuisance impacts. However, the location of the composting site is approximately 1,820m west of residential properties, and therefore the magnitude of impact on local communities from an odour perspective is considered to be low. There is likely to be a direct,

temporary long term effect of **minor negative** significance prior to the implementation of mitigation measures.

The storage of organic manures has the potential to leach nutrients into ground and surface water. This can be a problem where there are concerns over eutrophication of water bodies and/or nitrate levels in drinking water sources. The composting will take place on a concrete pad and therefore will minimise the leaching into groundwater, however this increased the likelihood of leachate and effluent run-off, and this is discussed in details in the wastewater chapter. Due to the generation of significant quantities of litter, it needs to be ensured that there are adequate storage facilities in place to receive the volumes. It is particularly important to consider the storage of compost following the composting phase of up to 55 days. It is understood that the spreading period lasts approximately 60 days and therefore adequate (temporary) storage of the compost needs to be in place. There is the potential to be indirect, temporary and long-term effect on waste management infrastructure of **moderate** significance prior the implementation of mitigation measures.

Following the composting stage, compost will be sold as a fertiliser. A subsidiary of MPF will complete the spreading activities on behalf of the customer. There is the potential for pollution and nuisance incidents as a result of the spreading activities.

The risks and impacts with regard to land spreading on the manure are discussed above.

Spreading organic manures have the potential to give rise to odour related impacts. There currently is no information with regards to the likely location of spreading and therefore the impact associated with this activity cannot be assessed in detail. However, if spreading takes place within close proximity to residential properties there is the potential to be indirect, temporary and medium-term effect on waste management infrastructure of **moderate negative** significance prior the implementation of mitigation measures.

Spreading organic manures adds significant nutrient value to crops, however there is the potential for the nutrients (predominately nitrogen and phosphorus) to leach into ground and surface waters. This can be a problem where there are concerns over eutrophication of water bodies and/or nitrate levels in drinking water sources. There currently is no information with regards to the likely location of spreading and therefore the impact associated with this activity cannot be assessed in detail. However there is the potential to be indirect, temporary and long-term effect on waste management infrastructure of **major negative** significance prior the implementation of mitigation measures.

MITIGATION

It is recommended that a schedule of movements is developed, which is based on the requirements of the broilers and the hatchery. This should take into consideration vehicle movements through villages and planning, where possible, to minimise travel through residential areas in order to minimise the risk of odour and noise nuisance impacts. It is recommended that the construction of bypass roads are considered, where there is a significant impact associated with the transportation of waste materials. Covered vehicles will be used for the transportation of litter and hatchery waste.

It is required that a formalised calculation is undertaken to ensure that adequate storage is available during the composting phase, in order to process 73,787 tonnes annually from the farms and also 1,000m³ of waste from the hatchery. This calculation should also take into consideration the likely rainfall. Heights of the windrows should be kept below 3m; higher than this will result in compression of the compost and therefore air will not pass. The use of tarpaulins for covering windrows will limit odour emissions and flies and allows better integration of windrows into the landscape. It also provides health protection towards birds and rodents and is also good for managing moisture content in places where heavy rainfall is experienced. The siting of the windrows should also be considered, and should not be sited within 10m of surface water or on a

groundwater vulnerable zone in order to minimise the pollution risk to surface and groundwater. The following BAT points should be considered:

- Store litter on solid impermeable floor, equipped with a drainage system and a collection tank for run-off;
- Ensure there is sufficient capacity to hold organic manures during periods in which the application to land is not possible;
- Store organic manure in field heaps places away from surface and/or underground watercourse which liquid run-off might enter;
- Reduce the ratio between the emitting surface area and volume of the organic manure;
- Cover solid heaps.

Prior to spreading organic manures a plan will be developed. Nutrient planning is fundamental in ensuring that both effective nutrient uptake and minimal nutrient run off is experienced. Applications of manure should be timed to optimise crop benefit and minimise environmental loss. Adapt the manure application rate taking into account the nitrogen and phosphorous content of the manure and the characteristics of the soil.

Areas which are unsuitable for spreading will be identified, such as steep slopes and fields with land drains. Organic manures will not be applied within 10m of a surface water course. They will also not be applied when the soil is waterlogged, flooded, frozen hard or covered in snow.

