

City of Bishkek & European Bank  
for Reconstruction & Development  
(EBRD)

**Bishkek Solid Waste Management  
Project**

Addendum to the Environmental and  
Social Impact Assessment

ADD\_ESIA\_001

Final | 9 November 2016

This report takes into account the particular  
instructions and requirements of our client.

It is not intended for and should not be relied  
upon by any third party and no responsibility  
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Job number 246385-00

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# 1 Introduction and Background

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The City of Bishkek (the ‘City’) seeks to improve its municipal solid waste (‘MSW’) management system and has been working with the European Bank for Reconstruction and Development (the ‘EBRD’ or the ‘Bank’), to invest in a viable development project. The proposed Bishkek Solid Waste Management Project (the ‘Project’) comprises a sovereign loan of EUR 11 million and a grant of EUR 11 million to the Kyrgyz Republic to be on-lent to the City for the benefit of the municipal solid waste management company Tazalyk (‘Tazalyk’) and a Special Purpose Vehicle ‘Bishkek Sanitary Landfill’ (the ‘Company’ or ‘SPV’). The loan agreement was signed in 2013. The Project will support priority investments in the waste management segment – primarily in waste collection and disposal.

The Bank commissioned a Feasibility Study (the ‘FS’) that was completed in the summer of 2013. The FS determined a priority investment programme (the ‘PIP’), evaluated its benefits, and assessed a proposed site for the new landfill, including assessing its environmental and social impacts. As part of the FS, an Environmental and Social Impact Assessment (ESIA) was prepared in line with the EBRD’s assessment requirement of PR1.<sup>1</sup>

However, since 2013 work has continued to develop the Project and circumstances in the local area have changed. Waste deposition at the existing dumpsite has continued and has extended into the adjacent area which was previously considered for the new landfill. Also, on-going consultation with key stakeholders in the City confirmed sanitary protection zone (SPZ) distances, which would apply around any new facility, within which key sensitive environmental and social receptors could not be located.

These changes required the location of the new facility to be reconsidered. An area further north of the site was identified that met sanitary zones requirements and was considered suitable to support the development of a new engineered landfill, and achieve the waste management objectives of the City. A new engineering design was developed for this new location.

To support the Project, Ove Arup and Partners International Ltd. (the ‘Consultant’ or ‘Arup’) have been appointed by the City to undertake an Environmental and Social gap analysis for the newly proposed site against the Terms of Reference for the initial FS and update the necessary technical, environmental, and social studies and plans where practicable, or recommend further action as required, to move the Project proposals in line with the EBRD’s Environmental and Social Policy (ESP, 2014) and its Performance Requirements (PRs), as well as applicable national and international requirements.

## 2 The Purpose of this Addendum

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The purpose of this ESIA Addendum is to provide updated information and assessment which relates to the relocation of the proposed new engineered landfill

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<sup>1</sup> Kyrgyz Republic: Bishkek Solid Waste – Feasibility Study, Environmental and Social Impact Assessment, Bishkek, CEMI, 2012.

from that assessed in the original ESIA. This Addendum focuses on issues where the conclusions of the original 2012 ESIA regarding potential impacts are significantly affected by the relocation of the facility. Where there is considered to be no change in the assessed impacts, no further assessment is required and potential impacts remain the same as concluded in the 2012 ESIA.

Therefore, this Addendum should be read in conjunction with the original ESIA and supporting documents prepared during the FS, and further studies undertaken as part of the Project development work since 2012.

## **3 Proposed Changes to the Original Proposals**

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### **3.1 Project Location**

The existing Bishkek authorized disposal site (BADS or the dumpsite) is located 12 km to the north of the City centre and 300-600 meters (m) east of the Ala-Archa reservoir. The site is situated within city limits nearing the Alamedin district of the Chui region. Officially, the existing site covers 36 hectares (ha) of land, including surrounding roads, leachate collection basins etc. However it is estimated that over the years its dimensions have expanded up to 80 ha. Over eight million tons of waste in total has been disposed to the BADS. The site is not fenced. Currently informal waste picking and sorting take place at the BADS and a number of informal settlements are located within its SPZ.

The proposed new facility is located around 350 m north of the previously proposed site and approximately 500 m from the BADS. It lies on the northern edge of an area of previous clay extraction which extended between the existing dumpsite and the new site. The indicative location and the site context are shown on Figures 1a-1d, 2 and 3. The area for the new landfill was determined taking into consideration the SPZs of legal and informal settlements, gas pipeline, Ala-Archa river and the water reservoir and the international airport of Bishkek. The new landfill location and the technical specifications developed for it in September 2015 do not materially change any of the technical considerations addressed in the original FS; the initially proposed waste management system remains fundamentally unchanged.



Figure 1a – 1d: Location of BADS – General View



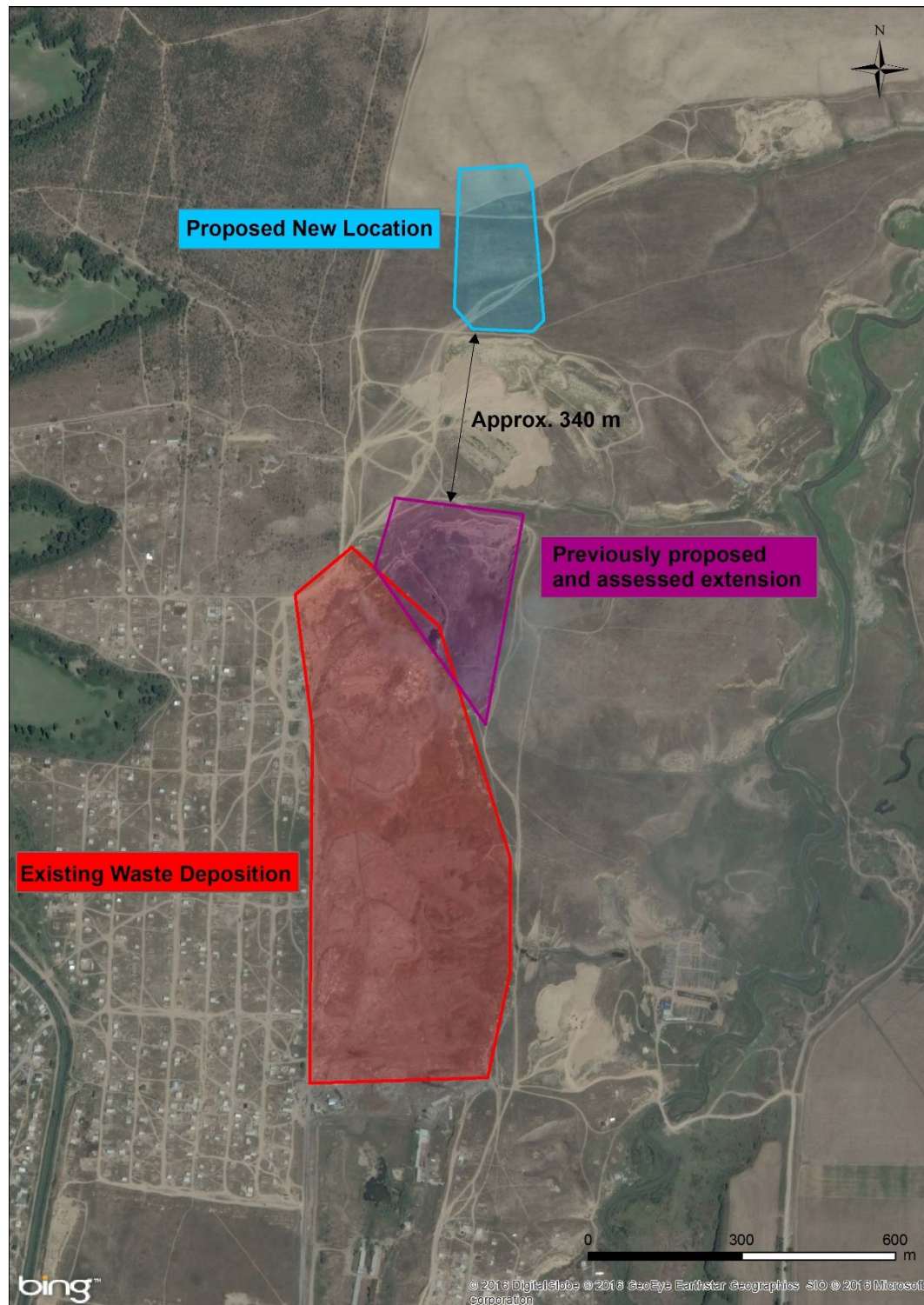
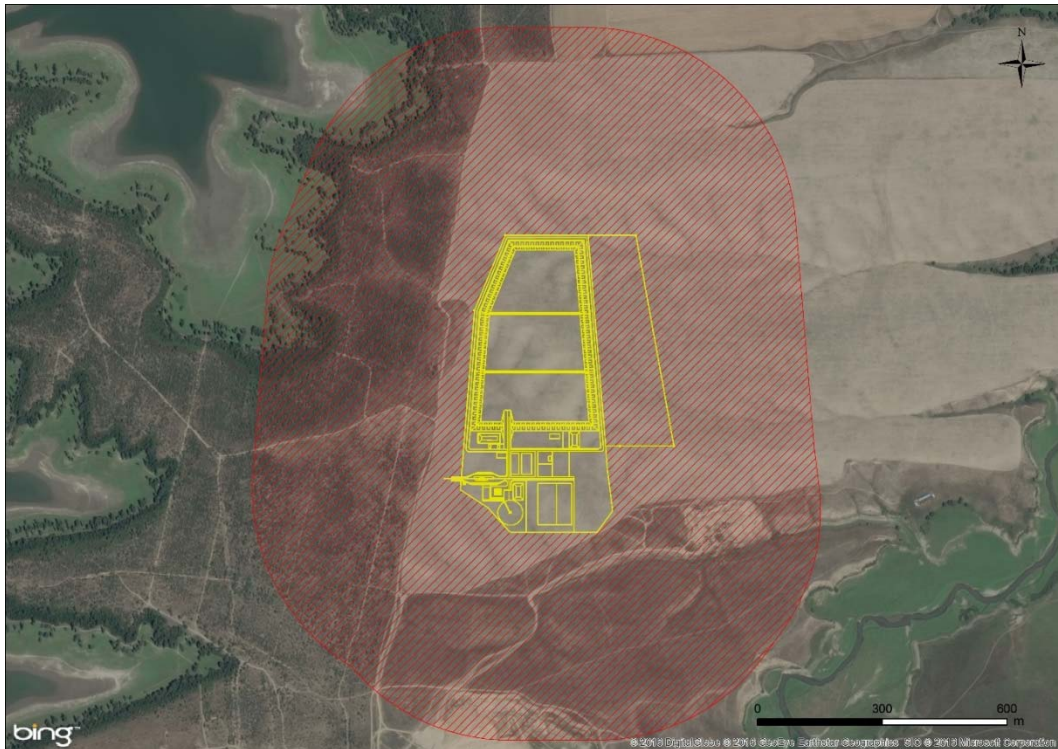


Figure 2: Approximate Relative Location of the Proposed Landfill

### 3.2 Proposed New Landfill

The total area allocated for the landfill waste disposal and infrastructure is 21.3 ha. The maximum length of the site north to south is 715 m and the maximum width east to west is 366 m. (Figure 3). The location, layout and SPZ of the proposed new waste management facility is shown in Figure 3.



