European Bank for Reconstruction and Development

SUPPLEMENTARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Kapshagai Town-Kurty Village 67 km Road Project, Kazakhstan

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1 NON-TECHNICAL SUMMARY

1.1 PURPOSE OF THE NON-TECHNICAL SUMMARY

This Non-Technical Summary (NTS) provides an easily understandable summary of the information that is provided in the Supplementary Environment and Social Impact Assessment (ESIA) Report. The purpose of the NTS is to help the public and non-experts to understand the background, Project description, the Supplementary ESIA process, the beneficial and adverse environmental and social impacts and effects, and the mitigation measures associated with the Project.

1.2 PURPOSE OF THIS SUPPLEMENTARY ESIA REPORT

The Supplementary ESIA Report has been prepared for the European Bank for Reconstruction and Development (EBRD) who are considering extending finance for the reconstruction of the 67 kilometre (km) "Kapshagai-Kurty" of the "Centre - South" corridor linking the cities of Astana to Almaty in Kazakhstan (herein referred to as the Project). The finance is sought by the Committee for Roads within the Kazakhstan Ministry of Investment and Development.

The Supplementary ESIA Report provides provide additional information to the local Environmental Impact Assessment (EIA) completed by the local EIA developer, to further consider the potential for significant effects and mitigation measures, where required.

1.3 EBRD PROJECT REQUIREMENTS

EBRD requirements are as follows:

- The Project will be structured to meet relevant EU substantive environmental standards, including (but not limited to) Directive 2014/52/EU of the European Parliament and of the Council amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment (herein referred to as the EIA Directive);
- When host country regulations differ from EU substantive environmental standards, the Project will be expected to meet whichever is the more stringent;
- It will be in compliance with the EBRD Environmental and Social Policy (ESP) and Performance Requirements (PRs) 2014, which are as follows:
    - PR1: Environmental and social appraisal and management;
    - PR2: Labour and working conditions;
    - PR3: Pollution prevention and abatement;
    - PR4: Community health, safety and security;
    - PR5: Land acquisition, involuntary resettlement and economic displacement;
    - PR6: Biodiversity conservation and sustainable management of living natural resources;
    - PR8: Cultural heritage;
    - PR9: Financial intermediaries; and
    - PR10: Information disclosure and stakeholder engagement.
- The Public consultation and stakeholder engagement will be tailored for the Project, be meaningful, and will allow for the disclosure of information and public participation in decision-making (in accordance with PR10);
- The Project shall include all reasonable measures to avoid, minimise or mitigate any adverse changes in environmental and social conditions, and impacts on public health and safety, especially with respect to any disproportionate impacts on any group of people as a result of their gender, age, ethnicity, disability, socio-economic status and/or other personal characteristics; and

- It will take into account relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation.

1.4 DESCRIPTION OF THE PROJECT

The Project is located approximately 60 km north of Almaty, and is orientated in an east/ west direction. The Project mainly follows the alignment of the P-18, an existing two-lane road. The Project will connect the A3 from outskirts of Kapshagai Town and run 67 km to the west to the M-36 on the outskirts of Kurty Village. The location of the Project is shown in Appendix A, Appendix B and Appendix D.

The Project includes:

- The reconstruction and widening of the existing road from two lanes (Kazakh Technical Category 2 Road) to four lanes;
- The reconstruction of a bridge and upgrading of intersections;
- The construction of a new junction outside Kurty Village; and
- Associated infrastructure including: off ramps, cattle and agricultural machinery underpasses, drainage pipes, rest areas, bus stops, zebra crossings, lighting and two maintenance depots.

The Project will be reconstructed to comply with the Kazakh Category 1b highway requirements. The existing road's asphalt pavement is now past its effective working life and its condition is rapidly deteriorating due to a combination of traffic loading and the age of the road surface. Reconstruction of the road is now urgently required to improve the ride quality of the road, minimise road user costs and provide a road surface that can be maintained in a cost-effective manner. In addition, widening of the road will improve road safety as currently the road has a single lane in each direction, so drivers must cross into the oncoming traffic lane to overtake vehicles or avoid potholes.

An overview drawing of the Project in included in Appendix A.

It is expected that the Project will reduce travelling distances substantially, as the drivers currently use the M36 via Karaoi (125 km) when travelling from the north to Kapshagai Town rather than travelling via Kurty Village on the road to Kapshagai Town. Once the route is reconstructed it is anticipated that they will use this shorter route instead (67 km).

Construction is expected to commence in Q1 / Q2 of 2019 and be completed within 37 - 43 months. The Project will become operational in 2021 / 22.

1.5 STAKEHOLDER ENGAGEMENT

Stakeholder engagement and public hearings are a requirement under the Republic of Kazakhstan (RoK) national legislation. There have been two public meetings relating to this Project as summarised below:

- 3rd December 2015 in the Town Hall of Kurty Village Rural District, Akshi Village. The invitation for the event and additional information on what would be shared at the meeting was publicised in local newspaper Ile tany in Russian and Kazakh on the 13th November 2015. This notice was compliant with the public consultation requirements that require a period of 20 days between the public note and the meeting taking place. The public meetings were attended by residents (22 people in total). This included farmers, the Head of Kurty Village rural district and the Chief Engineer of the Project.
- 15th June 2016 in Kapchagai Town Hall. The meeting was organised by KazAutoZhol and Kapshagai Town Hall. The invitation for the event and additional information on what would be shared at the meeting was publicised in local newspaper Нурлы ОЛКЕ No.25 (382) issued on the 8th June 2016. This short notice was non-compliant with the public consultation requirements that require a period of 20 days between the public note and the meetings. In addition to the newspaper publication, posters with information about public hearings were placed in the post boxes of all residents in the area as well as all the businesses located in Karlygash Village. This meeting was attended by residents', the Engineer of the Project, the Head of Public Transport and Roads Department of Kapshagai Town, the Head of Architecture and Town Construction Department of Kapshagai Town and a KazAutoZhol representative (16 people in total).

In addition to the public meetings, there was a meeting regarding the approval of the Project decisions within the borders of Kapshagai Town as a part of the wider "Centre - South" corridor linking Astana and Almaty. The

meeting was held on 2nd June 2016 at Kapshagai Town Hall. The meeting was attended by representatives of KazAutoZhol, Departments of Kapshagai Town; Land Relations Department; the Engineering Centre Astana, and the Scientific-Productional Centre of Land Assets.

During two site visits (April 2018 and July 2018) a representative number of farms and business along the route alignment were visited, those visited included (east to west): Closed Plastic Plant near NS1.8, Operational Asphalt Plant near NS1.8, Closed Landfill Site, Farm S4.06, Farm 11, Farm 9, Farm 33, Farm 21, Farm 22, Farm 5 and Farm 4. The location of the farms and business is depicted in Appendix B. The primary use of the farms is livestock farming (horses, cattle, goats, sheep etc.). The farmers that were met during both site visits, advised that they welcomed the road improvement mainly due to the reduction of travel time to Almaty.

1.6 CONSIDERATION OF ALTERNATIVES

Three alternative design layouts, within the borders of Kapshagai Town, were considered and presented at the meeting on the 2nd June 2016. Following the meeting, the final design, depicted in Appendix A, was approved.

No Project wide alternatives were considered as there are were substantial obstacles within the vicinity of the site, including farms and undulating land. The use of the existing alignment and adjacent highways land has enables the Project to reduce land take requirements substantially.

1.7 SUMMARY OF ENVIRONMENTAL EFFECTS

1.7.1 AIR QUALITY

Baseline air quality in the vicinity of the Project is considered unlikely to exceed the European Union (EU), World Health Organisation (WHO) and Kazakhstan objectives for nitrogen dioxide (NO_2), the pollutant of most concern, given the rural setting of the majority of the Project.

It considered likely that baseline concentrations of particulate matter measuring less than 10 micrometers in diameter (PM_{10}) and dust will be naturally elevated near the Project due to the arid conditions. However, it considered unlikely that EU, WHO and Kazakhstan objectives will be exceeded.

1.7.1.1 CONSTRUCTION

The construction activities associated with the Project have the potential to generate a large quantity of dust. There are a few residential properties within 50 m of the Project, who have the potential to be affected by increased dust deposition and thus have the potential to experience human health effects during construction. However, with the implementation of good construction site management practices and the implementation of appropriate mitigation measures, adopted through a Dust Management Plan and Construction Environmental Management Plan (CEMP) it considered that the construction air quality effects will not be significant.