- Assess the manure receiving land to identify risks of run-off, taking into account:
 - Soil types, conditions and slope of field;
 - Climatic conditions;
 - Field drainage and irrigations;
 - Crop rotations;
 - Water resources and water protected zones

In order to minimise the potential risk of odour related impacts, the organic manure will be incorporated within 24 hours of spreading. Where complaints / grievances are being received considerations should be given of techniques to minimise odour impacts, this includes ploughing immediately behind the spreader, delaying spreading until local weather conditions (i.e. wind direction) are more favourable, and injecting into the land. Spreading should also take place during the day when people are less likely to be at home and avoiding weekends and public holidays. Prior to spreading the machinery will be checked to ensure that it is manure is in good working order and set at the proper application rate.

It is recommended that guidance on manure land spreading to minimise loss of nutrients and potential pollution to watercourses and odour nuisance is developed and communicated to all relevant personnel.

Regular inspections of storage facilities will be undertaken. A record of the inspections will be maintained.

Emergency preparedness and response plan will be developed and followed in the event of a leak or failure.

RESIDUAL EFFECTS

The use of covered vehicles and the identification of routes in order to minimise the risk of odour related impacts will significantly mitigate the potential for impacts to result from this activity.

Therefore, following mitigation, there is likely to be a direct, temporary medium term residual effect of **negligible negative** significance.

It is already considered that the odour impact from storage of litter in windrows is minimal, due to the distance from residential properties. However, there is the opportunity to minimise this impact even further through following best practice and covering the windrows using tarpaulin.

Therefore, following mitigation is likely to be a direct, temporary long term residual effect of **negligible negative** significance prior to the implementation of mitigation measures.

Extensive mitigation has been proposed with regards to the storage of organic manures in order to minimise the potential impacts associated with these activities. Mitigation is aimed at reducing odour impacts and pollution incidents associated with run-off and leaching of nutrients into ground and surface water. Following the implementation of the mitigation measures it is expected that there will be an indirect, temporary and long-term residual effect on waste management infrastructure of **negligible negative** significance prior the implementation of mitigation measures.

Several mitigation and management measures have been proposed for the spreading of organic manures. As with the storage activities, these are also aimed at reducing odour impacts and pollution incidents associated with run-off and leaching. Following the implementation of the mitigation measures it is expected that there will be an indirect, temporary and long-term residual effect on waste management infrastructure of **minor negative** significance prior the implementation of mitigation measures.

7.12 CULTURAL HERITAGE

As mentioned in the baseline, there are no internationally, nationally or locally designated historical and cultural monuments in the project area. Two monuments and three churches were however identified within a 15km area surrounding the site and were assessed to be of cultural or religious value. Two designated archaeological areas were also identified 26km away from the project area.

Consequently, the project is not expected to have an impact on the cultural resources identified, since these are located considerable distance away from the project area. Similarly, potential impacts on the setting of these cultural resources are also unlikely as none of them is expected to be visible from the site. However, direct impacts to unknown cultural resources could occur from construction activities and indirect impacts could be caused by increased accessibility to the area. Mitigation measures are therefore recommended to avoid any potential impact.

MITIGATION

While no cultural resources are expected to be impacted by the project, the development of a 'chance to find' procedure to manage cultural heritage finds during the construction period is advised as part of the ESAP. In particular, archaeological research should be undertaken prior any development as required by article 39 of the Law of the Republic of Kazakhstan "On Protection and Use of the Historical Cultural Heritage" mentioned previously.

8 PROPOSED MITIGATION MEASURES

A summary of the likely impacts and proposed mitigation measures is presented in Table 8-1.