Legend:



Sanitary Protection Zone

Figure 3: Site Location – New Landfill Site

The proposed landfill site has been designed with reference to the legal requirements of the Kyrgyz Republic and in their absence, with relevant standards of the European Union. The annual volume of waste generated is assumed equal to the volume disposed of to the site, i.e. 1.5 million m<sup>3</sup> (before compaction) or 220,000 tons of solid waste. A detailed layout of the facility is shown in Figure 4 and a brief description of the infrastructure elements is provided below.

### 3.2.1 Landfill cells

The landfill site will consist of three cells, with following area:

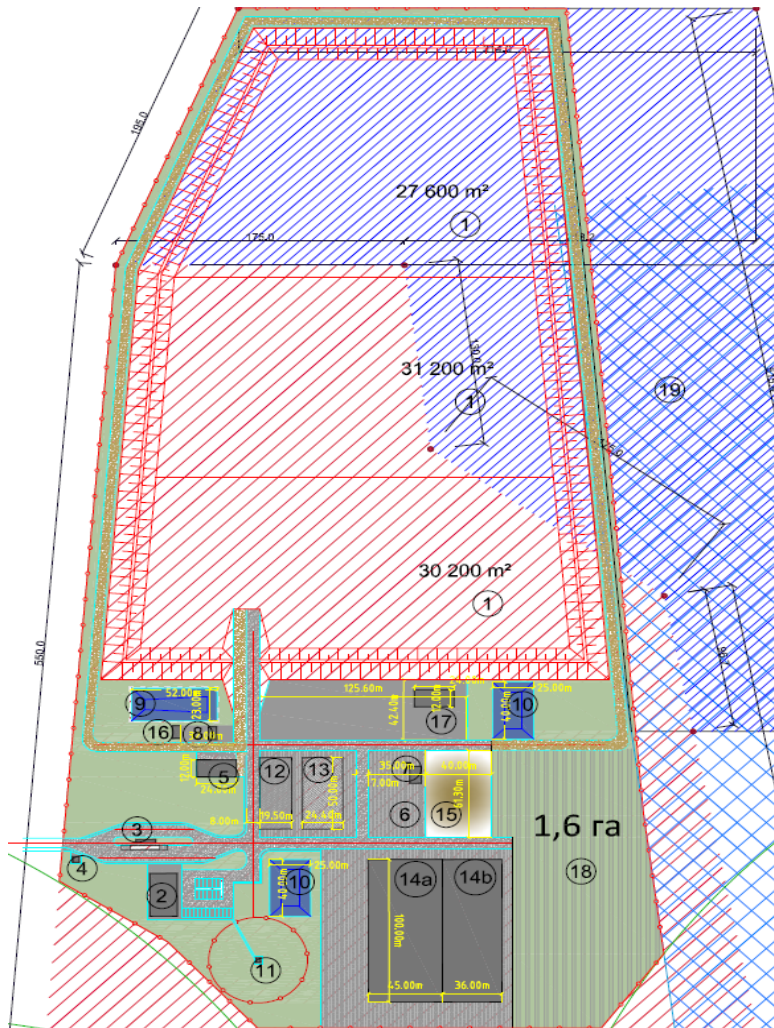
- Cell No 1: 27,600 m<sup>2</sup>;
- Cell No 2: 31,200 m<sup>2</sup>;
- Cell No 3: 30,200 m<sup>2</sup>.

Each landfill cell will be constructed with an artificial geological barrier which will be made from a clay layer at the bottom, as well as on slopes. A clay layer will be laid after a base layer. The thickness of the barrier shall be 0.50 m (measured after compaction), laid in layers of 0.25 m thickness and well



compacted, at least up to 95 percent of dry density, and in average not less than 98 % of maximum Proctor density.

A 2.0 mm thick High Density Polyethylene (HDPE) liner will be placed on a layer of protective geotextile and all seams welded to provide a single continuous liner. The next layer of protective geotextile will be placed on the HDPE liner. Finally, a drainage layer, consisting of washed gravel of fraction 16/32 mm, will be placed on the protective geotextile. The drainage layer will be protected with filtering geotextile. The waste will be deposited directly onto filtration layer. A section of the proposed landfill lining system is shown in Figure 5.



Legend:

- |   |  |
|---|--|
| 1 Landfill cells                              | 2 Administration building and parking    |
| 3 Inception and control zone                  | 4 Transformer station                    |
| 5 Garage for landfill equipment               | 6 Technical maintenance area             |
| 7 Equipment washing area                      | 8 Leachate recirculation system          |
| 9 Leachate collection pond                    | 10 Water reservoir for firefighting      |
| 11 Drilled well with 30m protection zone      | 12 Recycling station for inhabitants     |
| 13 Storage for containers                     | 14 Sorting plant with recyclates storage |
| 15 Soil collection area                       | 16 Biogas treatment system               |
| 17 Animal remains neutralisation installation | 18 Mechanical-biological treatment area  |

## 19 Area for future development

Figure 4: Plan of the Landfill Site with Auxiliary Facilities

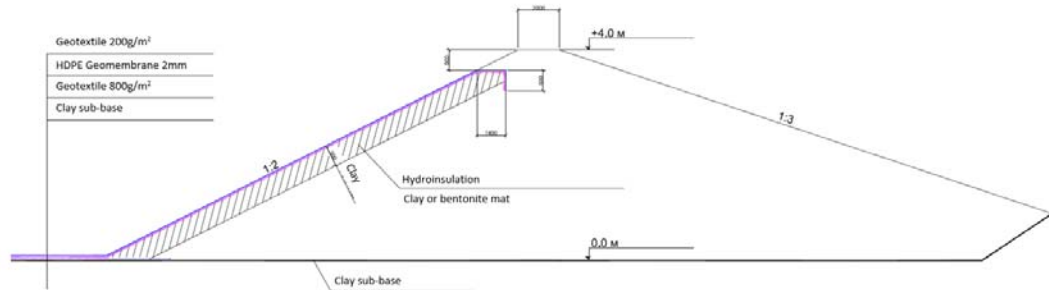


Figure 5: Section of the Landfill Lining

### 3.2.2 Access road

A short existing dirt road in a north-south direction leading to the planned landfill is currently in an unsatisfactory condition. It will be upgraded to a 6 m wide paved, asphalt access road designed for heavy traffic. Its total length is proposed to be 3.1 km from its junction with the main highway to a point midway the northern boundary of the proposed new landfill site. No lighting is proposed along the access road. The access road to the landfill must carry intensive loads of vehicles weighing up to 30 tons.

### 3.2.3 Perimeter fence and gate

The territory of the landfill will be surrounded by a fence of minimum height of 2.50 m. The access gate into the landfill site will be open only during working hours of landfill. An automatic barrier will be installed at the entrance to the landfill.

### 3.2.4 Entrance area, garage and parking area and lighting

A paved parking area will be provided with a capacity of 24 private cars near the technical area and garage. A 3,600 m<sup>2</sup> gravel paved area east of the garage will be provided which can be used for storage of containers and waste collection from customers.

A garage is planned for operational equipment including a storage room and workshop facility.

Lighting will be installed on the site, except along roads provided for technical maintenance and internal roads within each waste disposal cells. It is planned to install reflectors on the outer wall of a building or on lamp posts along the sides of roads and platforms. The proposed strength of the general lighting is estimated at 80 lux.

The total length of power supply cable is about 920 m, the total length of the cable of outdoor lighting is about 800 m, and 22 poles for outdoor lighting will be provided.

### **3.2.5 Weighbridge**

A check point and the weight station are provided to control the movement of waste trucks and record the weight received, as well as to prevent the entry of unauthorized transportation. The upper limit of the weighing will be minimum 60 tones with accuracy of less than 20 kg. Platform dimensions are 18.0 x 3.0 meters. The check point will be equipped with a computer with special software to collect data such as the type, characteristics, weight and origin of the wastes, the name and address of the supplier and the exact location of the discharge of waste at the landfill.

The operator's room is prefabricated module type with dimensions of 6.1 x 2.4 x 2.68 meters. The room will be provided with a bathroom unit. The room is heated by electric heating coils.

### **3.2.6 Wheel wash facility**

A wheel wash facility will be installed. Trucks will have to pass the wheel wash facility before leaving the site, or proceeding through the weighbridge if reweighing is required. Water will be reused and treated subject to settlement in a prefabricated treatment unit.

### **3.2.7 Administration, control, staff facilities including sanitary facilities**

There will be one staff building at the landfill site. This will include facilities for the weighbridge control office, mess room<sup>2</sup>, separate changing room and bathing facilities for men and women, toilet facility for trucks drivers and visitors and an entrance room, storage room and corridors.

### **3.2.8 Internal roads**

A separate internal road will be provided for permanent waste operational traffic and traffic to the site, directing them via the front gate, reception and weighbridge and then on to the landfill cell as required. There is a second internal access road for maintenance and inspection that routes around the perimeter of the site.

### **3.2.9 Surface water collection and storage**

The geological conditions across the site suggest that surface water run-off will take place during rainfall rather than infiltration. Surface water drainage ditches will be located along all internal roads and adjacent to the disposal area. All collected storm water from the landfill site outside the disposal cells (and from

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<sup>2</sup> For employees to consume their own prepared food only.

disposal cells when filled and covered) will be discharged to a surface water attenuation pond in the south of the site.

Surface water from areas, such as washing and fuel filling areas in front of the garage, where there is a risk of spillage from oil or other pollutants, will pass through an oil separator before being discharged to the surface water pond.

### **3.2.10 Sewage water, electricity, water (drinking/raw water) and communication**

There are limited utilities in the area therefore local facilities will be installed to service the site, including a dedicated power supply line (6.5km in length). Sewage from the administration building will be collected in a septic tank for periodic emptying, a diesel generator will be provided for back-up electricity and a tank will be installed for water storage. Phone and internet connection will be established by a wireless (mobile) communication.