1.7.1.2 OPERATION

The traffic related air quality emissions due to the increase in vehicles on the route after it has opened, are not expected to have a significant effect on people living in residential properties within 50 m of the Project. No additional mitigation measures for the operational phase are proposed.

1.7.2 BIODIVERSITY AND LIVING NATURAL RESOURCES

The Project is situated within the Palearctic biogeographic zone; and is most associated with the steppe landscape zone. The Project is situated on the edge of a mountainous region, and has been influenced by human activity, most notably the impacts of agriculture.

The area around the Project is dominated by an open agricultural landscape in which linear features and scrub represent the only notable variation from agricultural land. It is considered likely that species richness across the site is limited and typical of similarly disturbed agricultural areas across the region.

The nearest known nature conservation sites to the Project are the: Altun Emel National Park (approximately 135 km to the east), and Ili River Delta and South Lake Balkhash Ramsar site (approximately 200 km north-east). The Project is not expected to have significant effects on these protected areas, due to the substantial distance to these locations and the nature of the Project.

1.7.2.1 CONSTRUCTION

The construction activities are likely to result in minimal habitat loss to an already, heavily modified site, with minimal natural / semi-natural vegetation present in the form of small pockets of trees and shrubs.

Semi-natural habitats should be avoided through micro-siting. Should this not be possible then a pre-construction check of all mature trees and buildings should be undertaken by a suitably qualified local biodiversity specialist to identify the presence of protected fauna, which will need to be fully considered in terms of a detailed mitigation strategy. This will ensure compliance with both the EU Birds and Habitats Directive (a requirement under EBRD PR6).

Vegetation clearance works will be timed to take place outside of the breeding bird season, to prevent direct impacts to nesting birds.

No significant effects associated with vegetation are expected, although additional survey and assessment will be required to corroborate these findings.

The construction activities are not anticipated to have significant effects on animal welfare, due to the minor risk of injury or death to animals (livestock / wildlife) that access the construction site. This will be reduced by securing and making safe, all open excavations, hazardous materials, and plant machinery should be secured when not in use. The proposed boundary fence will provide further assistance in preventing site access by livestock / wildlife.

1.7.2.2 OPERATION

The operation of the Project has the potential to increase the risk of animal (livestock / wildlife) deaths by virtue of increasing traffic volumes. However, the design of the Project to include a mesh fence and cattle underpasses and given the limited protected / rare species presence in the area, the Project is not expected to result in significant effects on biodiversity.

1.7.3 CLIMATE CHANGE

The assessment considers the impacts and effects of the Project in terms of:

- The contribution of the Project to climate change: the greenhouse gas (GHG) emissions assessment; and
- The vulnerability of the Project to climate change: climate change resilience and adaptation assessment.

1.7.3.1 GREENHOUSE GAS EMISSIONS

GHGs are natural and man-made gases occurring in the atmosphere which absorb and emit infrared radiation thereby maintaining the Sun's energy within the Earth's atmosphere. There is a scientific consensus that the major increase in the concentration of GHGs from man-made sources is contributing to global warming and climate change.

It is unlikely that the Project will produce more than 25,000 tonnes of carbon dioxide equivalent (tCO_2e) from direct emissions per year during operations, and would therefore require emissions quantification as per the EBRD PR3 requirements. However, even though emissions do not need to be quantified due to EBRD PR3 requirements, it is recommended that emissions are quantified in line with the EIA Directive and best practice. It is not possible to assess the significance of effects associated with the Project until emission are quantified.

Potential sources of GHGs during each of the Project lifecycle stages (as per PAS 2080) have been identified and a qualitative assessment of the possible magnitude of emissions has been made.

CONSTRUCTION

None of the potential emissions sources during the construction are expected to be large in magnitude. Medium magnitude emissions during construction are likely to come from:

- Embodied emissions associated with extraction and manufacturing of the required raw materials;
- Emissions from fuel and electricity used in vehicles transporting materials to the site, and away from the site; and
- Emissions from fuel and electricity used in plant and equipment on site.

OPERATION

During operation, end user traffic emissions have the potential to be a large source of emissions. All other sources of emissions during the operation phase are anticipated to be small.

1.7.3.2 CLIMATE CHANGE VULNERABILITY

The assessment of vulnerability of the Project to the impacts of climate change is informed by historic and projected climate for Kazakhstan.

In general, climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events likely to punctuate these average changes. Climate change is projected to lead to warmer summers and winters, with more extreme temperature events.

The main potential impacts of climate change identified by the assessment are:

- High rainfall leading to flooding and overwhelming of drainage infrastructure;
- High temperatures leading to damage to or more rapid deterioration of materials, including the road pavement /surface, and increased thermal loading on structures;
- High winds leading to increased loads to structures and effects on road users;
- Increase in compaction and soil erosion leading to reduced stability of earthworks; and
- Change in ground water level affecting foundation settlement.

1.7.4 CULTURAL HERITAGE

Previous surveys carried out in accordance with national legislation have indicated that there are no known Cultural Heritage assets within the road corridor. Information collated suggests that there is a low potential for unknown archaeological remains.

1.7.4.1 CONSTRUCTION

In accordance with EBRD Performance Requirement 8, it is recommended that a Chance Find procedure is put into place. A Cultural Heritage Management Plan (CHMP) should be prepared and implemented to mitigate the for potential significant remains during construction. The accidental memorials along the alignment will be relocated further from the alignment in discussion with those affected.

1.7.4.2 OPERATION

No significant cultural heritage effects are foreseen during the operational phase.

1.7.5 MAJOR ACCIDENTS AND DISASTERS

There is the potential for a wide range of major accidents and disasters to occur, however, the probability, likelihood and frequency is very low, often due to the management of a risk under the established legislative requirements, construction and operational contractor processes or during the design process.

‘Disaster risk’ can be characterised as a hazard which has potential to incur community losses, encompassing assets, life, health and livelihoods, giving significance to disaster events at a personal and local scale. Disaster risk can also be defined as, hazards which could cause a locality to require assistance from an outside state, which could relate to international aid, or a local authority requiring assistance from another local authority. ‘Accident’ can be defined as, an undesirable event resulting in damage or harm.

Potential major accidents and disasters that may have an impact on the environment or human health largely include but are not restricted to:

- Seismic events: There is a risk that an earthquake could occur in the locality of the Project and that impacts to the Project itself and consequential adverse effects on the environment could occur as a result. However, compared to current road, the Project is not considered likely to increase the vulnerability of the Project to seismic events, as the Project will be designed in accordance with the rules, regulations and standards of the RoK for the design and construction of roads and any appropriate earthquake risk guidelines.
- Extreme weather event (e.g. flooding, heavy snow): The Project design will not increase the vulnerability of the Project to most extreme weather events relative to the current road. The Project will have a beneficial effect on flood risk associated with snow melt as the Project includes substantial drainage pipes (on average one pipe each 1.5 km of the road). The Project will have a beneficial effect on risks associated with heavy snow as the road will be raised above the existing ground level in more locations, which will reduce the likelihood of snow accumulating on the road surface.

- Major construction accident: The potential for construction related accidents and disasters will be generally mitigated through existing legislation (e.g. the rules, regulations and standards of the RoK for the design and construction of roads) and management procedures around safe working practices. A CEMP will be prepared prior to construction commencing to ensure that such risks are mitigated appropriately.
- Major road accident: The Project design will have a beneficial effect on road safety relative to the current road.

Plans and procedures to prevent and manage potential major accidents and disasters will be documented in the CEMP (for construction) and the Emergency Preparedness and Response Plan (or equivalent, for operational).

1.7.6 GEOLOGY AND SOILS

The area surrounding the route is primarily used for livestock farming. Various potential sources of contamination have been identified along the route including an Asphalt Plant, Plastic Plant, agricultural machinery, waste material (sewage, landfilling, fly tipping) and oil/chemical storage.

1.7.6.1 CONSTRUCTION

The risk from the potential sources of contamination would be mitigated through a ground investigation and risk assessment, together with the adoption of good site practices which will be detailed in the Construction Environmental Management Plan.