Table 8-1 Summary of Proposed Mitigation Measures

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Air quality						
Potential odour from: Wastewater Treatment Plant; Composting pad; Slaughter / processing plant; Broiler sheds; and Movement of waste from broiler sheds to composting pad.	Operation	Yes	Negative	Minor	<ul style="list-style-type: none"> → Optimise broiler shed management to reduce ammonia emissions from litter; → Maintain aerobic conditions within windows to minimise odour production during composting; → Ensure broiler sheds are thoroughly cleaned between cycles; → Maintain a clean and tidy Site, cleaning up spillages rapidly; → Maintain and clean vehicles to reduce road vehicle odour; and → Location of odorous processes well away from the Site boundary. 	Negligible
Dust and other emissions from construction activities	Construction	No	NA	Negligible	<ul style="list-style-type: none"> → Sprinkling of water on unpaved, non-vegetated surface to minimise airborne fugitive dust and during earth moving activities, prior to clearing and before excavating, backfilling, compacting or grading; → Post and enforce speed limits for vehicles to reduce airborne fugitive dust from vehicular traffic; → Allow site access only to authorised vehicles; → Keep soil moist while loading into dump trucks; → Keep soil loads below the freeboard of the truck; 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> → Tighten gate seals on dump trucks; → Trucks loaded with loose construction materials (such as gravel, sand, soil, etc.) shall be covered to minimise dust emissions during transportation; → When feasible, shut down idling vehicles and equipment; → Train workers to handle construction materials and debris during construction to reduce fugitive emissions; → Where possible stockpiling of friable material should be avoided and in time delivery should be practiced; → Implement dust suppression measures to prevent air pollution through water application on roads, construction site, construction camps; → Develop a traffic management plan to ensure smooth traffic flow and safety for workers and passing traffic; → All vehicles must be regularly checked to ensure they are operating within legal requirements; → Ensure no burning of waste on site; → Ensure wheels and chassis of all vehicles are cleaned prior to site departure. 	
Dust and other emissions from operation activities.	Operation	Yes	Negative	Minor	<ul style="list-style-type: none"> → Appropriate bag filters on feed mill exhausts (BAT); → Consideration of alternative bedding (e.g. coarser material such as wood shavings); → Use oil as binding agent within feed; → Manual spreading of litter; → Cover waste when transporting to composting pad; → Water unpaved roads to prevent spreading of dust, particularly during dry weather conditions; and 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					→ Pave internal roads.	
Dust and other emissions from decommissioning activities.	Decommissioning	No	NA	Negligible	→ Refer to construction phase above.	Negligible
Air pollution: Dust and emissions generated from machinery, dust during soil works, waste spreading by birds and other animals	Construction	No	NA	Negligible	→ Ensure all vehicle operators switch off engines when stationary - no idling vehicles; → Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable; and → Develop a Construction Management Plan to manage the sustainable delivery of goods and materials.	Negligible
	Operation	No	NA	Negligible	→ No idling vehicles on Site; → Ensure all vehicles are well maintained; → Develop and implement a Staff Travel Plan; → Optimise broiler shed management to reduce emissions from litter; and → Maintain aerobic conditions within windows to minimise emissions during composting.	Negligible
	Decommissioning	No	NA	Negligible	→ Refer to construction phase above.	Negligible
Emissions of greenhouse gases	Construction	Yes	Negative	Minor	→ Develop a traffic management plan to ensure smooth traffic flow; → Regularly check technical condition of vehicles and machinery; → Use vehicles equipped with effective exhaust mufflers; → Turn-off the construction machinery and equipment when not in use; and → Use efficient machinery and work schedule.	Negligible
	Operation	Yes	Negative	Moderate	→ Energy audits and identification of possibilities for heat and hot water reuse; → Minimisation of vehicle movements;	Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> → Management controls for composting and landspreading to be implemented; → Procedures for the efficient operation of the WWTP avoiding anaerobic conditions; and → Shut-off equipment and associated lighting when not in use. 	
	Decommissioning	Yes	Negative	Minor	<ul style="list-style-type: none"> → Develop a traffic management plan to ensure smooth traffic flow; → Regularly check technical condition of vehicles and machinery; → Use vehicles equipped with effective exhaust mufflers; → Turn-off the construction machinery and equipment when not in use; and → Use efficient machinery and work schedule. 	Negligible
Climate change and adaptation	Construction	No	NA	Negligible	None	None
	Operation	No	NA	Negligible	None	None
	Decommissioning	No	NA	Negligible	None	None
Noise						
Noise from machinery and vehicles	Construction	Yes	Negative	Minor	<ul style="list-style-type: none"> → Limit noisy activities to the least noise-sensitive times of the day (week days between 7am and 10pm); → All machinery and equipment should have sound-control devices no less effective than those provided on the original machinery/ equipment. Motorised equipment should be adequately muffled and maintained; → To the extent possible, route heavy-truck traffic away from residences and other sensitive receptors; 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					→ Workers in the vicinity of sources of high noise shall wear necessary personnel protective equipment (PPE);	