### **3.2.11 Leachate collection, transport, storage, treatment and discharged facilities**

Each cell will be fitted with HDPE leachate collection pipes which will gravity feed to an isolated and sealed leachate collection pond in the south of the site. This system is based on one cell being in operation at any given time with the previous cell filled and older cells filled and covered with top cover.

A collection well will be installed to manage any excess of leachate generation. The leachate will be collected into a tank and redistributed over to the operational waste cell for recirculation. This will increase the evaporation of leachate. The waste body will act as a buffer. An emergency overflow well will be installed in the leachate pond, with any overflow returned to the operational waste cell.

### **3.2.12 Landfill gas generation and collection**

A system of collection and removal of biogas from the landfill body will be installed including purification of biogas and burning in flare. The collected condensate will be pumped back into the landfill body (it allows for pumping into the pool for filtrate collection). Gas collection within the new landfill site will be carried out through vertical wells, in which perforated pipes are laid within a gravel package. During the first operational stage collection and utilization of biogas is not envisaged.

## **4 Alternatives Considered**

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Alternative solutions to the solid waste management system were considered in the FS and described in the 2012 ESIA, and include improvements to the collection system, investment in recycling and recovery, and green composting. The selected investment in technologies and waste management proposals remain the same in the current proposal. The only proposed change is the selection of an alternative location for the propose facility.

The 2012 ESIA describes environmental and social aspects considered when selecting potential alternative location. These issues are described below in Table 1 with the new proposed location included as an alternative.

Table 1: Comparison of Alternative Location Considered

Criteria	Area adjacent to current dumpsite	Area near Kuntuu village	Area near Kazakh border	New 2015 Proposed Location
Location and distance to Bishkek	12 km from city centre on good roads (except for last part on access road).	Around 30 km on a relatively poor road.	Around 150 km.	12 km from city centre on good roads (except for last part on access road).
Land ownership	Within city limits.	Land not owned by the City, currently used as agricultural land.	Land not owned by the City, currently used as agricultural land.	Within city limits (in the process of transferring ownership to the City).
Nearby settlements	Some informal settlement dwellings bordering the current dumpsite are nearby. Legal settlements < 1 km from site.	Several villages and farms within 1 km radius seriously limiting the available landfill area due to sanitary protection zones.	Can be placed in > 3 km distance from nearest settlements.	Some informal settlement dwellings bordering the current dumpsite are nearby. Legal and informal settlements > 500 m from facility.
Potential solution for rehabilitation of current dumpsite	Excavated soil can be easily used for rehabilitation works.	Transportation of excavated soil to current dumpsite would be more expensive due to distance.	Transportation of excavated soil to current dumpsite would be very expensive due to distance.	Excavated soil can be easily used for rehabilitation works
Topography	Flat area with old clay pits.	Limited flat area with edge of mountains (200 meter hills) within 1-1.5 km from the road. A stream crosses the area flowing to the north.	Flat area. An irrigation channel crosses the area with an irrigation pond nearby.	Flat area above excavated clay pits. Well drained.
Geological and hydrogeological conditions	Favourable based on drilling and analysis of probes.	No information available.	No information available.	Favourable based on investigation of adjacent site. Easily drained above existing excavation. Outside of SPZ or water bodies.



Criteria	Area adjacent to current dumpsite	Area near Kuntuu village	Area near Kazakh border	New 2015 Proposed Location
Expected implementation risks	Resistance from neighbouring settlements.	Resistance from four nearby towns (Ismail, Kyzyl-Tuu, Tokbay, Kuntuu). Difficulty of negotiation with Sokuluk rayon and Chui oblast.	Resistance from nearby towns (Kamyshanovka, Nizhnechuysk) and potentially from Kazakhstan. Difficulty of negotiation with Sokuluk rayon and Chui oblast.	Potential reduced resistance from neighbouring settlements as over 500 m to the north east

The environmental consideration given to the alternative locations largely includes the location considerations required under the EU Landfill Directive<sup>3</sup> stating that the location of a landfill must take into consideration requirements relating to:

- The distances from the boundary of the site to residential and recreation areas, waterways, water bodies and other agricultural or urban sites;
- The existence of groundwater, coastal water or nature protection zones in the area;
- The geological and hydrogeological conditions in the area;
- The risk of flooding, subsidence, landslides or avalanches on the site;
- The protection of the nature or cultural patrimony in the area.

A landfill should be considered suitable if the characteristics of the site relating to the issues above, or the corrective measures to be taken, indicate that the landfill does not pose a serious environmental risk.

The 2012 ESIA considers the site adjacent to the existing dumpsite the most favourable compared to more distant locations identified, a conclusion that remains valid for the new proposed location as it is:

- Within close proximity to the existing dumpsite, an environment already containing a landfill;
- Close to the City as the source of waste;
- The land is controlled by the City.

The new location offers several benefits over the previously assessed adjacent location when considering meeting these requirements because:

- The new site has been specifically selected and designed to provide the appropriate SPZs for the facilities proposed and the receptors identified in vicinity including informal settlements, the gas pipeline and water bodies;

<sup>3</sup> Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

- The site is above the area excavated for clay extraction, and therefore presumably underlain by clay and geologically and hydrogeologically suitable;
- The area is above the area subject to water logging and leachate collection;
- The area is relatively flat, sloping to the north, not subject to flooding and is free draining;
- The area is currently scrubland, previously used for grazing;
- The area is in City controlled land, currently designated as a Park, however, this is not an area designated for nature or heritage conservation and re-designation is a formal procedure which is under consideration.

Given that the new location was specifically selected to meet all the requirements for distance from sensitive receptors relevant for a waste management facility of this type; to the extent that the site boundary shape accounts for them the new location is considered to be the most appropriate of those identified as feasible alternatives.

## **5 Applicable Legal and Regulatory Framework**

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### **5.1 National Legislation**

#### **5.1.1 Environmental Impact Assessment**

The following key laws of the Kyrgyz Republic are relevant to the Project:

- Law on ‘On Production and Consumption of Waste’ (No.101, 2011);
- Law ‘On Water Resources’ (No.1422-XII, 1994);
- Law ‘On Subsoil’(No.42 1997);
- Law ‘On Air Protection’ (No. 51 1999);
- (No.53, 1999);
- Law ‘On Environmental Expert Review’ (No.54, 1999);
- Law ‘On Sanitary Epidemiological Wellbeing of the Population’ (No. 32, 2002);
- Law on ‘General Technical Regulation on Ensuring Environmental Safety in the Kyrgyz Republic’ (No. 151, 2009);
- Law on ‘On Town Planning and Architecture of the Kyrgyz Republic’ (No. 1372-XI, 1994);
- Labour Code of the Kyrgyz Republic (No. 106, 2004).

Legal requirements for stakeholder engagement are listed in the SEP.

According to the law ‘On Environmental Expert Review’ and the decree ‘On the Procedure for the Environmental Impact Assessment in the Kyrgyz Republic’ (No.60, 2015) changing the landfill location from the one initially specified in the Feasibility Study requires an Addendum to the FS, repeat public hearings, and subsequent State Ecological Expertise approval.

Selection of the landfill site must be approved by an Act on Site Selection issued by a competent state committee. A consideration should be given to the size of the sanitary protection zone (SPZ) for the site (500 m as per SanPiN 2.2.1. 2.1.1.006-03), development of the SPZ design, as well as requirements regulating neighbouring protection zones (e.g. water protection zones).

This Addendum is not designed to meet the requirements outlined above or to gain any permit under national legislation. This Addendum identifies potential environmental or social impacts that may have changed as a result of changing the location of the proposed facility of the site during the development the Project. **Therefore, additional documentation for the new landfill location may be required, to satisfy national requirements.**

## 5.2 International Legislation

### 5.2.1 EU Waste Directive 2008/98/EC

Directive 2008/98/EC, on waste (the revised Waste Framework Directive), sets out measures to minimise the negative effects of the generation and management of waste on human health and the environment and aims to reduce the use of resources through the development of a waste policy, which should help move the EU closer to a ‘recycling society’. The Directive does this by establishing the following waste hierarchy, which will apply as a priority order in waste prevention and management legislation and policy:

- Prevention;
- Preparing for re-use;
- Recycling;
- Other recovery, for example, energy recovery; and
- Disposal.

A list of wastes is established by Decision 2000/532/EC. This contains the current version of the European Waste Catalogue. This catalogue provides codes allowing consistent identification of types of waste for accurate characterisation, monitoring and recording of waste generation, transfer and ultimate destination.

### 5.2.2 EU Landfill Directive 99/31/EC

This Directive aims to provide for measures, procedures and guidance to prevent or reduce as far as possible the negative effects on the environment from landfill waste. It applies to all landfills, and provides certain exclusion from the scope of the Directive. The key requirements that need to be met to minimise the potential

environmental impacts from the construction and operation of a landfill are summarised below.

### **5.2.2.1 Classes of landfill**

Every landfill must be classified as receiving either hazardous, non-hazardous or inert waste.

### **5.2.2.2 Waste not accepted in landfills**

The following wastes are not accepted in landfills:

- Liquid waste, unless authorised for disposal at inert landfill sites;
- Waste which, in the conditions of the landfill, is explosive, corrosive, oxidising, highly flammable, or flammable (as defined in Annex 3 of Directive 91/689/EEC on hazardous waste);
- Hospital and other clinical waste from medical or veterinary establishments which are defined as infectious under Directive 91/689/EEC;
- Whole used tyres and shredded used tyres (excluding bicycle tyres and those with an outside diameter above 1,400 mm); and
- Any other type of waste that does not fulfil the acceptance criteria determined in accordance with Annex 2 of the Directive.

There are also targets for the reduction of biodegradable waste going to landfill.

### **5.2.2.3 Permit to operate a landfill**

A permit to operate a landfill must be obtained from the relevant authority, the Directive describes the required information that must be provided by an applicant to allow an application to be determined, including where an impact assessment is required under Directive 85/337/EEC (since amended with most recent requirement falling under Directive 2014/52/EU).

### **5.2.2.4 Waste acceptance procedures**

Prior to accepting waste landfill site operators are to ensure that:

- The waste in question can be accepted at that site according to the conditions set out in the permit and that waste fulfils the acceptance criteria set out in Annex 2;
- The following acceptance procedures are observed:
  - Checking of waste documentation;
  - Visual inspection of the waste at the entrance and the point of deposit and, where appropriate verifying conformity with the description provided in the documentation. Provision is made for sampling and analysis; and

- Keeping a register of the quantities and characteristics of the waste deposited, indicating origin, date of delivery, identity of the producer (municipal waste) and, in the case of hazardous waste the precise location on the site.
- Written certification of each delivery is provided; and
- The competent authority is notified in the event of the non-acceptance of waste.