1.7.6.2 OPERATION

The nature of the road construction will act as a barrier to potentially contaminated soils underlying the road alignment. The risk from potential ground gas and to buried concrete and structures will need to be addressed through a ground investigation and appropriate design.

1.7.7 LANDSCAPE AND VISUAL

1.7.7.1 CONSTRUCTION

During construction, landscape and visual impacts will occur due to the use of construction machinery, construction works, and importation of materials, which will create increases in noise, dust and activity along the Project, along with traffic management requirements (to maintain access along the route during construction).

During construction the traffic impacts will be reduced though the implementation of a traffic management plan. Traffic will be organised so that the existing road can be utilised to maintain access to adjacent properties and roads throughout construction, including during widening, realignment and the construction of culvert pipes. During the bridge construction, a temporary road bypass will be used to maintain access. Alternative routes for dirt roads while intersections are constructed will be considered. Access to existing monuments will not be blocked, even where they are far enough from the planned road to not be directly affected by the project.

Construction activities have the potential to have significant effects on site vegetation, local landscape character and local visual receptors, although these will be temporary, and will be reduced through mitigation measures in the CEMP.

1.7.7.2 OPERATION

The Project will result in increased traffic volumes along the highway, therefore there is the potential for a greater number of animal collisions and road traffic accidents as well as noise, activity and visual intrusion from raised sections of the road and traffic movement. There will be far fewer available crossing points for animals, being largely restricted to designed underpasses, with the highway being wider (c25m wide) and above existing ground level, making it more visually prominent in the local area. Traffic headlights will also be more visible in the local landscape, along with traffic lights within Kapshagai Town. Realigned sections of the route will also alter the local landscape character of the immediate area by introducing new hard-surfaced areas into existing undeveloped land.

Operational activities will have adverse effects on local visual receptors, namely isolated properties along the route.

With the exception of local visual receptors surrounding the Project, particularly isolated properties from the limited baseline information available, it is not anticipated that the Project would have significant adverse effects on local landscape character or visual receptors following the implementation of mitigation measures.

1.7.8 MATERIAL RESOURCES AND WASTE

1.7.8.1 CONSTRUCTION

The consumption of materials and generation of waste will occur as part of the Project. During construction materials are likely to comprise asphalt, sub-base materials (aggregate), concrete, steel, timber, bituminous materials, metal and plastics. The quantity and source of the materials as well as details on the recycled content of the materials could not be provided in sufficient detail at this stage to produce a full assessment of the potential impact. However, information from the site visit indicated that materials from the demolition of the existing road would be utilised to reduce the impact on primary material resources, and quarries local to Kapshagai Town would be utilised to source some construction materials. Further studies would be required to provide additional material type, quantity and source information as further information on the availability of these resources at a local, regional and national scale.

Some information on the quantities of earthwork removal was available, however quantities for wastes such as broken out concrete, road planning, bituminous materials, contaminated land or vegetation were not available. A commitment to divert waste from landfill through recycling was made during consultations during the site visit, with non-diverted waste taken to a local licenced landfill. Due to the limited amount of information currently available on the anticipated waste arisings, and absence of data on the capacity of landfills at a local, regional and national level, a further study is required to assess the significance of effects associated with the Project.

1.7.8.2 OPERATION

The Project is anticipated to consume minimal quantities of materials and generate minimal volumes of waste during operation. Maintenance activities are considered likely to consume small quantities of specialist components (for example signage and lighting) as well as some bulk products (asphalt), and generate small volumes of associated waste. Any materials required will impact on the consumption of natural resources resulting in the depletion of natural resources and local / regional stocks, resulting in an adverse, permanent and direct impact on the consumption of construction materials. Despite the limited information currently available, professional judgement indicates that the effects are likely to be not significant, however further information on the likely operational / maintenance activities would need to be obtained to verify this precisely.

Where wastes are not recovered, the impact on landfill capacity would be adverse, permanent and direct. Based on the limited information currently available, and using professional judgement, it is considered likely that the operational waste effects will not be significant. However, further information on operational waste generation and the capacity of waste recovery and landfill sites within the region would need to be obtained to make a full assessment.

1.7.9 NOISE AND VIBRATION

1.7.9.1 CONSTRUCTION

Temporary noise and vibration effects are defined as those that occur between the start of advance works and the end of the construction period. Where materials need to be transported to or from the site, the effects of the additional traffic along access routes are likely to extend beyond the immediate construction corridor.

At this early stage, very little is known about the number, type and location of construction plant that might be used. Nevertheless, based on the activities and processes likely to be employed during the highway improvements along with the possibility of night-time working, it is inevitable that some disturbance to those living nearby would arise. However, the sparse nature of the area through which the Project passes (and particularly the separation distance between the road corridor and the nearest noise sensitive receptors) as well as the temporary nature of the works, means that the potential for disturbance is likely to be limited.

The noise and vibration effects arising during construction can be mitigated to an extent through contractual means. It will also be important to manage and control noise and vibration throughout the construction period, a mitigation strategy will be developed and formalised within a Construction Environmental Management Plan (CEMP) developed by the Contractor.

Through the preparation of a CEMP and the adoption of a considerate approach throughout the construction phase, for example, adhering to construction working hours, keeping residents informed of progress and

particularly noisy activities and ensuring that best practicable means are adopted at all times to minimise noise and vibration levels, it is anticipated that all construction related activities can be undertaken whilst minimising disturbance to residents. With the implementation of mitigation measures it considered likely that the effects will not be significant.

1.7.9.2 OPERATION

In this situation, the key factors that contribute to the change in road traffic noise level at sensitive receptors along the route include the volume of traffic, vehicle speed and proportion of heavy duty vehicles, all of which combine to influence the level of traffic noise at source, and the alignment of the road, which affects the propagation of noise between road and sensitive receptor.

Traffic information is limited at this stage, but based solely on the number of additional traffic movements, the likely change in source noise level between 2021 (the year of opening) and 2036 is anticipated to be just over 3 dB. This long-term change would be described as an adverse impact of minor magnitude and it is also above the International Finance Corporation (IFC) change threshold of +3 dB.

Further road traffic calculations indicate that most dwellings located in excess of 200 metres from the road would have LAeq,1h levels below IFC thresholds (55 dB during the day and 45 dB at night), even in 2036. However, for properties closer to the road (for example, those within 100 metres, as present at each end of the Project in 2036) noise levels are predicted to exceed the IFC thresholds.

Based on the above it can be concluded that there is some potential for adverse impacts of minor magnitude, particularly at dwellings at each end of the Project. Consequently, to minimise these impacts, consideration should be given to introducing acoustic barriers, most likely in the form of reprofiled earthworks to create an earth bund, to screen the road from the nearest dwellings.

1.7.10 WATER ENVIRONMENT

The Project crosses several seasonal streams, that are reported to be dry for much of the year, but that convey flow resulting from snow melt and during heavy rainfall events. The Project also crosses a surface water channel that is reported to covey treated wastewater.

Approximately 60 drainage pipes pass beneath the Project along its length. These are to allow the flow of rainfall, snow melt and floodwaters from one side of the Project to the other. The existing road is sheds runoff to adjacent ground, with no prior attenuation or treatment of runoff.

The Kurty River flows immediately to the west of the proposed P-18 and M-36 road junction. The Kapshagai Town Reservoir is located approximately 2 km to the east of the proposed P-18 and A-3 road junction. The Kapshagai Town Reservoir is the second largest lake in Kazakhstan. It feeds the Kapshagai Hydroelectric Power Plant and supports essential water supplies in the region. Groundwater is not considered to be a prominent source of water supply within the region, as none of the farmers consulted had access to groundwater, and one advised that he had received a grant to drill for groundwater, but that the drilling had been unsuccessful.

1.7.10.1 CONSTRUCTION

Due to the proximity of the works to the Kurty River, seasonal streams and groundwater resources there may be a slight adverse impact to these features during construction. However, the impacts are likely to be temporary and pose no long-term risk, assuming good proactive working methods are implemented and all necessary permits are obtained.

It is estimated that approximately 464,857 m^3 of water per year will be required during the three-year construction programme. No known detailed water balance calculations have been undertaken, but it is understood that the required water supplies (potable and non-potable) have been approved by the Water Basin Inspection Authority (Balkhash-Alakol) and the applicable local authorities. It is considered unlikely that the abstraction of water for construction would have a notable impact on environmental water quality, although it is recommended that a more detailed water balance assessment is undertaken prior to construction. The CEMP will specify that no groundwater or surface water sources along the alignment of the Project are used as this could affect local livelihoods as livestock regularly use the water channel for drinking.