	Operation	Yes	Negative	Minor to moderate	→ Limit noisy activities to the least noise- sensitive times of the day (week days between 7am and 10pm); → All mechanical service equipment shall include suitable noise control measures such as silencers, anti-vibration mounts and flexible connections; → Barriers (e.g. fences, etc.) or purpose-built acoustic screens should be used to reduce noise reaching administrative building where practicable; → Machinery in intermittent use should be shut down or throttled down to a minimum when not in use; and → PPE should be provided to employees for hearing protection, the sign boards and training procedure should be in place.	Negligible
	Decommissioning	Yes	Negative	Minor	→ As per Construction Phase, above	-
Landscape and visual						
Landscape and visual impact of construction	Construction	Yes	Negative	Minor to moderate	→ All practicable measures should be implemented to avoid or effectively control potentially adverse construction effects on existing landscape character and visual receptors; → Installation of 2 m high fence with checkpoint is planned for the construction and operation phase in order to protect the site and to screen the development from nearby sensitive receptors;	Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Landscape and visual Impact of poultry farm operation	Operation	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Lighting for facilities should not exceed the minimum required for safety and security. → All practicable measures should be implemented to avoid or effectively control potentially adverse operation effects on existing landscape character and visual receptors; → Mitigation planting of local tree species on site to reduce the landscape and visual impacts of the farm. → Planting of two rows of trees within each farm unit and between the buildings used to breed broiler chickens. → Planting of trees around veterinary, composting and clearance facilities as well as along the site boundary. → In particular, to avoid adverse impacts on the visual amenity, planting of trees should be undertaken around the incubator building and along the south-west and south site boundaries to screen Baisuat village, Karaozek village, Sukhaya River, Kayrakty River, and pond on Kayrakty River from the proposed farm. → Lighting for facilities should not exceed the minimum required for safety and security. 	Moderate
	Decommissioning	Yes	Positive	Minor to moderate	<ul style="list-style-type: none"> → Remove all necessary aboveground structures and facilities from the site; → Re-establish the terrain and drainage pattern similar to natural conditions of the adjacent areas; → Restore the vegetation cover, composition and diversity commensurate with the ecological setting; → Use plant species characteristic of the landscape 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					in the course of restoration of the vegetation cover on the reclaimed areas;	
Geology and soils						
Loss/contamination of soil during removal for construction/ operation/ decommissioning of buildings	Construction	Yes	Negative	Minor	<ul style="list-style-type: none"> → Topsoil depth confirmation and identification of dispersion characteristics for erosion potential → Careful removal of topsoil → Appropriate and secure storage e.g. away from drainage lines and strategically located to assist sequence of future rehabilitation → Management of topsoil to maintain stability e.g. minimise length of time subsoil is exposed, use erosion control measures such as bonded fibre matrix, composite/ erosion control blankets, gravelling, revegetation etc. → Upon completion of construction, reinstatement of topsoil landscaping the works as soon as practicable including use of suitable topsoil, use of contour ripping to control erosion, seeding with appropriate seed mix, application of appropriate fertiliser or gypsum if required → Development of detailed topsoil management plan, including a site layout drawing, locating where soil will be removed and stored. 	Negligible
	Operation	No	-	Negligible	None	-
	Decommissioning	Yes	Negative	Minor	<ul style="list-style-type: none"> → Carry out same activities required during construction of buildings 	Negligible
Impacts from seismic activity, potential for slope instability and increased erosion and water quality problems	Construction	Yes	Negative	Minor	<ul style="list-style-type: none"> → Establishment of buffer zone around poultry farm; → Ensure preservation of safety rules by workers whilst dealing with hazardous and toxic materials; → Compliance with site rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.; → Regular inspection of poultry farm and associated 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					infrastructure to ensure proper operation; → Train workers on how to act in an emergency situation; and → Establish reliable communication between site and respective regional authorities, first aid service, rescue service, police office, fire office, operators of electricity, gas and water supply to ensure adequate response in case of an emergency..	
	Operation	Yes	Negative	Moderate	→ Prepare Emergency Preparedness and Response Plan, inform the workers on its provisions; → Ensure compliance with rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.; → Regularly inspect facilities and infrastructure to ensure their proper operation and updating of as-built documentation; → Provide periodic training to workers on how to act in emergency situations; and → Maintain reliable communication between site and respective regional authorities, first-aid service, rescue service, police office, fire office, operators of electricity, gas and water supply utilities to ensure adequate response in case of emergency.	Minor
Spillages/ leakages of oil, fuel from machinery, equipment and vehicles and other potentially polluting substances impacting land and surface water	Construction	Yes	Negative	Moderate	→ Compliance with site rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.; and	Minor
	Operation	Yes	Negative	Moderate	→ Regular inspection of facilities to ensure proper operation.	
	Decommissioning	Yes	Negative	Moderate		
Hydrogeology, hydrology and water quality						