### **5.2.2.5 Control and monitoring procedures in the operational phase**

Control and monitoring procedures in the operational phase must meet at least the following requirements:

- Operator carries out a control and monitoring programme as specified in Annex 3 of the Directive;
- Operator notifies the competent authorities of any significant adverse environmental effects revealed by the control and monitoring procedures and follow any decision about corrective measures to be taken. Such measures will be at the expense of the operator; and
- Quality control of the analytical operations of the control and monitoring procedures.

### **5.2.2.6 Closure and after-care procedures**

The full costs of landfill are to be reflected in the charges for waste acceptance. This must include the costs of closure and aftercare for at least 30 years.

## **5.2.3 EU Industrial Emissions Directive (integrated pollution prevention and control) 2010/75/EU**

The Industrial Emissions Directive (integrated pollution prevention and control) (IE-IPPC) represents a combined approach to managing the environmental impacts of industry, including the waste management industry. It sets out measures designed to prevent and reduce emissions in the air, water and land from such activities in order to reach a high level of protection of the environment. Through a single permitting process, operators must apply best available techniques (BAT) and meet various requirements, whilst taking into account local factors. The operator must apply for a permit from the national competent authority who will assess the application and if proposals are deemed appropriate, issue a permit containing conditions for environmental protection and monitoring the operation of the facility under those conditions.

The European Commission has not produced a best available techniques reference document (BREF) for landfill. Instead the Landfill Directive described above provides certain technical standards for landfill sites.



Guidance provided by the European Commission explains the interface between the IPPC and Landfill Directives.<sup>4,5</sup> With respect to the technical requirements for landfills, the guidance explains that the provisions of the Landfill Directive are considered to take the place of the provisions of Article 9(4) of the IPPC Directive. That part of the IPPC Directive requires that emission limit values and the equivalent parameters and technical measures are based on best available techniques (BAT). Where the Landfill Directive does not provide the relevant technical requirements then the general principles of the IPPC Directive and BAT must be applied.

## 6 Assessment Methodology

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A review of the existing baseline conditions as described in the 2012 ESIA has been undertaken and applied where relevant to the new proposed location. As the new location is only 350 m north of the previously proposed site, many of the local, and all regional and national data regarding prevalent environmental and social conditions are still applicable to the new location.

A review of readily available, publically accessible environmental and social information has also been undertaken to provide an update of conditions that may have changed since the 2012 ESIA. Further studies have also been undertaken as part of the Project, the results of these have been used to inform the baseline condition and assessment; including:

- A Resettlement Framework (RF) developed in March 2014;
- A Livelihood Restoration Plan (LRP) developed in August 2014.

Both plans were developed based on a number of socio-economic surveys conducted in 2013 and 2014.

Where applicable, an updated description of the baseline conditions is provided below, against which an assessment of the potential changes to the conclusions reached in the 2012 ESIA has been made.

## 7 Impact Assessment

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### 7.1 Air Quality, Odour and Climate Change

#### 7.1.1 Air Quality

Although between 1990 and 2010, air emissions in Kyrgyz Republic (KR) decreased sharply (from 82.1 thousand tons to 14.4 thousand tons correspondingly), Table 2 shows there has been a gradual and noticeable increase

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<sup>4</sup> Environmental Permitting Guidance, The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1, Department for Environment, Food and Rural Affairs

<sup>5</sup> Guidance on Interpretation and Implementation of the IPPC Directive  
[http://ec.europa.eu/environment/archives/stationary/ippc/general\\_guidance.htm](http://ec.europa.eu/environment/archives/stationary/ippc/general_guidance.htm)

in air emissions in the country as well as in Bishkek between 2010 and 2014 with a spike in emission levels in 2014. Table 2 demonstrates that Bishkek remains the largest emitter in the country (on average 40% of all national air emissions). Air quality in the City is one of the main environmental factors affecting population health.

Table 2: Air emissions in Bishkek and Kyrgyz Republic<sup>6</sup>

	1990	2010	2012	2013	2014
Kyrgyzstan	82.1 thousand tons	14,4 thousand tons	43,5 thousand tons	45,1 thousand tons	60,5 thousand tons
Bishkek	n/a	n/a	18,7 thousand tons	17,1 thousand tons	26,4 thousand tons
% of emissions in Bishkek to Kyrgyzstan	n/a	n/a	43	37	43.6

The main sources of air pollution in Kyrgyzstan are energy sector enterprises (heating and power production). According to Chui-Bishkek Territorial Department of Environmental Protection (SAEPF) the major sources of air pollution in Bishkek remain motor transport, the city thermal power plant and small heating plants, which account for over 90% of pollutant emissions to the atmosphere.

According to UNFCCC monitoring data, Bishkek suffers from air pollution by particulate matter (primarily ashes) which often exceeds maximum permissible concentrations (MPC), as well as high levels of benzopyrene (up to 47 times the MPC)<sup>7</sup>. As mentioned in the 2012 ESIA, monitoring of benzopyrene pollution in the country has been suspended.

Table 3 provides a recent breakdown of the share of major air pollutants across the country and in Bishkek. It is evident that Bishkek accounts for the majority of air pollutant emissions in the country, sometimes up to 70% (for sulphur dioxide).

Table 3: Air pollutant emissions from stationary sources in 2014 (Units: '000 tons)<sup>8</sup>

	Total	Suspended matter	Gaseous and liquid	Sulfur Dioxide	Nitrogen Oxide	Carbon Dioxide
Kyrgyzstan	42,7	18,3	24,4	16,7	3,3	3,6
Bishkek	26,4	11,8	14,6	11,8	2,2	0,4

<sup>6</sup> National Statistical Committee, Report '2 TP-Air', 2014.

<sup>7</sup> Second Report by the UN Framework Convention on Climate Change – Bishkek, 2009.

<sup>8</sup> National Statistical Committee. Air pollutant emissions from stationary sources, 2014.

	<b>Total</b>	<b>Suspended matter</b>	<b>Gaseous and liquid</b>	<b>Sulfur Dioxide</b>	<b>Nitrogen Oxide</b>	<b>Carbon Dioxide</b>
% of emissions in Bishkek to Kyrgyzstan	62	64.4	60	70.7	66.7	11.1

Table 4 shows that current concentrations of main air pollutants either considerably decreased or remained at about the same level since 2012 ESIA, however current pollution levels still significantly exceed maximum permissible concentrations.

Table 4 : Comparative concentrations of air pollutants in Bishkek City (Units; mg/m<sup>3</sup>)

	<b>2005</b>	<b>2010</b>	<b>2014</b>	<b>Maximum Permissible Concentrations</b>
Nitrogen dioxide	70	60	60	0,2
Nitrogen Oxide	100	120	60	0,4
Sulphur dioxide	4	2	3	0,5
Formaldehyde	26	19	9	0,05
Ammonia	30	20	10	0,2

Monitoring of air pollutants shows (Table 4) that in December 2015, emissions of nitrogen dioxide, nitrogen oxide and formaldehyde were in excess of daily MPC.

The high concentrations of air pollutants reported above are provided for the City; the 2012 ESIA (Table 10) provides some local analysis of air quality in the vicinity of the dumpsite, however no more recent data is available at this location. The elevated levels for the existing dumpsite reported in the 2012 ESIA are reported to be a result of combustion, likely to be a result of fires, and emissions associated with the dumpsite, dust from vehicles and stone working in the area.

The ESIA reports that rehabilitation of the BADS was expected to have a '*small but positive impact on air quality in this area of Bishkek*'. Given that this aspect of the project remains unchanged, a similar impact can be expected.

A '*small positive impact on air quality*' is also reported to result from improvements in waste collection vehicles, and can therefore still be expected to be realised.

Although not quantified, temporary increases in air pollution during construction are reported in the ESIA as a result of the new road system being constructed to the west of the BADS near residential properties. **No significant change in construction impacts from the relocation of the facility are expected.** Mitigation measures are proposed and will still be implemented through the Environmental and Social Management and Monitoring Plan (ESMMP). In the long term, the ESIA reported that construction of new roads was expected to '*drastically reduce*' air emissions associated with poor road conditions. The additional road required to access the new facility will be asphalt surface and designed to accommodate the heavy vehicles; therefore, any such improvement can still be expected.

The proposed new landfill will be greater than 500 m from any receptor considered sensitive to emissions to air from the proposed activities in the facility; therefore, **no change in BADS rehabilitation or operational impacts from the relocation of the facility are expected.**

### 7.1.2 Greenhouse Gases and Climate Change

The latest available assessment of the situation relating to greenhouse gas emissions in Kyrgyz Republic (KR) and Bishkek in particular is provided in the Second Report to the UNFCCC, 2009. This information considers the situation before 2005 and, therefore, does not provide insight to the current state and trends in climate change and emissions in Bishkek. However, the Report confirms that the emissions in Bishkek are the highest in the whole course of inventory, though their relative contribution has slightly decreased in 2005. Chui oblast and Bishkek are the main industrial centers where during the whole inventory time the bigger part of industrial production had been concentrated and considerable part of population of the country resided.<sup>9</sup>

The 2012 ESIA identifies two main sources of greenhouse gas emissions of the Project:

- Combustion emissions from vehicles and plant machinery at the BADS and the new landfill;
- Emissions of carbon dioxide, methane and water from the decomposition of organic waste at BADS and the new landfill.

An estimate of carbon dioxide and methane generation is described in the 2012 ESIA and a predicted reduction of 5,760 t CO<sub>2</sub>-equivalent is reported and shown in Table 5.

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<sup>9</sup> <http://climatechange.kg/natsional-ny-e-soobshheniya/>

Table 5: Estimated Changes in GHG emissions at the Originally Proposed Landfill<sup>10</sup>

	Current level of emissions	After Project development	Change in CO <sub>2</sub> equivalent
CO <sub>2</sub> from waste disposed of, increased through flaring methane	1,555	2,696	1,141
Methane (CH <sub>4</sub> ) emissions from landfill, reduced from flaring methane	624	261	-(363)
CO <sub>2</sub> equivalent	13,104	5,481	-(7,623)
CO <sub>2</sub> from landfill operation machinery	20	216	196
CO <sub>2</sub> from vehicles	3,945	4,471	526
<b>Total CO<sub>2</sub> equivalent</b>	<b>18,624</b>	<b>12,864</b>	<b>-(5,760)</b>

Estimated biogas emissions for the new landfill site are not expected to be materially different from those previously estimated given that closure and restoration of the existing dumpsite will still take place; there is no change in waste composition and the landfill at the new location will be constructed to the same standards as originally proposed.