Overall the construction works may increase local flood risk associated with works to the existing seasonal streams and drainage channels, but this is unlikely to be significant if the existing drainage pipes are maintained.

1.7.10.2 OPERATION

The Project will increase traffic flow which in turn could increase pollution risk and spillage risk to adjacent surface water and groundwater features. It is assumed that the current drainage regime will be maintained, although the Project may offer an opportunity to improve the quality of surface water discharge through the provision of improved drainage and treatment systems. The impact is likely to be limited to seasonal streams and the water channel.

The Project may also increase the rate and volume of surface water runoff that may subsequently increase local flood risk to users of the road and elsewhere, although inclusion of improved drainage and attenuation systems may offer an opportunity to better control runoff.

1.7.11 SOCIAL

The land required for the road rehabilitation will be State reserved land (159 ha), land acquired from the state enterprises (176 ha) and land acquired from private and commercial land owners and tenants 200 ha). The land is mainly required for the five sections where realignment is required and the Kurty Village junction, but also along the road for accommodation of higher embankments to provide the requirements for the road category vertical visibility. The compensation process is being progressed by the department of land management at Ili district and Kapshagai Town municipality. The compensation will be undertaken in accordance with EBRD PR5. The Project includes plans to temporarily rent land to build two construction camps; one is expected to be in Kapshagai Town; and another near to Kurty Village. The size and capacity of the camps are not known, but it is not expected that there will be a major influx of workers.

The households, individuals and areas along the Kapshagai Town-Kurty Village route mainly fall within the following categories:

- Farmers mainly involved in husbandry and cattle breeding (i.e. mostly pasture lands);
- No agricultural lands were identified close to the road; some agricultural lands were present further outside the road boundary;
- Businesses, including one café close to Kurty Village junction, one asphalt making plant, and an anonymous enterprise; and
- No indigenous peoples were identified during the WSP site visit in July 2018.

1.7.11.1 CONSTRUCTION

The permanent and temporary land acquisition for the Project is not expected to cause an adverse impact on local income and livelihood. It is expected that only small part of each land parcel will be affected and as a result affected land users/owners will not lose access to the remaining land. The majority of lands are categorised as ‘Pasture’ which are used for herding and animal husbandry activities. Key potential impacts associated with land acquisition and use are:

- Permenant land loss resulting in reduced herding area for cattle;
- Temporary loss of access rights, resulting from temporary land use i.e. construction corridor, camps and potential new quarries; and
- Reduced temporary income for businesses and individuals if access is blocked to businesses or farms.

Further details with regard to land acquisition is available in Livelihood Restoration Framework (LRF). The Project will implement Livelihood Restoration Plan (LRP) prior to land acquisition and subsequent to agreement with the EBRD to ensure that all affected land owners and users (formal and informal) are compensated and supported in accordance with PR5.

The construction activities including groundwork, blasting, material crushing and vehicle movements will potentially cause some disturbance to locals. Key potential impacts associated with construction activities are:

- Noise disturbance to locals particularly living close to the construction corridor;
- Road accidents resulting from increased local traffic; and
- Reduced air quality and minor impact on community health (dust associated with ground work).

The availability of temporary construction employment opportunities is sometimes associated with an increase in vulnerability and susceptibility of local communities to increased crime, alcoholism, etc. There is a potential impact associated with conflicts between workers and locals, and some women may feel discomfort, particularly in Kapshagai Town and Kurty Village where camps will be built. There is a risk associated with influx of workers into the Project area, however, it is not expected that there will be a large construction workforce, and hence the impact associated with limited influx is not considered as significant. However, if the construction workforce is not managed, the Project could lead to issues associated with child labour, forced labour, poor working condition and labour grievances within its organisation and associated supply chain. Key mitigation measures in relation to compliance with EBRD PR2 will be implemented to minimise these risks.

Most of unskilled and skilled labour jobs are expected to be undertaken by men. However, there will be opportunities for local women to obtain jobs in catering, accommodation camps, service industry and administration. There will be also opportunities for women experts from Almaty to conduct technical work in planning, designing and mapping the Project.

Vulnerable people are categorised as the 31 land users (including State land users) who may not receive any compensation entitlements, due to the existing national compensation procedures in Kasakhstan. In addition, women (who due to traditional limiting factors may not able to attend consultations and cannot claim compensation), elderly, the disabled and individuals with chronic health condition or poor socio-economic status/background will be sensitive to the Project impacts and are classed as 'Vulnerable Groups'.

If not managed, the impact of the Project construction and land acquisition on vulnerable people (including land users) could potentially be significant. The Project will implement a LRP and will consult with vulnerable people to ensure their needs and concerns are taken into account during the course of the Project, to avoid the potential impact on vulnerable people.

1.7.11.2 OPERATION

The new road would potentially bring new investments into the area, and could also lead to increased land prices. The new road will reduce travel times from Europe to China, and enable road users to bypass Almaty and Kaskelen (30 km from Almaty). Therefore, the new road will be the main route for inter-regional trips and increased number of road users would potentially bring additional income for local businesses and farmers. As part of this project, local communities will obtain some social benefits including:

- Lighting will be provided at junctions;
- Bus stops and resting areas with benches will be built along the new road;
- The new road will provide a shorter route and thus faster trips to other regions; and
- Further local investments could be attracted to the area through opening new shops, restaurants, petrol stations, etc.

There will be some long-term opportunities for local women to obtain jobs, training and internship programmes once the new road is operational, due to the improvement in accessibility to other areas. However, such opportunities are expected to be limited.

The Project operational impacts are minimal, and social benefits (including employment, infrastructure improvements) are expected.

1.8 CUMULATIVE ASSESSMENT

Cumulative effect interactions can occur as either:

- Interactions between effects associated with the Project; and / or
- Interactions between the effects associated with one or more other developments within the study area for the Project.

Cumulative effect interactions during construction and operation these have been identified as have the potential for adverse effects. The effects are summarised in Table 1.

Table 1 - Summary of Cumulative Effects

Nature of Cumulative Effects	Temporal Stage	Environmental Discipline	Summary of Effects
Interactions between effects associated with the Project.	Construction and Operation	• Air Quality; • Noise and Vibration; • Traffic and Transport; Landscape and Visual; and • Social.	• Nuisance and disturbance to local business and farms caused by noise, dust, visual impacts and increased traffic movements during both the construction and operational phases; and • Potential for business and farms to have views of the construction activities and the operational road; and • Potential for business and farms to experience dust and windblown litter during both the construction and operational phases.
Interactions between the Project and other projects within proximity of the Project.	Construction and Operation	• Air quality; • Noise and vibration; • Landscape and visual; • Biodiversity and living natural resources; • Geology and Soils; • Water environment; and • Material resources and waste.	There are two roads which connect to the Project. The A3 on the outskirts of Kapshagai Town has been redeveloped and is already operational. As this redevelopment was completed prior to the commencement of this Project it has formed part of the baseline environment for the assessments, and thus a cumulative assessment is not required. The M-36 on the outskirts of Kurty Village is part of the 228 km "Kurty-Buribaytal" Project, the adjacent stretch of this Project currently being disbursed by EBRD, it is expected to be completed in late 2019 / early 2020. Thus, there is the potential for inter-Project cumulative effects.

1.9 FURTHER INFORMATION AND CONTACTS DETAILS

Documents associated with the Project, inclusive of this Supplementary ESIA Report can be requested from:

- Ministry of Investment and Development of Kazakhstan;
- JSC "NC "KazAutoZhol"; and
- EBRD.

Electronic versions of these documents will be available for a minimum of 120 days (the public disclosure period) and also the following websites:

- Ministry of Investment and Development of Kazakhstan: http://mid.gov.kz;
- JSC "NC "KazAutoZhol": www.kazautozhol.kz; and
- EBRD website: http://www.ebrd.com.

The contact details for the relevant person at JSC "NC "KazAutoZhol", the organisation responsible for the implementation of the Project are provided in Table 2.