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Pollution of surface water and groundwater resources due to spillage of fuel/oil or other hazardous substances including concrete, in addition to, movement of vehicles and machinery/ equipment	Construction	Yes	Negative	Minor	<ul style="list-style-type: none"> → To reduce the likelihood of contamination due to spillage of oil from construction equipment and wastewater from construction camps, the sites for these areas should be carefully designated and proper technical condition of machinery and equipment shall be ensured. In addition, sand or fine gravel should be spread on the ground at these locations designated for parking and servicing construction machinery. In the event of a spillage, the polluted layer should be removed and replaced with a new layer of sand or gravel; → Sections located very close to drainage ditches/ culverts shall not be used for construction material storage and temporary accumulation of waste; → Provide for covered zones of preliminary accumulation of construction materials and wastes in order to minimise formation of leachate as a result of rainfall; → Septic tank installed and to be emptied on a regular basis to control domestic effluents; → All vehicles must be regularly checked and their normal operation technical conditions shall be ensured. In case any leakage of oil or other liquid occurs, the vehicle must be moved to a paved impermeable area to be immediately repaired; and → Water samples shall be taken and analysed for oil products in the event that leakage is observed. 	Negligible
	Operation	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Regularly inspect and clean drainage ditches/ gullies; → Regularly inspect leachate collection and treatment facilities, wheel wash system, water supply and sewerage network at administrative buildings to ensure proper operational technical 	Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<p>conditions;</p> <ul style="list-style-type: none"> → To reduce the likelihood of oil spillage from machinery and equipment, and contamination with wastewater from administrative facilities, proper technical condition of machinery and equipment shall be ensured. → All vehicles must be regularly checked and their normal operational technical conditions shall be ensured. In case any leakage of oil or other liquid is observed, the vehicle must be moved to a paved impermeable area and be immediately fixed; → Groundwater and surface water quality shall be monitored at regular intervals during operation. 	
	Decommissioning	Yes	Negative	Minor	<ul style="list-style-type: none"> → Regularly inspect and clean drainage ditches/gullies; → Regularly inspect leachate collection and treatment facilities to ensure proper operational technical conditions; → All vehicles must be regularly checked and their normal operational technical conditions shall be ensured. In case any leakage of oil or other liquid is observed, the vehicle must be moved to a paved impermeable area and be immediately fixed; → Surface water quality will be managed for directing clean run-off away from sources of possible contamination; and → Groundwater and surface water quality shall be monitored at regular intervals during decommissioning. 	Negligible
Change in drainage pattern resulting from construction of construction compound and temporary laydown area, site	Construction	Yes	Negative	Minor	<ul style="list-style-type: none"> → Minimise the planned amount of land to be disturbed as much as possible (use existing access roads and quarries if possible); → Locate access roads to minimise stream 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
buildings, access roads, grid connection, electric cable and other pipework installation, and excavation activities					crossings; → Construct drainage ditches where necessary, use appropriate structures at culvert outlets to prevent erosion; → Clean and maintain drainage ditches and culverts regularly; → Use special construction techniques in areas of steep slopes, erodible soils and stream crossings; → Dispose of excess excavation materials in approved areas to control erosion and minimise run-off.	
	Operation	Yes	Negative	Minor	→ Clean and maintain drainage ditches and culverts regularly to ensure proper removal of run-off; → Do not alter or restrict existing drainage systems, especially in sensitive areas such as erodible soils or steep slopes; and → Regularly monitor groundwater table through monitoring wells established at the site.	Negligible
	Decommissioning	No	-	Negligible	None.	-
Wastewater generation and disposal	Construction	Yes	Negative	Minor	→ Avoid potential spills; → Washing of vehicles and equipment on the site will be restricted; → Chemicals and other liquid and solid dangerous materials must be managed properly; and → Septic tank installed and to be emptied on a regular basis to ensure that wastewater from the welfare facilities will be collected and adequately removed from the site.	Negligible
	Operation	Yes	Negative	Moderate	→ Regularly inspect and ensure proper maintenance of wastewater collection tank, vehicle washing systems, leachate collection and treatment facilities; → Regularly inspect and maintain the surface water	Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> collection systems; → Ensure regular cleaning of drainage ditches/ culverts; → Avoid potential spills through application of appropriate staff training and occupational rules; → Washing of vehicles and equipment on the site to be restricted to garage areas; → Chemicals and other liquids and solid dangerous materials must be stored and properly managed; and → Wastewater from the administrative facilities and poultry farm shall be collected and treated at the WWTP. 	
	Decommissioning	Yes	Negative	Minor	→ Refer to mitigation measures related to construction phase above.	Negligible
Landspreading of the manure on agricultural land	Construction	No	N/A	N/A	None	N/A