CO<sub>2</sub> emissions from operational machinery at the new landfill location is also not expected to differ to that predicted in the 2012 ESIA because the new site is expected to be operated in the same manner.

As the access road to the new landfill location is 1.9 km longer, CO<sub>2</sub> emissions from vehicles travelling to and from the new location during construction and operation activities will be marginally higher than those predicted in the 2012 ESIA. However overall, this is **not considered to result in a material increase in GHG emissions posed by the relocation of the new landfill.**

The 2012 ESIA reports that climate change in the Project area is not predicted to significantly affect the operation of the new landfill over the next fifteen years. Disruptions to transportation of waste and damage to road infrastructure could be caused by extreme weather conditions, such as intensive precipitation. However, the impact is not considered to cause significant disruptions to the process, providing the access road is designed and constructed in compliance with required specifications.

<sup>10</sup> Environmental and Social Impact Assessment for Bishkek Solid Waste Management Project, 2012.



### 7.1.3 Odour

The 2012 ESIA predicts a major positive impact on odour as a result of improved collection points, reduced areas of open waste and rehabilitation of the existing dumpsite. This improvement can still be expected from the new location.

Residential receptors were located within the SPZ of the previously proposed site. The new site for the landfill is located more than 500 m from the nearest residential receptors and appropriate containment and management processes will be employed. Therefore, **no significant impacts at additional receptors sensitive to odour are expected as a result of relocation of the facility.**

## 7.2 Water Resources

The Ala-Archa river is the main river situated in the Project area flowing through Alamedin District of Chui Province of Kyrgyzstan. It originates from the Adygene Glacier on the northern slopes of Kyrgyz Ala-Too, flows north and enters the Chu River in Chui Valley. The main source of water for the river is glacial as the precipitation in the area is scarce. The Ala-Archa River is 78 km long with a catchment area of 27 km<sup>2</sup>. The average, minimum and maximum annual flow rates are 4.17 m<sup>3</sup>/s, 0.94 m<sup>3</sup>/s and 20.1 m<sup>3</sup>/s respectively<sup>11</sup>. It has several tributaries: the Ak-Sai, Top Karagai, Teke-Terre, Tuy-Suu Adygine, Jindi-Suu. In addition to the Ala-Archa river, a large artificial reservoir is located 300-600m to the south of the new landfill location. It was built in 1968; its surface area is 5.1 km<sup>2</sup> and has an annual capacity of 39 million m<sup>3</sup>.

The Ala-Archa valley is among the most important glaciated catchments in Kyrgyzstan. Despite the presence of a relatively small glacier-covered area of 36 km<sup>2</sup>, the Ala-Archa river is of critical importance to the Bishkek area, its agriculture, and its population which currently exceeds one million<sup>12</sup>.

As stated in the 2012 ESIA, the Ala-Archa river flows through Bishkek city, to the east of the dumpsite. The distance from the edge of the BADS to Ala-Archa River is 200-250 m. The water protection zone for Ala-Archa River is 100 m.

The previous location for the new landfill was within an excavated area to the north of the BADS. This location was a low point in the area, reported and observed as being prone to water logging. **The new location for the landfill is above the excavated area and can therefore be considered less prone to flooding.**

Regular water quality sampling is undertaken along the Ala-Archa river by Kyrgyzhydromet at two points, north and south of the City. The results of the sampling made in December 2015 are presented in Table 6 below. The results indicate that the level of nitrite nitrogen at sampling point 19 is slightly above

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<sup>11</sup> Technical Specification Draft (of the new location of the Bishkek landfill), October, 2015.

<sup>12</sup> Glacier lake outburst floods caused by glacier shrinkage: case study of Ala-Archa valley, Kyrgyz Ala Too, northern Tian Shan, Kyrgyzstan, 2012.  
<http://adsabs.harvard.edu/abs/2012AGUFMEP53D1062P>

(1.16 times) the maximum permissible concentration (MPC) while the level of ammoniacal nitrogen significantly exceeds the MPC (4.87 times).

Table 6: Water quality sampling of the Ala-Archa river <sup>13</sup>

Pollutant	Unit	Sampling points		MPC for fisheries
		18 (4 km North of the City)	19 (1 km South of the City)	
pH	ml/l	7.8	8.13	6.5-8.5
BOD <sub>5</sub>	mgO <sub>2</sub> /l	2.54	2.7	3
Ammoniacal nitrogen	ml/l	0.01	0.19	0.039
Nitrite Nitrogen	ml/l	0.001	0.028	0.024
Nitrogen	ml/l	1.32	2.1	9.0
Suspended matters	ml/l	0.2	12.0	N/A
<b>Total hardness</b>	mmol/l	1.33	3.7	N/A

Results presented in the 2012 ESIA shows only ammoniacal nitrogen exceeding the MPC (Table 6 of the ESIA).

The 2012 ESIA predicts that the rehabilitation of the BADS will ‘*radically reduce*’ the environmental impact associated with the landfill as a result of reduction in run off and infiltration; any such improvement can still be expected from the Project. The ESIA also identifies a risk of negative impacts of run off and infiltration from the introduction of waste management activities associated with the new facility; however, this risk is managed through appropriate design and installation of pollution prevention measures.

The new landfill is located outside the SPZ for any body of water and the design includes similar pollution prevention measures proposed for the previously assessed site. These measures include an impermeable base layer and lining system, and isolated leachate and surface water collection to EU standards. Therefore, **no change in potential impact to water quality is expected to result from relocation of the proposed landfill.**

### 7.3 Soil and Groundwater

Baseline soil and groundwater conditions for the BADS are presented in the 2012 ESIA. There is no publicly available or comparable information to assess whether any changes in baseline conditions have occurred since the ESIA was prepared. However the proximity of the BADS location to the initially and newly proposed landfill locations suggests that the quality of soil and groundwater are likely to be similar. During the site visit no facilities were identified that could noticeably

<sup>13</sup> [http://meteo.kg/environment\\_water.php](http://meteo.kg/environment_water.php)

affect soil and groundwater conditions in the vicinity of the newly proposed landfill location.

According to the Technical Specifications for the new landfill location, the area of the new landfill is underlain with by paleogenic-neogenic continental ground deposits. The new landfill area is formed by boulder ground with mixture of gravel and sand, and layers of anisomeric sand and sand-loam formations. The quaternary deposits are common in the Project area and their identified reserves 200 m in depth.

Geological conditions of the new location are considered to be favourable for construction of the landfill site. The top soil is dominated by cohesive soils. The area is characterised by loams with filtration rate below  $10^{-7}$  m/s.

A recent ground investigation undertaken for the new landfill location (April 2015) found groundwater inflow at a depth of 150 m with mineralisation below 1g/l and the flow rate at 10 l/s, while the sampling at the depth of 21m showed an even lower level of mineralisation, below 0.2 g/l. The groundwater detected is therefore considered suitable for concrete structures and arranging water supply during the operation of the landfill.

Bishkek and the Project area are located in a highly seismic zone with a seismic rating of 9, which should be considered during the detailed design and construction.

The 2012 ESIA predicts that the rehabilitation of the existing dumpsite will ‘*radically reduce*’ the environmental impact associated with the landfill as a result of reduction in run off and infiltration; any such improvement can still be expected from the project. The design of the new site includes similar pollution prevention measures to those proposed for the previous site including an impermeable base layer and lining system, and isolated leachate and surface water collection to EU standards. Therefore, **no change in potential impact to soil or groundwater quality is expected to result from relocation of the proposed landfill.**

## 7.4 Biodiversity

The national and regional ecological baseline remains the same as that reported in the 2012 ESIA.

There are 10 protected nature reserves (IUCN Category I), 9 national parks (IUCN Category II), 19 natural monuments (IUCN Category III), 49 - habitat management areas, 10 - forest reserves, 14 – zoological reserves in the country<sup>14</sup>. The closest to Bishkek and Project area is the Ala-Archa National Park situated south of the city. The proposed new location for the landfill does not pose any increased risk of impact to protected sites.

According to the 2012 ESIA there are no red-listed species in the area of the Project. However, there was a communal nesting area for migratory birds, probably bee-eaters, reported in the north east of the BADS with burrows formed

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<sup>14</sup> National Environment Protection Agency, 2009.

in the vertical wall of the previous clay extraction pit. The previously proposed development suggested that the site of the rainwater collection pond could directly impact this area, and proposed mitigation during the BADS rehabilitation. Although the specific location of the communal nesting area is not identified, this impact is presumably avoided by the relocation of the proposed facility to the top northern edge of an area of previous clay extraction (north-west of the BADS). The vertical wall of the previous clay extraction pit is not predicted to be affected by construction or operation activities of the landfill. Should any construction and/or operation disturbances of this clay wall occur, then it is likely that the bee-eaters would re-locate and nest in an undisturbed part of the extensive clay pit wall.

The vertical face with nest burrows should be undisturbed and, provided the work near this area is undertaken during the winter period (late October to early March) it will not disturb nesting birds. There is still a risk that the colony will move or expand and start to dig nests in cell walls or the sides of the extension area. Therefore, the monitoring programme is proposed in the ESMMP to check where the colony is nesting each year and a plan to remove new nest burrows in cell sides during the winter months, including checks by an ecologist prior to construction.

A large number of buzzards (*Buteo Buteo*) were observed over and around the dumpsite during the site visit that appear to have replaced colonies of black crows identified in the 2012 ESIA. The buzzards are not red-listed or protected species.

The territory around the existing dumpsite and the new location of the landfill appear to be under significant anthropogenic impact which is described in 2012 ESIA. The new site is located within the general area described in the ESIA. The footprint comprises scrub grassland, previously used for grazing. Site observations revealed an area of reforestation south east of the new site.

The 2012 ESIA indicates that the fauna of the Project site is represented largely by rats, wood mice, shrews, voles, rarely by, hedgehog. Larger mammals include foxes and badgers. The 2012 ESIA reports a '*negative impact on the number of species of fauna that are using the existing waste management system*', however, goes on to say that this is considered '*positive social impact*' as these species are considered vermin. The ESIA also reports that landfill reconstruction and screen planting around the sorting and composting plants and leachate and rainwater lagoons offer an opportunity for the use of indigenous vascular plants making provision of shelter and food sources for a wider range of indigenous fauna for the area and having a *positive impact* on biological resources in the area.