Table 2 - JSC "NC "KazAutoZhol"

Contact Information

Contact Information	
Name	Aliya Zeinullina
Title	Environmental and social issues specialist of the JSC “National Company “KazAutoZhol” – “Construction Directorate”
Telephone	+7 7101-982-66-57
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2 INTRODUCTION

2.1 THE PROJECT

The Project is located approximately 60 km north of Almaty, and is orientated in an east / west direction. The Project mainly follows the alignment of the P-18, an existing two-lane road, although there are five short sections that will be realigned. The Project will connect the A3 from outskirts of Kapshagai Town to the M-36 on the outskirts of Kurty Village, it will be approximately 67 km in length, as shown in Appendix A, Appendix B and Appendix D.

The Project includes:

- The reconstruction and widening of the existing road from two lanes (Kazakh Technical Category 2 Road) to four lanes;
- The reconstruction of a bridge and upgrading of intersections;
- The construction of a new junction just outside Kurty Village; and
- Associated infrastructure inclusive of off ramps, cattle and agricultural machinery underpasses, drainage pipes, rest areas, bus stops, zebra crossings, lighting and two maintenance depots.

The Project will be reconstructed to comply with the Kazakh Category 1b highway requirements. The existing road's asphalt pavement is now past its effective working life and its condition is rapidly deteriorating due to a combination of traffic loading and the age of the road surface. Reconstruction of the road is now urgently required to improve the ride quality of the road, minimise road user costs and provide a road surface that can be maintained in a cost-effective manner. In addition, widening of the road will improve road safety as currently the narrow width of the road forces drivers to cross into the oncoming traffic lane to overtake vehicles or avoid potholes.

An overview drawing of the Project in included in Appendix A.

Construction is expected to commence in the 1st or 2nd Quarter (Q1 / Q2) of 2019 and be completed within 37 - 43 months. The Project will become operational in 2021 / 22.

It is expected that the Project will reduce travelling distances substantially, as the drivers currently use the M36 via Karaoi (125 km) when travelling from the north to Kapshagai Town rather than travelling via Kurty Village on the road to Kapshagai Town. They will now use the shorter route instead (67 km).

Average daily traffic numbers for the Project were approved by KazAutoZhol on the 5th May 2017. Traffic intensity between Kurty Village and Kapchagai Town in 2017 was 2,656 cars a day. The forecasted increase in traffic intensity is approximately 5% a year, as shown in Table 3. However, during the site visit KazAutoZhol provided daily average traffic intensity numbers obtained from the contractor who maintains this section of the road, which were significantly lower at 567 cars in 2017. It is not clear why there is a discrepancy in this data. The earliest anticipated renewal year is 2037.

Table 3 - Traffic Projections

Year	Scenario	Traffic Flow (Daily)
2017	Baseline year.	2,656
2019	Start of construction year.	2,928
2021	Earliest opening year.	3,228
2037	Earliest anticipated renewal year.	6,711

Approved by KazAutoZhol on the 5th May 2017, titled *"71"*.

2.2 THE PROJECT SETTING

The Project is located on the territory of the Balkhash high plain, to the South of Lake Balkhash between Zhetysu Alatau in the southeast, Ile Alatau in the south and the Chu-Ile mountains in the west. It is part of the

larger transit "Centre-South" corridor of "Astana-Karaganda-Balkhash-Almaty" which is aligned in a south-eastern direction. EBRD have provided finance for the adjacent road sections.

The Project runs along the southwestern outskirts of the Balkhash plain along the Karaoy plateau, which is close to the Moyynkum sands in the southeast. To the north of the Project the plateau shares a border with the sands of Abdilkum. The plateau is located in the interfluve of r.Kurty Village - r.Kaskelen -r.Ile.

The Project is located on the territory of two regional authorities:

- From 0 km to 2 km - Kapshagai Town (Almaty region); and
- From 2 km to 67 km - Iliyski District (Almaty region).

The road corridor runs on relatively flat terrain in a steppe / desert landscape. The road corridor crosses several seasonal streams that are reported to be dry for much of the year, but that convey flow resulting from snow melt and during heavy rainfall events. The road corridor also crosses a surface water channel that is reported to covey treated wastewater. The area surrounding the road is partly used for non-intensive herding. At present, on some days the small herds from the settlements and the farms may cross the road wherever convenient in the early morning and before dusk. The herders currently take their livestock across the road at all locations.

Appendix D depicts the location of the Kurty Village - Kapchagai Road (P-18) in relation to Almaty in the south.

2.3 STAKEHOLDER ENGAGEMENT

Stakeholder engagement and public hearings are a requirement under the Kazakh national legislation. There have been two public meetings relating to this Project as summarised below:

- 3rd December 2015 in the Town Hall of Kurty Village Rural District, Akshi Village. The invitation for the event and additional information on what would be shared at the meeting was publicised in local newspaper Ile tany in Russian and Kazakh on the 13th November 2015. This notice was compliant with the public consultation requirements that require a period of 20 days between the public note and the meeting taking place. The public meetings were attended by residents (22 people in total). This included farmers, Head of Kurty Village rural district and the Chief Engineer of the Project.
- 15th June 2016 in Kapchagai Town Hall. The meeting was organised by KazAutoZhol and Kapchagai Town Hall. The invitation for the event and additional information on what would be shared at the meeting was publicised in local newspaper Нурлы ОЛКЕ No.25 (382) issued on the 8th June 2016. This short notice was non-compliant with the public consultation requirements that require a period of 20 days between the public note and the meetings. In addition to the newspaper publication, posters with information about public hearings were placed in the post boxes of all the residential houses in the area, as well as all the businesses located in Karlygash Village. This meeting was attended by residents', the Engineer of the Project, the Head of public transport and roads department of Kapchagai, the Head of architecture and town construction department of Kapchagai and a KazAutoZhol representative (16 people in total).

In addition to the public meetings, there was a meeting regarding the approval of the Project decisions within the borders of Kapshagai Town as a part of the wider "Centre - South" corridor linking Astana and Almaty. The meeting was held on 2nd June 2016 at Kapchagai Town Hall. The meeting was attended by representatives of KazAutoZhol, Departments of Kapshagai Town; Land Relations Department; the Engineering Centre Astana, and the Scientific-Productional Centre of Land Assets.

During two site visits (April 2018 and July 2018) a representative number of farms and business along the route alignment were visited, those visited included (east to west): Closed Plastic Plant near NS1.8, Operational Asphalt Plant near NS1.8, Closed Landfill Site, Farm S4.06, Farm 11, Farm 9, Farm 33, Farm 21, Farm 22, Farm 5 and Farm 4. The location of the farms and business is depicted in Appendix B.

The primary use of the farms is livestock farming (horses, cattle, goats, sheep etc.). The farmers that were met during both site visits welcomed the road improvement, mainly due to the reduction in travel time to Almaty.

2.4 CONSIDERATION OF ALTERNATIVES

Three alternative design layouts, within the borders of Kapshagai Town, were considered and presented at the meeting on the 2nd June 2016. Following the meeting, the final design, depicted in Appendix A, was approved.

No Project wide alternatives were considered as there are were substantial obstacles within the vicinity of the site, including farms and undulating land. The use of the existing alignment and adjacent highways land has enables the Project to reduce land take requirements substantially.

2.5 RESPONSIBLE BODIES

The Committee for Roads manages road construction projects. It is within the Ministry of Investment and Development of Kazakhstan, which is the implementing agency. The Ministry has responsibilities for transport sector policy and for planning, developing and regulating transport in the road, railway, and aviation sectors.

The Road Police committee under the jurisdiction of Ministry of Internal Affairs is responsible for road safety and will be required to approve the road safety measures that have been proposed. After completion of the Project, the Ministry of Investment and Development will be in charge of the operation and maintenance of the road, however, for a 3-year guarantee period the road repairs will be conducted by the construction contractor.

KazAutoZhol is under the Committee of Roads and will be responsible for Project implementation. A summary of all organisations including the Project level, with their functions and reporting lines are presented in Table 4 below.