	Operation	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Develop land spreading procedures that cover: <ul style="list-style-type: none"> o Nutritional need of land and crops; o Prevention of spreading too close to rivers, when land too wet, whilst snow is present on the ground, on sloping fields and take into account land practices; o Manage land spreading during sensitive periods such as public holidays and weekends, take into account wind direction and how to incorporate into the ground rapidly to reduce odour potential. → Develop a spill prevention and response plan for addressing land spreading operations including spill prevention measures, training requirements, spill response actions, spill response kits and notification to authorities; 	Negative Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> → Train employees to promptly contain, report and/or clean up any spill; → Provide portable spill containment and clean-up equipment in all vehicles; → Document accidental releases as to cause, corrective actions taken, and resulting in environmental or health and safety impacts. 	
	Decommissioning	No	N/A	N/A	None	N/A
Potential for flooding	Construction	No	-	Negligible	None.	-
	Operation	Yes	-	Negligible	→ Surface water drainage infrastructure included within design.	-
	Decommissioning	Yes	-	Negligible	None.	-
Ecology						
Loss of biodiversity	Construction	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Pollution prevention measures to ensure protection of the local water environment. → Site fencing installed prior to poultry farm construction to minimise site access by wildlife species. → Robust cleaning of works vehicles at source in order to prevent spread of non-native invasive plant species. → Full survey of ecological receptors across the site – focussing primarily on fauna (e.g. roosting bats and nesting bats). → Retention of key habitat features where possible (as identified from the field survey work), or compensatory provision thereof, → Monitoring of any mitigation to ensure ongoing success of such measures. 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
	Operation	Yes	Negative	Low to negligible	<ul style="list-style-type: none"> → Pollution prevention measures to ensure protection of the local water environment. → Specific traps chosen to avoid capture of non-target species. 	Negligible
	Decommissioning	No	Negative	Negligible	None	-
Electromagnetic fields						
Impact from electromagnetic fields	Construction	No	NA	Negligible	None	Negligible
	Operation	No	NA	Negligible	None	Negligible
	Decommissioning	No	NA	NA	None	-
Groundwater and water supply						
Impacts of Construction and Operation	Construction	Yes	Negative	Major	<ul style="list-style-type: none"> → Groundwater pumping test data to assess the potential yields available and the response/impact to superficial aquifer groundwater levels or river stage levels. → Develop sub-regional water balance to assess whether potential abstractions could be sustained by the local aquifer/river system (basic inflows/outflows considerations). → Consideration of the need for groundwater treatment during abstraction. 	Moderate
	Operation	Yes	Negative	Major		Moderate
	Decommissioning	No	NA	NA	None	-
Waste						
Construction waste impacts on ground and water quality	Construction	Yes	Negative	Minor	→ Best practice measures and recommendation for the minimisation and management of waste should be incorporated into a Construction	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					Environmental Management Plan (CEMP)	
	Operation	Yes	Negative	Minor	→ The waste hierarchy will be adopted as far as reasonable practicable. Dedicated waste storage areas for waste segregation for recyclable and non-recyclable refuse will be implemented on site. Waste storage will be clearly labelled to ensure that cross contamination is minimised.	Negligible
Construction waste impacts on waste management infrastructure	Construction	Yes	Negative	Moderate	→ A waste management strategy is recommended to be developed and implemented to ensure that that waste materials are stored and disposed of appropriately. → The waste hierarchy will be adopted as far as reasonable practicable. Material deemed suitable for reuse on the project site will be retained and stockpiled where possible to incorporate such materials into the subsequent construction process. If materials cannot be reused on-site, then the feasibility of reusing them off-site will be explored. → Identifying waste streams which could successfully be used by other businesses or operations. This results in the diversion of waste from landfill and thus presents the potential for cost savings.	Minor
	Operation	Yes	Negative	Moderate	→ A waste management strategy is recommended to be developed and implemented to ensure that that waste materials are stored and disposed of appropriately.	Minor
Odour and nuisance related impacts associated with the transport of litter and hatchery waste to the composting site	Operation	Yes	Negative	Moderate	→ It is recommended that a schedule of movements is developed, which is based on the requirements of the broilers and the hatchery. This should take into consideration vehicle movements through	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<p>villages and planning, where possible, to minimise travel through residential areas in order to minimise the risk of odour and noise nuisance impacts.</p> <p>→ It is recommended that the construction of bypass roads are considered, where there is a significant impact associated with the transportation of waste materials.</p> <p>→ Covered vehicles will be used for the transportation of litter and hatchery waste.</p>	
Odour and nuisance related impacts associated with the composting	Operation	Yes	Negative	Minor	<p>→ It is required that a formalised calculation is undertaken to ensure that adequate storage is available during the composting phase.</p> <p>→ Heights of the windrows should be kept below 3m;</p> <p>→ The use of tarpaulins for covering windrows will limit odour emissions and flies and allows better integration of windrows into the landscape.</p> <p>→ The use of tarpaulins to provide health protection towards birds and rodents and for managing moisture content in places where heavy rainfall is experienced.</p> <p>→ The siting of the windrows should also be considered, and should not be sited within 10m of surface water or on a groundwater vulnerable zone in order to minimise the pollution risk to surface and groundwater.</p> <p>→ The following BAT points should be considered:</p> <ul style="list-style-type: none"> • Store litter on solid impermeable floor, equipped with a drainage system and a collection tank for run-off; 	Negligible