The new site will contain similar facilities and will be located on scrub land of low ecological value within a similar environment; therefore, **no change in potential impact on biodiversity is expected to result from relocation of the proposed landfill.**

## 7.5 Landscape and Visual Impacts

Landscape description of the existing dumpsite and the initially proposed landfill site adjacent to it is described in the 2012 ESIA. It provides an overview of the

neighbouring receptors which include informal settlements, the brick factory, a clay pit, Ala-Archa river and Ala-Archa reservoir. Site observations reveal that there have not been obvious changes in landscape or topography within the Project area since the 2012 ESIA, apart from the expansion of the dumpsite which has extended north and encroached on the initially proposed landfill location. There has been no expansion of boundaries of the informal settlements in the immediate vicinity of the dumpsite. The new site is located within a landscape typical of the area and can be described as steppe vegetation. Photographs taken looking North, East, South and West from the approximate high point of the newly proposed landfill site location, where the reception and waste management facilities will be located, are provided in Figure 1 to Figure . A view of the newly proposed landfill site is depicted in Figure 10.



Figure 1: View to the North from the Newly Proposed Site





Figure 2 View to the East from the Newly Proposed Site



Figure 8: View to the South from the Newly Proposed Site (including the view to the BADS)



Figure 9: View to the West from the Newly Proposed Site





Figure 3: View to the New Landfill Location, North East from Residential Properties Adjacent to the BADS

The new landfill facility will be located on higher ground to the north west of the previously proposed site. The southern end of the facility, including the waste management activities and site buildings will be visible from the residential properties to the west of the existing dumpsite; located approximately in the centre of the photograph provided in Figure 3. The landfill cells will be located on the ground sloping down to the north and are not expected to be visible from the residential properties. The proposed buildings are single storey and landscape screening will be planted around the site boundary and will only be visible in distant views from properties at the edge of this settlement. Views from other properties to the east and south east of the new site, across the river valley, are considered too distant to be impacted significantly.

The 2012 ESIA reports an overall improvement in visual amenity as a result of the rehabilitation of the existing waste dumpsite. This is **not expected to change as a result of the proposed relocation of the new landfill.**

## 7.6 Noise and Vibration

There were no noise or vibration measurements reported in the 2012 ESIA and no data was available during the writing of this Addendum.

The 2012 ESIA reports no impact from the improvements to the waste collection system, and short term negative impacts from the rehabilitation of the existing

dumpsite. The relocation of the new landfill will not result in any changes to these predicted impacts.

The 2012 ESIA reports that the construction of the new landfill will have limited short term construction impacts that are manageable through implementation of mitigation measures outlined in the ESMMP. The operation of the new landfill, including sorting and composition, was predicted to reduce noise at receptors to the west of the landfill whilst increasing noise at receptors to the south east.

The new proposed landfill will be constructed at least 500 m from any receptors sensitive to noise. Also, those receptors are currently exposed to baseline noise conditions which include activities at the existing dumpsite. This relocation of potential operational noise is expected to result in a beneficial impact of **low magnitude** at the receptors considered to be of **medium sensitivity**; therefore, resulting in a **low beneficial effect**.

## 7.7 Cultural Heritage

There is no baseline data available regarding archaeology and there are no historical structures in the vicinity of the project. The ESIA states that according to the data of the Ministry of Culture and Information of the KR, there are unexplored archaeological sites on the territory adjacent to the BADS and that national legislation requires comprehensive archaeological surveys for such areas. No information was available with regard to known sites of archaeological or cultural significance on the territory of the new site for the landfill and a request for further information from the Ministry of Culture would not be processed during the time available for this Addendum.

The original location of the landfill was within an area previously disturbed by extraction activities. The new proposed location of the landfill is undisturbed and may therefore be considered to pose a **higher risk of previously unknown archaeological finds**. However, without further information from the proposed Cultural Heritage Survey, this risk or potential impact cannot be assessed.

The need for additional survey to be undertaken prior to development of the site is described in the 2012 ESIA and remains a requirement for the newly proposed site.

## 7.8 Demographic and Socio-economic Conditions

There has been no significant demographic changes in the Kyrgyz Republic since 2011-2012. The KR is still characterised by a high rate of population growth and young population, mainly due to the continued high birth rate (27.1 per 1,000 population) and relatively low death rate (6.5 per 1,000 population). As of January 2015 the population of the KR comprised 5.9 million people<sup>15</sup> compared to 5.6 million<sup>16</sup> in 2011. The demographics of Bishkek follow a similar trend. A total of 937,400 people<sup>17</sup> live in the capital which constitutes nearly 25% of the

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<sup>15</sup> National Statistics Committee of the Kyrgyz Republic, 2015.

<sup>16</sup> Kyrgyz Republic Demographic and Health Survey Report, 2012.

<sup>17</sup> National Statistics Committee of the Kyrgyz Republic, 2015.

national population. Population growth within the capital is amongst the highest (2.3%) and maintains above the national average of 2.1%<sup>18</sup>, however, the reason is not only natural population increase.

Bishkek and the Chui region continue to attract internal migrants. The 2012 ESIA estimated that an additional 200,000-400,000 people moved to the City unofficially, while a recent report of the Asian Development Bank (ADB) suggests this figure can be as much as a million<sup>19</sup>. This is mainly due to internal migrant population remaining officially registered in their home regions while residing in Bishkek. Socio-economic surveys of the livelihood of waste pickers undertaken in 2013-2014 for the Project also confirm this as well as subsequent difficulties faced by these migrants in accessing social welfare and formal public opportunities. At the same time, Bishkek and the Chui region continue to dominate with over twice the national average levels of external migration, mainly to Russia and Kazakhstan.

Life expectancy among both women and men in Bishkek continues to grow, from 65.7 to 66.5 for men and from 73.7 to 74.5 for women between 2011 -2014<sup>20</sup>. There is an obvious prevalence of female population over the male after the age of 35 due to a comparatively early male mortality.

Fairly marginal changes are observed in employment dynamics and levels of economically active and unemployed population in the City since 2011. Key comparative employment indicators for Bishkek are presented in Table 7. The decrease in economically active population may reflect a national decline potentially related to the effects of the low birth rates in 1990-ies. The level of unemployment in Bishkek is 9.4% which is higher than the national average of 8.3%<sup>21</sup>.

Table 7: Key comparative employment indicators of Bishkek city.<sup>22</sup>

Indicator	2010	1-2Q 2011	1Q 2015
Population size (thousands)	876.3	864.0	937.4
Economically active population (thousands)	412.4 (47%)	412.3 (47.7%)	432.1 (46.09%)
Employed population (thousands)	370.4 (42.3%)	370.4 (42.8%) 89.84 % of economically active population	391.3 (41.7%) 90.55 % of economically active population
Unemployed population (%)	10.2	10.2	9.4

<sup>18</sup> Annual Demographic Report of Kyrgyz Republic 2009-2014.

<sup>19</sup> The Kyrgyz Republic: strategic assessment of economy. Promoting inclusive growth, ADB 2014.

<sup>20</sup> Ibid.

<sup>21</sup> National Statistics Committee of the Kyrgyz Republic, 2015.

<sup>22</sup> Environmental and Social Impact Assessment for Bishkek Waste Management Project, 2012; Bishkek Department of the Ministry of Labour and Social Development.  
<http://btm.kg/index.php/66-02-04-2015-rynok-truda-goroda-bishkek-v-1-kvartale-2015-goda;>

Indicator	2010	1-2Q 2011	1Q 2015
Registered unemployment rate (%)	2.4	2.5	1.7

Overall, the economic situation in the country affects employment opportunities in the formal sector, leading to widespread underemployment, informal unemployment, relatively low rates of labour market participation, particularly among women; and high rates of external migration and heavy reliance on remittances.

Women in particular face difficulties in the labour market – the unemployment rate among women is traditionally higher compared to men. In 2013, the employment rate for women (aged 15–64 years) was at 51.8%, still much lower than that for men, which was 77.3%. The gender pay gap has narrowed between 2007 and 2012 (from 67.3% to 74.3% to men's wages respectively), however, there are significant variations across sectors with the largest gap being in the transport sector<sup>23</sup>. Bishkek and the Chui region continue to have the highest rate of female employment. However, youth unemployment in Bishkek is above the national average which is influenced by the high internal migration to the City. Without family support, migrant youths become particularly vulnerable to falling into poverty. The latest Project socio-economic survey demonstrates that over 30% of the surveyed waste pickers are under the age of 29<sup>24</sup>.

Poverty levels in Bishkek and the Chui region have consistently been among the lowest in the country, whilst salaries are typically substantially higher, as shown in Table 8. However, there has been a rapid increase in the incidence of poverty in Bishkek between 2010 and 2012, from 7.9% to 21.4% respectively<sup>25</sup>. One of the reasons could be attributed to inflation.

Table 8: Average monthly salary in Kyrgyz Republic (in Som)

Region / years	2006	2007	2008	2009	2010	2011	2012	2013	2014
Kyrgyz Republic	3,270	3,866	5,378	6,161	7,189	9,304	10,726	11,341	12,285
Batken oblast	2,266	2,658	3,703	4,012	4,651	6,531	8,206	8,593	8,903
Jalal-Abat oblast	2,511	2,914	4,467	5,166	5,986	8,149	9,818	9,993	10,877
Yssyk-Kul oblast	4,383	5,048	6,762	8,538	9,676	13,667	14,119	15,507	17,192
Naryn oblast	2,571	2,853	4,476	4,741	5,770	8,445	9,991	10,378	11,013
Osh oblast	1,569	2,170	2,981	3,279	3,719	6,419	7,639	7,747	8,141
Talas oblast	1,944	2,361	3,590	4,412	5,155	7,036	8,453	8,829	9,192
Chui oblast	2,858	3,577	4,499	4,862	5,736	7,207	8,657	9,313	10,303
Bishkek city	4,376	5,072	6,958	8,041	9,351	11,336	12,796	13,875	14,865
Osh city	2,733	3,298	4,599	5,153	6,104	7,394	9,864	9,417	10,578

<sup>23</sup> The Kyrgyz Republic: strategic assessment of economy. Promoting inclusive growth, ADB 2014.

<sup>24</sup> Bishkek Solid Waste Project. Livelihood Restoration Plan, 2014.

<sup>25</sup> The Kyrgyz Republic: strategic assessment of economy. Promoting inclusive growth, ADB 2014.

Overall, demographic and socio-economic conditions in the City of Bishkek and Chui region did not appear to have changed significantly since the 2012 ESIA, apart from the noticeable increase in levels of poverty which is likely to put vulnerable population (youth, women, pensioners, single-head households etc.) at a higher risk of a worsening standard of living. **No change in potential impact on socio-economic situation in Bishkek is expected to result from the relocation of the proposed landfill.**

## 7.9 Land Ownership, Use and Physical Relocation

The land on which BADS is situated belongs to the city of Bishkek. The land for the new landfill location was allocated on 17th September 2015 by the State Act for Land Allocation for the Landfill Construction. The entire Project area is located within land currently designated as 'Park'. The status of this designation is not clear at present, however, the requirement for an application to re-categorise the area for waste management within the City Masterplan has been identified and prepared and is currently under consideration with the appropriate authority (Department of Architecture and City Planning). As of September 2015, the land plot for the new landfill location is under registration for municipal ownership of the City.