Table 4 - Project Level Organisations

Organisation	Project Function	Reporting Line
Ministry of Finance	Loan benefactor, approves budget and controls usage.	Government
Committee for Automobile Roads	Administers budgets for all road projects and controls procurement.	Ministry of Investment and Development
KazAutoZhol	General control of the Project implementation and manages internal resources between the projects.	Committee for Automobile Roads
Project Implementation Unit (PIU) at the KAZ Construction Directorate	Selection and control of contractors in accordance with contract conditions and schedule.	KazAutoZhol
Kazavtodor LLP	Maintenance, cleaning, amenity planting and post-guaranty running repairs of the road.	KazAutoZhol (sole service provider)
Ili District Council and Kapshagai City Municipality	Permanent and temporary acquisition of land for the Project and approvals within the framework of the regional council requirements for the local infrastructure maintenance and improvements.	Regional Council
Kurty Village and Karaoy Rural Areas Councils	Organisation of local stakeholder engagement and amalgamation of their opinions of the Project. Approval of locations for the disposal of construction waste.	District Councils
Regional Departments of various Ministries (See Section 2.2.1.5 on Permit and Licences)	Project approval, issue of permits for various construction works.	Ministries
Infrastructure Companies	Approval of changes in the infrastructure, road crossings and their protection from damage	-
Engineering Centre Astana LLP	Detailed design, obtainment of approvals, and stakeholder engagement at design stage.	Contracted by KazAutoZhol
Various Consultants	Surveys and studies.	Contracted by

(archaeology, geology, geomorphology etc.)		Engineering Centre Astana LLP

2.6 INVESTMENTS PLANS

The proposed investment is sought by the Committee for Roads and includes the reconstruction and widening of the existing road from two lanes (Kazakh Technical Category 2 Road) to four lanes, the reconstruction of a bridge and upgrading of intersections as well as providing finance for the supervising Project engineers, implementation assistance to the Project Implementation Unit (PIU) and institutional components.

EBRD previously financed nearby road sections which are part of the "Centre - South" corridor comprising the 62 km Burybaytal-Aksuek road section and the 81 km Kurty Village-Burybaytal road section.

2.6.1 EBRD CATEGORISATION

The EBRD are considering providing finance as detailed above. Under the EBRD ESP projects are categorised as A, B, C or FI to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required. This will be commensurate with the nature, location, sensitivity and scale of the project, and the significance of its potential adverse future environmental and social impacts. Past and present environmental and social issues and risks associated with project-related existing facilities will be subject to environmental and social appraisal regardless of the categorisation.

Category A applies to "greenfield" or major extension or transformation-conversion projects in the categories listed which are examples of projects that could result in potentially significant adverse future environmental and/or social impacts and therefore require an ESIA. The categorisation of each Project will depend on the nature and significance of any actual or potential adverse future environmental or social impacts as determined by the specifics of nature, location, sensitivity and scale of the project.

Contained within the example list of Category A projects that relate to this Project are:*6. Construction of motorways, express roads and lines for long-distance railway traffic; airports with a basic runway length of 2,100 metres or more; new roads of four or more lanes, or realignment and/or widening of existing roads to provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length.*

The proposed investment is for widening of an existing road to four lanes of a continuous length of 67 km, exceeding the 10 km given in the example. This meets the criteria above, as such this Project is classed as a Category A Project which at an early stage in the Project would be in line with the policy where potentially significant adverse future would not have been readily identified or assessed, and which, therefore, would require a formalised and participatory ESIA process. However, following a review of the environmental and social impacts, it is now considered that potential adverse impacts have been identified, assessed and can be addressed through mitigation measures, typical for the requirements for a Category B project. However, due to the length of the road, as required under EBRD requirements, this Project is classed as a Category A projects, for which there is a need for a comprehensive ESIA and a review of associated documents that must be carried out, followed by their public disclosure for a minimum period of 120 days.

None of the activities that will be associated with the reconstruction of the road are those that are listed in the Exclusion List in the EBRD Environmental and Social Policy (ESP) 2014.

2.7 EBRD PROJECT REQUIREMENTS

EBRD requirements are as follows:

- The Project will be structured to meet relevant EU substantive environmental standards, including (but not limited to) the pertinent requirements of:
  - Directive 2014/52/EU of the European Parliament and of the Council amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment (herein referred to as the EIA Directive);
  - Council Directive 92/43/EEC of the European Parliament and of the Council on the Conservation of Natural Habitats and of Wild Fauna and Flora (herein referred to as the Habitats Directive);

- Directive 2009/147/EC of the European Parliament and of the Council on the Conservation of Wild Birds (herein referred to as the Birds Directive);
- Directive 2002/49/EC of the European Parliament and of the Council Relating to the Assessment and Management of Environmental Noise (herein referred to as the Environmental Noise Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a Framework for the Community action in the Field of Water Policy (herein referred to as the Water Framework Directive);
- Directive 2006/118/EC of the European Parliament and of the Council on the Protection of Groundwater Against Pollution and Deterioration (herein referred to as the Groundwater Directive); and
- Directive 2008/50/EC of the European Parliament and of the Council on Ambient Air Quality and Cleaner Air for Europe (herein referred to as the Air Quality Directive).

- When host country regulations differ from EU substantive environmental standards, the Project will be expected to meet whichever is the more stringent;
- It will be in compliance with the EBRD Environmental and Social Policy (ESP) and Performance Requirements (PRs) 2014;
- The Public consultation and stakeholder engagement will be tailored for the Project, be meaningful, and will allow for the disclosure of information and public participation in decision-making (in accordance with PR10);
- The Project shall include all reasonable measures to avoid, minimise or mitigate any adverse changes in environmental and social conditions, and impacts on public health and safety, especially with respect to any disproportionate impacts on any group of people as a result of their gender, age, ethnicity, disability, socio-economic status and/or other personal characteristics; and
- It will take into account relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation.

The legislative and policy requirements are described further in Chapter 3. Discipline specific legislation and policy requirements are outlined within each chapter (Chapters 5 to 15).

2.8 PURPOSE OF THIS REPORT

The Supplementary ESIA Report has been prepared following a review of the national EIA for the Project which was developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. The key purpose of the review was to evaluate whether the national EIA met the relevant EU substantive environmental standards, notably the EIA Directive.

The findings of the review were presented in the Environmental and Social Assessment Report and Environmental and Social Action Plan submitted to EBRD in April 2018. that the report identified that supplementary EIA information was required to establish the baseline conditions, potential impacts and suitable mitigation measures for the following environmental disciplines:

- Alternatives for the Project (Section 2.4);
- Air Quality (Chapter 5);
- Biodiversity and Living Natural Resources (Chapter 6);
- Climate Change (Chapter 7);
- Cultural and Archaeology Heritage (Chapter 8);
- Major Accidents and Disasters (Chapter 9);
- Geology and Soils (Chapter 10);
- Landscape and Visual (Chapter 11);

- Material Resources and Waste (Chapter 12);
- Noise and Vibration (Chapter 13);
- Water Environment (Chapter 14);
- Social (Chapter 15);
- Cumulative Effects (Chapter 16).

The chapter references for each of the environmental disciplines addressed the Supplementary ESIA Report are provided in bullet points above. A summary of the potential impacts and suitable mitigation measures is also presented in Chapter 17.

The Environmental and Social Action Plan that was prepared in April 2018 has also been updated following the completion of the Supplementary ESIA Report.

3 EBRD PERFORMANCE REQUIREMENTS, EU DIRECTIVES, LEGISLATIVE AND POLICY CONTEXT

3.1 EBRD PERFORMANCE REQUIREMENTS

The Project is required to comply with the following PRs:

- PR1: Environmental and social appraisal and management;
- PR2: Labour and working conditions;
- PR3: Pollution prevention and abatement;
- PR4: Community health, safety and security;
- PR5: Land acquisition, involuntary resettlement and economic displacement;
- PR6: Biodiversity conservation and sustainable management of living natural resources;
- PR8: Cultural heritage;
- PR9: Financial intermediaries; and
- PR10: Information disclosure and stakeholder engagement.

PR7, titled 'Indigenous people' is not applicable to the Project as there are no indigenous people in the RoK. With regard to PR5, PR9 and PR10 the following documents should be reviewed as supporting information:

- Updated Stakeholder Engagement Plan (SEP) Report, issued in July 2018: The Updated SEP Report provides a review of stakeholder engagement requirements and grievance procedures, a summary of comments, queries and concerns raised by stakeholders during public consultation meetings and how these have been addressed, a framework for consultation activities and Project disclosure, including the identification of potential stakeholders, methods used for consultation activities and the records to be kept; and
- Livelihood Restoration Framework (LRF), issued in July 2018: The LRF provides a summary of the key social risks associated with the Project and evaluates the compensation process / livelihood restoration which are being undertaken.