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> • Ensure there is sufficient capacity to hold organic manures during periods in which the application to land is not possible; • Store organic manure in field heaps places away from surface and/or underground watercourse which liquid run-off might enter; • Reduce the ratio between the emitting surface area and volume of the organic manure; • Cover solid heaps. 	
Odour related impacts from spreading activities	Operation	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Develop a management plan prior to spreading. → Time applications of manure to optimise crop benefit and minimise environmental loss. → Adapt the manure application rate. → Identify areas unsuitable for spreading. → Avoid organic manure within 10m of a surface water course. 	Negligible
Impacts from spreading activities on waste management infrastructure	Operation	Yes	Negative	Moderate	<ul style="list-style-type: none"> → Assess the manure receiving land to identify risks of run-off, taking into account: <ul style="list-style-type: none"> • Soil types, conditions and slope of field; • Climatic conditions; • Field drainage and irrigations; • Crop rotations; • Water resources and water protected zones → Incorporate organic manure within 24 hours of spreading. → Consideration of techniques to minimise odour impacts: 	Minor

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
					<ul style="list-style-type: none"> • Ploughing immediately behind the spreader; • Delaying spreading until local weather conditions (i.e. wind direction) are more favourable; • Injecting into the land ; <p>→ Spreading should also take place during the day;</p> <p>→ Prior to spreading the machinery should be checked;</p> <p>→ Development and communication of guidance on manure land spreading and odour nuisance to all relevant personnel.</p> <p>→ Regular inspections of storage facilities;</p> <p>→ Development of emergency preparedness and response plan;</p>	
Cultural heritage						
Impacts of construction and operation	Construction	No	Negative	Negligible	→ Develop a chance find procedure to be used during construction to aid in managing archaeological finds.	Negligible
	Operation	No	Negative	Negligible	→ The procedure should include a method for considering whether there are areas with a higher potential for undiscovered archaeology to be present, where an archaeological watching brief should be used.	Negligible
	Decommissioning	No	Negative	Negligible	None	-