The 2012 ESIA presented the current arrangements and use of the Project land in relation to BADS borders and SPZ; a summary is provided in Table 9. It established that the Project could induce potential resettlement impacts and the need to prepare a Resettlement Action Plan.

Table 9: Social Receptors in the Project area

Site	Location relating to the initial landfill location	Distance to the border of the initial landfill location	Remarks
Settlement 'Kalys-Ordo- 2' (self-named)	Western part	Nearest residences 5 metres (adjacent to access road)	Informal settlement containing about 300- 500 people The sanitary protection zone is not maintained. It should be not less than 500 metres from the settlements.
Settlement 'Altyn- Kazyk' (self-named)	South part	280 metres	Containing up to 300-400 people
Municipal cemetery	South-West part	200 metres	The sanitary protection zone is not maintained. It should be not less than 300 metres from the settlements.
Agricultural lands	Eastern part	650 metres	Belong to the Alamudun District of Chui oblast. Cultivation of different crop types varies annually.

Site	Location relating to the initial landfill location	Distance to the border of the initial landfill location	Remarks
Ala-Archa River	Eastern part	450 metre	Water protection zone constitutes 100 metres
Municipal entity 'Bishkek Asphalt Service'	South-West part	650 metres	Acting municipal entity
Ala-Archa reservoir	North-West part	550 metres	Water protection zone constitutes 200 metres
Clay pit	Northern part	Less than 100 metres	Operating (at the time of 2012 ESIA)
Brick factory	South-East part	Less than 600 metres	Acting private entity

Between December 2013 and March 2014, the City Municipal Housing and Utilities Department, with the support of the independent consultants, undertook a socio-economic survey of potentially affected people and prepared a Resettlement Framework (RF) in line with the EBRD resettlement requirements of PR 5. The RF was prepared on the basis that the new landfill would be located on land adjacent to the BADS, therefore, requiring careful consideration over the new landfill SPZ in relation to the informal settlements. The Framework described the socio-economic profile of the potentially affected households and outlined scenarios for physical displacement that would depend on the Project and access road design arrangements, as well as decisions over the land category and SPZs for the new landfill. Scenarios of physical displacement are presented in Table 10 below.

Table 10: Scenarios of Project Physical Displacement

No.	Scenarios	Physical displacement Impact	Remarks
Scenario 0	Physical displacement completely avoided	None.	The City of Bishkek may decide to construct a new access road needed for the Project, along the inner edge of the existing dumpsite, instead of upgrading the existing access road which runs along the outer edge of the dumpsite. In this case, there will be no need to resettle households in the vicinity of the road, at least until after the decision of the Chief Medical Officer of the KR in relation to the applicable SPZ. After rehabilitation of the old dumpsite is completed, only if safety zones are set at 100 m or 500 m from the existing dumpsite, will these households need to be resettled (see scenarios 2 and 3).
Scenario 1	Permanent physical displacement of households affected	4 households to be resettled,	Two of the houses are inhabited by households who own them, while two are inhabited by households renting them.

No.	Scenarios	Physical displacement Impact	Remarks
	during construction, residing immediately next to the access road (50 m from the dumpsite)	20 unfinished houses to be compensated	
Scenario 2	Permanent physical displacement of households that are located within a 100 m sanitary protection zone from the dumpsite	20 households to be resettled, 21 completed houses (uninhabited) and 83 unfinished houses to be compensated.	15 of the houses are inhabited by households who own them, while 5 are inhabited by households renting them.
Scenario 3	Permanent physical displacement of the whole Altyn Kazyk settlement, located within a 500 m sanitary protection zone of the dumpsite.	145 households to be resettled, 107 completed houses (uninhabited) and 401 unfinished houses to be compensated.	131 of the houses are inhabited by households who own them, while at least 14 are inhabited by households renting them.

Note: based on a socio-economic survey conducted in March 2013.

The proposed new location for the landfill is situated around 350 m north of the previously proposed site, on higher ground above an area of clay excavation which is located between the existing dumpsite and the new site. The area for the new landfill was selected taking into consideration the SPZs of formal and informal settlements, gas pipeline, the Ala-Archa river, Ala-Archa water reservoir and the international airport of Bishkek. The new location for the landfill satisfies sanitary protection requirements, including for the informal settlement of Kalys-Ordo-2 and Altyn Kazyk and a dormitory of the brick factory located 500 m south-east of the new site. However, finalisation of land ownership, re-categorisation of the land and a formal approval of the SPZ compliance for the new site are still on-going.

The Detailed Project Design will be developed by a Contractor selected based on the competitive tender which is currently under preparation. Providing the Detailed Project Design and design of the access road in particular adopts Scenario 0, as suggested in the RF, physical displacement impact from the Project would be completely avoided. **This would reduce the Project impact related to physical displacement from permanent significant adverse to none.** Should Scenario 0 not be possible, a Resettlement Action Plan should be prepared for project-affected persons (PAPs) as per the Resettlement Framework and applicable Scenario.



## 7.10 Livelihood Restoration

The 2012 ESIA estimated that approximately 700-1000 people could be involved in informal waste picking at BADS and suggested that the magnitude of the impact on them had to be assessed and a RAP prepared.

In addition to the RF prepared in 2014, the City developed a standalone Livelihood Restoration Plan (LRP) in line with the EBRD PR5. The LRP and the findings of its socio-economic survey undertaken between 2013 and 2014 revealed that the number of PAPs engaged in waste picking whose livelihood could be affected by the rehabilitation of BADS could be over 250. This is a considerably lower number than was initially estimated for the 2012 ESIA (700-1000 people), however the impact on livelihood from the closure of the existing dumpsite is still considered to be:

- (i) significant due to the estimated number of affected people (a new socio-economic survey is being undertaken from December 2015 and should confirm the exact number of affected waste pickers);
- (ii) potentially adverse – the number of PAPs whose income and livelihood is regularly or seasonally dependant on waste picking is likely to be over 50% (to be confirmed by the new survey);
- (iii) long-term or permanent;
- (iv) potentially irreversible for some PAPs – according to the ESIA and the initial survey the new landfill, sorting and other facilities will not be able to offer employment opportunities to all PAPs. Also, for some PAPs, the salaries offered by the public sector will be considerably lower than the current income from informal waste picking.

The new socio-economic survey (due to finish in May 2016) should confirm the number of PAPs, establish the cut-off date for compensation and update provisions for compensation and assistance to the affected people, and the ways of engaging with them.

Entitlements currently envisaged in the LRP include:

- Training and access to employment / livelihood generation programmes;
- Assistance with obtaining personal documents;
- Assistance with access to social welfare, health care and education;
- Other forms of assistance.

During the assessment of the new site for the landfill the dormitory of the neighbouring brick factory was identified as another structure in the proximity to the new location. Although the dormitory is located outside the landfill SPZ, it is recommended that:

- (i) the residents of the dormitory are informed about the Project and the newly proposed location as soon as possible;
- (ii) their socio-economic profile and vulnerability is understood and their feedback on any potential Project impact (during construction, operation or closure of the existing BADS) to their livelihoods or access is sought as part of the socio-economic survey activities of the Livelihood Restoration Plan for waste pickers;

- (iii) the residents of the dormitory benefit from access to livelihood restoration programme, if deemed eligible.

Overall, the relocation of the landfill site is not expected to trigger significant changes in livelihood impacts to the local community, however the assessment of the impact presented in the LRP requires confirmation by the findings of the new socio-economic survey. **At present, the Project impact on livelihoods is expected to remain significant, potentially adverse and irreversible.**

## 7.11 Waste Tariff Affordability

The 2012 Feasibility Study suggested the proposed tariff structure is deemed affordable. From January 2016 waste collection and disposal tariffs increased to a level that permits full cost recovery by Tazalyk (based on operational costs of new collection and disposal system) from residents not entitled to subsidies, and from businesses. The tariff has increased as follows:

- For residents (monthly) from 15 Som to 22.5 Som;
- For low-income groups (monthly) from 4 Som to 6 Som;
- For businesses (per 1m<sup>3</sup>) from 190 Som to 225 Som.

Although there is a seemingly substantial increase in the tariff rate (around 35%), these increases are considered affordable for the majority of residents and for business when compared to the waste tariffs in other cities of KR, such as 55 Som/month in Osh, and taken in relation to average salary of 14,865 Som/month which are the highest in the country.

It has yet to be established if there is a difference in capital and operating costs for the new landfill that would be sufficient to materially alter the tariffs and affordability reported for the originally proposed location. However, **it is estimated that this difference will be marginal considering the access road will be extended by only 1.9 km.**

The foreseeable impact from tariff increase is, therefore, considered to be permanent, irreversible but minor, providing the subsidies to disadvantaged groups are maintained. It is, nevertheless, recommended that a targeted public campaign is rolled out to inform and explain to the public any changes and further plans with regard to the tariffs, as well as to ensure clear channels for public feedback. This action is included in the updated Stakeholder Engagement Plan.

## 7.12 Public Health and Safety

### 7.12.1 General Conditions

General health situation in the Kyrgyz Republic, Bishkek and Chui region was briefly considered in the 2012 ESIA. There have been no changes in reported positive national health trends, such as life expectancy which continues to grow

both among men and women, and falling mortality, particularly among children between 0-4 years and adults of 65-69 years<sup>26</sup>.

The majority of deaths in the KR are a result of cardiovascular diseases (50% of all causes), injuries and malignant neoplasms (cancers); respiratory, digestive, infectious, and parasitic diseases are also prevalent. There is a rapid increase in multidrug-resistant tuberculosis and intravenous drug use<sup>27</sup>.

The 2012 ESIA lists malignant neoplasms and asthma as having had the most prevalence in disease incidence in Bishkek and the Chui region in 2009. It also highlights concerns over an increased incidence of tuberculosis, brucellosis and typhoid. Data from 2015 suggests significantly lower levels of brucellosis (30% lower than in 2014) but continuing increase in tuberculosis (12% higher than 2014) and an insurgence of measles<sup>28</sup>.

Although in the context of Bishkek or the Chui region it is not feasible to establish a correlation between disease prevalence and waste management system, favourable conditions exist at the current BADS for disease carriers such as bacteria, flies, rodents and stray animals. Together with the combustion of waste, this is likely to be affecting the urban environment and population health potentially influencing the prevalence of vector borne infections and respiratory diseases.