Recommendations are included in the Updated Environmental and Social Action Plan (ESAP), issued in July 2018. The ESAP has been developed to ensure that the Project is fully aligned and compliant with relevant EU standards, EBRD Performance Requirements and best practice.

3.2 EU ENVIRONMENTAL DIRECTIVES

The Project is required to meet relevant EU substantive environmental standards, including (but not limited to) the pertinent requirements of the EIA Directive, Habitats Directive, Birds Directive, Environmental Noise Directive, Water Framework Directive, Groundwater Directive and the Air Quality Directive.

Details of the EIA Directive are provided below, and details of each of the other Directives are provided in the relevant discipline chapters.

3.2.1 EU EIA DIRECTIVE

A review against EIA Directive requirements has been undertaken, to assess whether the Project activities are listed in Annex I or II of the EIA Directive. The EIA Directive Annex I projects require a full EIA in the EU. For Annex II projects, EIA is not compulsory but requires assessment on a Project by Project basis, using national law to undergo a "screening process"[1].

[1] Directive 2014/52/EU of the European Parliament and of the Council amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.

The following are of potential relevance to the Project:

- Annex I, Article 4(1), Paragraph 7(c): *"Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road or realigned and/or widened section of road would be 10 km or more in a continuous length"*[2].
- Annex II, Article 4(2), Paragraph 10(e): *"Construction of roads, harbours and port installations, including fishing harbours (projects not included in Annex I)"*[2].

As the Project consists of four lanes and covers a distance in excess of 10 km it would be captured under Annex I. It would therefore require a full EIA in accordance with the EU Directive.

3.3 REPUBLIC OF KAZAKHSTAN LEGISLATION

RoK legislative and regulatory measures consist of laws and treaties.

Table 5 below provides a summary of the RoK legislation relevant to this Project that has been considered in the Supplementary ESIA Report, it should be acknowledged that this is not an exhaustive list and further legislation and regulatory measures are provided within each discipline chapter.

Table 5 - RoK Legislation

Title	Year
Law	
Constitution of Kazakhstan	2011
Labour Code of the Republic of Kazakhstan No. 414-V (as amended by No. 483-V)	2015 (as amended in 2016)
Law on Culture of the Republic of Kazakhstan No. 207 (as amended by No. 446-V)	2006 (as amended in 2016)
Law on Protection and Use of Objects of Historical and Cultural Heritage of the Republic of Kazakhstan No. 1488-XII (as amended by No. 479-V)	1992 (as amended in 2016)
Treaties	
Kyoto Protocol to the United Nations Framework Convention on Climate Change	2009
International Plant Protection Convention	2010
International Covenant on Economic, Social and Cultural Rights	2006
United Nations Framework Convention on Climate Change	1995
Convention on Biological Diversity	1994
Convention concerning the Protection of the World Cultural and Natural Heritage	1994
Convention for the Safeguarding of the Intangible Cultural Heritage	2012

[2] Directive 2011/92/EU of the European Parliament and of the Council on the Assessment of the Effects of Certain Public and Private Projects on the Environment.

4 ESIA METHODOLOGY

4.1 INTRODUCTION

The approach to the supplementary ESIA is outlined in this section of the report.

Annex IV, Paragraph 4, of the EIA Directive, provides an indication of the topic areas to be considered in the EIA as *"…. a description of the factors in Article 3 (1) likely to be significantly affected by the project: population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, including the architectural and archaeological aspects, and landscape…."*[3].

Having regard to the above, this Chapter sets out the approach adopted in the ESIA for the following disciplines:

- Air Quality (Chapter 5);
- Biodiversity and Living Natural Resources (Chapter 6);
- Climate Change (Chapter 7);
- Cultural and Archaeology Heritage (Chapter 8);
- Major Accidents and Disasters (Chapter 9);
- Geology and Soils (Chapter 10);
- Landscape and Visual (Chapter 11);
- Material Resources and Waste (Chapter 12);
- Noise and Vibration (Chapter 13);
- Water Environment (Chapter 14);
- Social (Chapter 15);
- Cumulative Effects (Chapter 16).

4.2 TEMPORAL SCOPE

The Supplementary ESIA has addressed effects that are anticipated to arise during the construction of the Project (the construction phase), and following its completion (commonly referred to as the 'operational phase'). These effects can broadly be summarised as follows:

- Construction effects: Those effects which may arise demolition, temporary use of land (e.g. minor diversions) and construction of new the Project and the associated structures; and
- Operational effects: Those effects which may arise from the introduction of the Project into the surroundings or from the activities associated with the use of the Project.

Consideration has been given to those impacts (i.e. changes to the environment) associated with the Project, compared with the baseline conditions (i.e. those conditions which would exist if the Project did not go ahead).

The baseline year for the assessment of construction impacts is the projected start year for construction, which is anticipated to be 2019. Construction impacts have been assessed for the projected period of construction, which is anticipated to 37 - 43 months be commencing in 2021 / 22.

Operational impacts will be assessed for the proposed opening year for the Project unless stated otherwise in respect of a particular discipline within the subsequent section of the ESIA. This is anticipated to be 2021 / 22, 2021 has been used as the assessment year for the operational phase.

[3] Directive 2014/52/EU of the European Parliament and of the Council amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.

4.3 SPATIAL SCOPE

The Project footprint for the ESIA is defined by Appendix A.

The spatial scope for the varies, according to the specific discipline assessment requirements. This is detailed further within each discipline chapter, and takes into account the following:

- The Project;
- The nature of the existing baseline environment;
- The pathway for some effects that may extend beyond the boundary of the Project footprint (e.g. effects on watercourses may extend beyond the area defined within the footprint);
- The area affected (beneficially, adversely, directly and indirectly) by transport movements; and
- The geographical boundaries of the political and administrative authorities which provide planning and policy context for the Project.

The spatial scale of the effect is defined according to whether it is local, authority-wide, regional, national or international. Definitions of the spatial scales to be used are provided in Table 6.

Table 6 - Definition of Spatial Scales

Spatial Extent of Effects	Definitions
International	Effects extending beyond Kazakhstan.
National	Effects within the Kazakhstan but extending beyond region.
Regional	Effects within the District of Almaty.
Local	Effects confined to a local area, typically <1km from the Project.

4.4 BASELINE

Environmental effects from the Project are described in relation to the extent of changes to the existing baseline environment. The baseline is the environmental characteristics and conditions of the area likely to be affected that are present at the time of the assessment, or which are predicted to be the case at certain times during the Project's development ('future baseline').

The future baseline for the Project assumes that the road will continue to deteriorate due to a combination of traffic loading and the age of the road surface.

The collection of baseline information has been achieved through desk study, consultation and a field survey, where appropriate. Social data was obtained using a combination of research, interviews, surveys and public consultation.

The baseline environmental condition, including the predicted future baseline, has been assessed through the use of existing available data, additional studies, surveys and modelling.

A receptor is an entity that may be affected by direct or indirect changes to an environmental variable. Together, the receptors and their setting comprise the baseline for each topic. Relevant receptors have been identified for each environmental and social topic and an appropriate baseline has been developed for each of these disciplines.

Each discipline chapter details the following aspects for the baseline conditions:

- Sources of information;
- Methodology (including that for modelling or surveys);
- Consultation;
- Any limitations (data availability, seasonal variation, etc.); and

- The temporal and spatial extent.

4.5 PREDICTION OF IMPACTS AND ASSESSMENT OF EFFECTS

The Supplementary ESIA Report describes the outcome of the additional ESIA processes, i.e. the significant effects of the Project. This has been undertaken in accordance with Annex IV, Paragraph 5 of the EIA Directive. The Supplementary ESIA Report details the significant environmental effects (both beneficial and adverse) that are predicted to result from the construction and operation of the Project.

The purpose of determining the significant effects of a Project is to inform the decision maker so that it may make a balanced and informed decision regarding the Project in respect of the environment.

An impact is a physical or measurable change in the environment, such as the demolition of a structure, the construction of new facilities, or an increase in noise levels. Construction impacts are those generated by construction activities, for example noise, dust, additional lighting from night works, risk of water pollution and traffic/road diversions. Operational impacts are the impacts that result from the Project's existence beyond the construction phase. These include changes in the appearance of the site, and traffic movements associated with the waste trucks.