9 EMERGENCY SITUATIONS

This Chapter describes the extent and the degree of the impact as a result of emergency situations, the possibilities, the ways and the measures for reducing or eliminating the impact.

9.1 NATURAL HAZARDS

The term “natural hazard” refers to all atmospheric, hydrological, geological (including seismic) and wildlife phenomena that, because of their location, severity and frequency have the potential to affect human, their structures or their activities adversely. The natural hazards relevant include drought, earth quake, flood and wild fire.

9.2 CONSTRUCTION

Mitigation of disasters usually entails reducing the vulnerability of the elements at risk, modifying the hazard proneness of the site. Mitigation measures to address such impacts usually include specific safety or vulnerability reduction measures incorporated into the design documents developed for construction of the poultry farm and associated infrastructure, especially the feed mill with blast protection. To properly deal with hazards and ensure timely implementation of mitigation measures it is recommended that an Emergency Management Plan be developed for the poultry farm and associated infrastructure jointly with the Regional Authorities. The Emergency Management Plan should include measures addressing the following issues:

- Natural hazard prediction;
- Emergency preparedness;
- Disaster rescue and relief;
- Post-disaster rehabilitation and reconstruction; and
- Education and training activities.

To reduce hazard vulnerability at the poultry farm and associated infrastructure site during construction the following measures are recommended:

- Establishment of buffer zone around the poultry farm and associated facilities;
- Ensure preservation of safety rules by workers, while dealing with hazardous and toxic materials;
- Compliance with rules of MPF to ensure their proper operation;
- Train workers on how to act in an emergency situation;
- Establish reliable communication between MPF and respective regional authorities and emergency services (first aid service, rescue, police, fire, etc.)

To reduce hazard vulnerability at the poultry farm and associated infrastructure site during operation the following measures are recommended:

- Prepare Emergency Preparedness and Response Plan and inform the workers of its provision;
- Regularly inspect drains and maintain the sanitary protective zone around the poultry farm and associated infrastructure;

- Ensure compliance with rules on storage and handling of construction materials, fuel, oil products, chemical substances, etc.;
- Regularly inspect MPF facilities and infrastructure to ensure their proper operation and updating as-built documentation;
- Provide training to workers on how to act in emergency situations; and
- Maintain reliable communication between MPF and respective regional authorities, first aid service, rescue service, police office, fire office, operations of electricity, gas and water supply to ensure adequate response in case of emergency.

10 ENVIRONMENTAL SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) has been prepared as a separate standalone document for the construction, operation and decommissioning the Makinsk Poultry Farm project, to be carried out by UKPF. The ESMP was prepared based on the environmental and social issues identified during the environmental and social evaluation.

The ESMP contains plans, programmes, specifications and guidelines designed to control and manage the potential environmental and social impacts that were identified in the ESIA. The geographical, social, cultural and environmental dynamics have been taken into consideration. The ESMP is an integral part of the ESIA as it is a policy setting document for MPF and its contractors. This document represents a commitment by MPF and the local municipalities to environmental and social sustainability, and applies to the Project's entire life cycle.

The ESMP establishes MPF's policies, commitments, and resources that are needed to allow effective implementation and continuation of the programmes and procedures to manage and mitigate the predicted impacts of the Project. Implementation of the ESMP will fulfil the requirements established by the environmental laws and regulations of Kazakhstan, as well as other technical and legal instruments that apply. The Project will also comply with the EBRD Performance Requirements.

The implementation of the ESMP's commitments will be subject to supervision and internal and external auditing. Supervision of the implementation of, and compliance with, commitments set in the ESMP will be overseen permanently by RoK Environmental Inspection and an Independent Engineer appointed by Lenders during the life of the loan.

This version of the ESIA is the basis against which the ESMP monitors and continuously improves. The ESMP is the living document that changes as things change from what was predicted in the ESIA.

The principal objective of the ESMP is to "operationalise" the commitments to environmental and social management and mitigation as identified by the ESIA. This should ensure that the Project (including construction, operation, closure and post-closure phases) is undertaken in a manner which maximises the benefits to, and minimises the negative impacts on, the physical, biological, social and archaeological environments in the Project-affected area.

Specific objectives include:

- Zero lost time injuries (LTI's) during construction and operation;
- Establishing upfront during construction a culture for safety, productivity, efficiency and flexibility to be subsequently maintained by poultry farm operations;
- Implementing appropriate prevention and mitigation measures to reduce the incidence of negative environmental impacts and promote favourable conditions during the construction, operation and decommissioning phases;
- Creating an effective environmental monitoring and supervision plan that allows for the monitoring of the proposed activities and environmental variables during the Project;
- Establishing participation mechanisms for the Project stakeholders to keep them informed about Project activities and how they may affect their daily activities;

- Elaborating procedures that will allow effective and timely response to emergencies, and enable the reporting of events that may arise;
- Safeguarding biodiversity and ecosystems and making special provision for habitats and species of conservation importance at the national and international levels;
- Performing adequate management of solid residues as required by applicable laws and IFC/EBRD requirements;
- Monitor any future land acquisition and economic displacement activities;
- Restoring livelihoods impacted by economic displacement caused by the Project;
- Preserving the archaeological heritage identified in the Project's area of influence as defined by applicable laws; and
- Establishing and maintaining communication channels among MPF, the appropriate authorities and stakeholders associated with the Project.

End of Document