### 7.12.2 Project-specific situation

Baseline conditions of public health and sanitary situation within the Project area and current waste management issues in Bishkek are presented in the 2012 ESIA and are considered to remain valid for the current Project proposal and the new landfill location. The assessment highlights high risks to the health of local residents due to the proximity and unrestricted access to the dumpsite, poor or absent sanitary conditions, high risks of infectious diseases and accidents because of the hazardous environment of the dumpsite and associated environmental problems (pollution and emissions, ground and water contamination, spread of disease vectors etc.).

The 2012 ESIA also stated that local residents reported chest complaints and sickness which they attributed to odour and combustion emissions from waste on the dumpsite and disease vectors. However, further socio-economic surveys undertaken to assess resettlement and livelihood impacts revealed an overall low level of reporting health problems among the informal residents (only 7 out of 365 PAPs in 2013 and 2 out of 237 PAPs in 2014 reported health issues).

Impacts to public health and safety associated with the construction activities of the new landfill and rehabilitation of the existing dumpsite are described in the 2012 ESIA. They may include air emissions, noise and dust pollution, health and safety and environmental accidents. These impacts may occur within the sites as well as along the traffic routes used by construction vehicles. Community safety

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<sup>26</sup> National Statistics Committee of the Kyrgyz Republic, 2015.

<sup>27</sup> Kyrgyz Republic Demographic and Health Survey Report, 2012.

<sup>28</sup> Socio-economic Situation of Bishkek, 2015.

may also be at risk from unrestricted and unauthorised access to the construction site or dumpsite rehabilitation area.

Health and safety impacts to the local population and residents of the brick factory dormitory from construction activities at the new landfill location are estimated to be short-term and insignificant since the new site is located further north from informal settlements and at least 500 m away from the nearest structure. However, potential nuisance, safety and access impacts to the residents of the brick factory dormitory will have to be confirmed by the new socio-economic survey and should be avoided through the appropriate design of Project access roads and organisation of construction activities.

Health and safety impacts from BADS rehabilitation relate to access by waste pickers to the dumpsite and nuisance to informal settlements located within the BADS SPZ. The impacts are considered to be short-term, local, reversible but moderate as some of the households are located as close as 5-10 m to the site and there is a risk of accidents to waste pickers who maybe still be attempting to access dumpsite areas undergoing rehabilitation (e.g. vehicle movement, combustion of disturbed waste etc.). Outside the construction and BADS rehabilitation it is expected that construction traffic will primarily use existing public roads, apart from the extension of the access road to the new landfill location.

Fencing of Project construction and BADS rehabilitation areas will be required to prevent unauthorized access, accidents and ensure public safety at the Project construction stage. These and other measures mitigating nuisance, pollution to the public and preventing accidents should be outlined in a Project construction management plan, traffic management plan and general housekeeping procedures. **No changes to assessed impacts or proposed mitigation measures with regard to the rehabilitation of BADS are, therefore, predicted.**

Apart from BADS rehabilitation, construction impacts on public health and safety are considered to be short-term, local and reversible and assumed to be minor, providing appropriate design of the Project access road and the application of appropriate abatement and housekeeping measures.

Health, safety and access impacts to the public during Project operation stage relate to the BADS post-rehabilitation issues, operation of the new landfill and the combined material recovery and mechanical-biological treatment (MBT) plant, as well as upgrade and extension of the waste collection system in Bishkek.

These include:

- Impacts from direct or indirect human contact with waste at the landfill and MBT plant;
- Environmental, health and safety accidents during landfill/MBT operation;
- Traffic-related issues such as dust, noise and air pollution and traffic accidents.

These impacts are described in the 2012 ESIA. Since the new landfill location does not affect the Project technical specifications, and changes in the internal site

organisation are **not considered to pose any additional risks to the public, the original ESIA conclusions are considered to be valid.**

The 2012 ESIA also identified the release of fungal spores from the MBT plant as a potential health risk for the population residing within 250 m distance from the MBT plant. Since the new location of the landfill ensures a distance of 500 m from the nearest (informal) settlements, **this impact is not expected for the new location.**

Impacts from direct or indirect human contact with waste should be mitigated during operation of the landfill and waste transportation by the Company through implementation of waste management procedures and general housekeeping. Fencing and security provisions for the new landfill are required.

Traffic-related issues such as dust, noise and air pollution and traffic accidents should be mitigated through the development and implementation of health and safety procedures, traffic management and emergency response plans as well as compliance with the national health and safety regulations for waste management.

Considering mitigation measures, the impacts to public health from the operation stage of the Project are assessed as moderate to minor, and are **not expected to change as a result of the relocation of the new landfill.**

Impact from the upgrade and extension of the waste collection system in the City were assessed in the 2012 ESIA to have a neutral or positive impact due to improved waste containers, upgraded fleet and overall expanded coverage area. **No change is expected as a result of the relocation of the new landfill.**

## 7.13 Labour and Working Conditions

Assessment of health and safety impacts from construction and operation of the Project is presented in the 2012 ESIA and **is not expected to change as a result of relocation of the proposed landfill.**

Negative impacts that may occur during construction activities that are associated with health and safety in the workplace will be short-term and reversible.

Providing that the Contractor ensures compliance with the national health and safety regulations, and appropriate worker health and safety management plans and emergency procedures will be developed in accordance with best practice these impacts will be minor.

During landfill operation, negative impacts that may occur due to exposure of workers at the landfill and drivers of waste vehicles to hazardous materials include noise, accidents (also traffic accidents), injuries, and exposure to pathogens and vectors which, if left unchecked, could result in a moderate impact to workers health and safety.

As mentioned above, the 2012 ESIA also identified the release of fungal spores from the MBT plant as a potential health risk. Although not considered to be an impact on the public, this may still affect workers employed at the new landfill and MBT.

Working within the waste collection and management industry can encompass a number of different roles. Typically accidents and injuries that are suffered by those who work within the industry are transport related. These can be associated with street refuse collection vehicles where workers can be struck by a vehicle or occur on a landfill site where earth moving vehicles and people on the ground interact.

Manual handling injuries may also occur with workers suffering cuts from sharp objects such as broken glass as well as suffering musculoskeletal problems which can be caused by incorrect lifting and manual handling job over a long period of time. Respiratory problems and skin conditions such as dermatitis may also result in health complaints. Slips and trips also form a large proportion of potential injuries resulting from working in the waste collection and management industry.

Tazalyk's labour and H&S management system described in the 2012 ESIA covers most of the key labour condition aspects apart from non-employee/supply chain provisions, plans for management of redundancies for the closure of the dumpsite and security arrangements.

According to the 2012 ESIA it is envisaged that the new landfill will provide around 250 jobs. The LRP suggests that affected waste pickers will be given a priority and assisted in securing employment at the landfill. Additional short-term job opportunities will be generated during landfill construction and BADS rehabilitation stages, which can be assessed as beneficial impact.

The 2012 ESIA does not suggest if there are impacts on workforce after rehabilitation of the dumpsite, such as retrenchment. There are 18 workers currently employed at the BADS. It is envisaged that the staff will be offered jobs at the new landfill site.

The following are the key elements of working conditions requiring elaboration by the PIU, Tazalyk, Landfill Operator and Contractor:

- Human Resource policies and procedures;
- Specific requirements to manage risks from and monitor labour, working conditions and health and safety of non-employee workers (contractor and supply chain workers);
- Security personnel requirements compliant with the EBRD PR 2 and best practice;
- Additional provisions for labour grievance management.

Also required by the Contractor:

- If the Contractor plans to provide accommodation for workers, specific requirements for worker accommodation that meet legal and EBRD requirements (i.e. Workers' Accommodation: processes and standards – a guidance note by IFC and the EBRD)

## 7.14 Impacts on Utilities

The 2012 ESIA identifies that the old waste deposits and the main leachate pond of BADS are located within the SPZ of a gas pipeline. It suggests that the proposed BADS rehabilitation solutions include removal of waste from the SPZ of the gas pipeline, thus, mitigating the impact. The originally proposed landfill location did not infringe on the gas pipeline SPZ.

No direct impacts to the existing or proposed utility networks are envisaged within the Project area. The Project does not infringe on the SPZ of the gas pipeline. Potential impacts on utility networks relate only to their accidental damage during construction works, BADS rehabilitation works and transportation. The contractor should obtain accurate utility maps and set procedures in a construction management plan to address the safety of neighbouring utilities as well as safety of construction personnel during the construction works.

Due to the temporary nature of impacts, as well as the distance of known utilities from the site, existing protection zones and safety mitigation measures to be developed for undertaking construction works the impacts on utilities from the Project are considered to be negligible. **The impact is not expected to change as a result of the new location of the landfill.**

## 7.15 Suppliers of Goods and Services

Construction-related purchase of goods and services from various contractors and suppliers will generate benefits for the local economy and beyond. It is assumed that subcontractors will provide transportation of materials to the construction site, deliver drinking water, provide sanitary and security services. The impact for the local community can be assessed as minor beneficial, as it will be engaged in the provision of only limited services / selling of goods. There is no information at this stage whether any specific local enterprises would benefit from the Project construction activities.

Few opportunities for involvement of local contractors and suppliers will remain at the Project once BADS rehabilitation is complete and the new site is operational. Nevertheless, any opportunities generated are expected to generate a **minor beneficial impact considering its small scale and high sensitivity of local receptors.** An assessment of this impact was not presented in the 2012 ESIA.

## 8 Environmental and Social Management and Monitoring Plan

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The ESMMP proposed in the 2012 ESIA was reviewed in relation to the proposed relocation of the new landfill. The mitigation and management measures proposed in the ESMMP are considered comprehensive and are not specific to the location of the landfill. The relocation of the landfill has not identified any specific



additional measures to be included in the ESMMP therefore it is not reproduced. All proposed measures must remain in place and be effectively implemented to ensure that impacts are avoided, reduced and minimised where possible.

With regard to social management and monitoring, several actions in the ESMMP related to social management were found not relevant in light of the Project developments and are recommended for exclusion. These include:

- Action 1.4 of the Management Section of the ESMMP, relating to the development of a Resettlement Action Plan;
- Action 1.2 of the Monitoring Section of the ESMMP, relating PAPs affected by resettlement.

Up-to-date recommendations are outlined in the updated Environmental and Social Action Plan (ESAP), updated Stakeholder Engagement Plan (SEP) and Livelihood Restoration Plan (LRP). As mentioned above, the LRP will be updated upon the completion of the socio-economic survey.