An effect is the interaction of such an impact or change in the environment with an identified receptor (such as a human being), or to the quality of an environmental resource. The significance of an effect is assessed by looking at what the changes will be against the existing, or predicted, baseline as a result of both the construction and operation of the Project. The way that the significance of effect is determined for each discipline varies, but in principle has been based on the degree of change (i.e. the magnitude of impact), along with the sensitivity of the receptor which is affected. Criteria which define the sensitivity of a receptor are provided in Table 7.

Table 7 - Sensitivity Description

Sensitivity	Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional (within the District) scale, limited potential for substitution.
Low	Low or medium importance and rarity, local (within town or city) scale.
Negligible	Very low importance and rarity, very local (<1km) scale.

Descriptions of the magnitude of impact are provided in Table 8.

Table 8 - Magnitude Description

Magnitude	Impact Type	Typical criteria descriptors
Very Large	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality
Large	Adverse	Loss of resource, but not negatively affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Moderate	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or

		elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Slight	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No Change	n/a	No loss or alteration of characteristics, features or elements; not observable in either direction.

Once the sensitivity of receptors and magnitude of impacts have been established, the effects have been classified using the matrix in Table 9.

Table 9 - Criteria for Classifying Effects

		Magnitude (Table 8)				
		No Change	**Slight**	**Moderate**	**Large**	**Very Large**
Sensitivity (Table 7)	**Very High**	Not Significant	Minor	High Significance	Very High Significance	Very High Significance
	High	Not Significant	Minor	Medium Significance	High Significance	Very High Significance
	Medium	Not Significant	Minor	Minor	Medium Significance	High Significance
	Low	Not Significant	Minor	Minor	Minor	Medium Significance
	Negligible	Not Significant	Not Significant	Minor	Minor	Minor

The environmental and social topic chapters outline where this approach to assigning the significance of an effect varies, according to the requirements of that discipline. Assessing the likely significant effects of the Project on the environment considers the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, reversible and irreversible, beneficial and adverse effects of the Project. Unless indicated otherwise in the technical chapters, those effects classified as moderate or major are considered to be 'significant' and those effects classified as negligible or minor are considered to be 'not significant' in EIA terms.

Direct effects arise as a direct consequence of a Project, for example an increase in construction traffic. Indirect effects are those which are not a direct result of the project, but occur away from the original effect or as a result of a complex pathway. The effect pathway is mediated or transmitted by effects on another receptor. Indirect effects consist of a sequence of at least two effect steps. For example, effects of traffic may indirectly affect air quality, and in turn affect people. There are many such interactions, which have been taken into account in for each discipline. A secondary effect is a change to the environmental setting of a receptor, which in turn affects the receptor.

The EIA Directive also requires the assessment of cumulative effects. There are two aspects to cumulative effects:

- Those arising from the Project in combination with other projects or project proposals; and
- Additional impacts arising from interrelationships within the same project.

Consideration has been given to any proposals within the vicinity of the Project that have the potential to come forward to a similar timescale, and hence where there is the potential for interaction of impacts with those arising from the proposed Project to occur, either during construction or operation. Relevant proposals have been outlined at the outset when the site and its surroundings are described. Where relevant, the potential

impacts of any or all of these projects, along with any others subsequently identified, have been considered in combination with those of the Project, within the relevant discipline chapters.

The potential for cumulative effects to arise as a result of several different impacts resulting from the Project affecting a single receptor, or group of receptors, has also been considered. Individually, these effects might not be significant, but collectively they could assume a greater level of significance. Such effects could be negative or positive. The potential for such cumulative effects have been assessed within the Chapter 16.

The Supplementary ESIA Report does not use the term combined effects, as these are considered to be included within cumulative effects, nor does it use the term synergistic effects, as these are contained within direct, indirect and cumulative effects.

With regards to the frequency and duration of effects, it considers whether the effect will be continual or intermittent over the period of time identified. Duration of effect is defined in Table 10.

Table 10 - Duration of Effect

Classification	Guidance
Long Term	10-15 years
Medium Term	5-10 years
Short Term	2-5 years
Very Short Term	<2 years

Potential effects will be described as either temporary or permanent, according to whether or not the effect is expected to last for an indefinite period of time, and are be detailed within the discipline chapters.

Any effects described as reversible or irreversible refer to whether the effect could be removed if deliberate action were taken to do so. This judgement is based on the timescale for a receptor's return to baseline conditions without intervention. If the timescale for a receptor's return to baseline conditions is greater than 15 years then it is considered irreversible and if it is less than it is considered reversible.

A beneficial effect is defined as one that is favourable or otherwise beneficial to the condition of a receptor. An adverse effect is one that is unfavourable or otherwise adverse to the condition of a receptor.

4.6 MITIGATION OF EFFECTS

The Supplementary ESIA Report includes details of any measures that can be practicably implemented to prevent or reduce any significant effects on the environment. The identification of any such measures has been undertaken as part of the assessment process, and in parallel with the design process to incorporate measures into the Project, wherever feasible.

Effects have been assessed following the inclusion of mitigation measures as outlined above. If any significant effects remain after mitigation of significant adverse effects, these residual effects have been reported in the Supplementary ESIA Report. Mitigation measures have also been incorporated into the ESAP.

5 AIR QUALITY

5.1 LEGISLATION

Applicable laws, directives, policy and guidance are outlined in the table below.

Table 11 - Air Quality Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Sanitary and Epidemiological Requirements for the Atmospheric Air Quality of the Republic of Kazakhstan No. 629.	2004
EU Directives	
Air Quality Directive 2008/50/EC.	2008
Policy	
World Health Organisation (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide.	2005
Guidance	
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control.	2014
Institute of Air Quality Management (IAQM): Guidance on the Assessment of Dust from Demolition and Construction.	2016
Highways Agency. Design Manual for Roads and Bridges (DMRB). Air Quality, HA207/07.	2007

5.2 ASSESSMENT METHODOLOGY

5.2.1 SCOPE OF THE ASSESSMENT

The scope of this assessment includes consideration of the potential effects on air quality that may arise during the construction and operational phases of the Project, specifically:

- Increases in dust and particulate matter (PM_{10}) concentrations at existing receptors due to construction activities;
- Changes in ambient concentrations of nitrogen dioxide (NO_2) and PM_{10} at existing receptors as a result of exhaust emissions arising from construction plant and traffic; and,
- Increases in pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) as a result of exhaust emissions from road traffic generated by the operation of the Project at relevant receptor locations.

5.2.2 ASSESSMENT METHODOLOGY

5.2.2.1 CONSTRUCTION PHASE

An assessment of construction phase effects in terms of deposited dust and ambient PM_{10} concentrations has been undertaken following the relevant methodology published by the Institute of Air Quality Management (IAQM) in the UK in the absence of a local prescribed methodology.

The IAQM assessment is undertaken where there are: 'human receptors' within 350 m of the site boundary, or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s); and / or 'ecological receptors' within 50 m of the site boundary, or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

This assessment considers the risk of effects in relation to the following construction activities, which are generally undertaken:

- Demolition;
- Earthworks;
- General construction activities; and
- Trackout (dust and dirt that can be carried out of the site predominantly on the wheels of construction vehicles).

The IAQM method considers the nature and scale of the activities undertaken and the sensitivity of the area to increases in dust and PM_{10} levels to assign a level of risk (low, medium or high). Once the level of risk has been established, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in Appendix C.

In terms of emissions from Non-Road Mobile Machinery (NRMM) i.e. construction plant, information regarding the number, type and operations of NRMM are unavailable and consequently their effect on local air quality has been assessed qualitatively using professional judgement.

It has been assumed that construction traffic will access the Project either from Kapshagai Town or Kurty Village. A qualitative assessment of impacts on ambient NO_2 and PM_{10} concentrations has been carried out, as information on the number of road vehicles associated with the construction phase is also unavailable.

5.2.2.2 OPERATIONAL PHASE

Assessment of the effects of the operational phase relate to potential changes in ambient concentrations of NO_2 and PM_{10} has been undertaken following the methodology set out in the Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3 (Department for Transport, 2007).

The DMRB methodology is accompanied by a spreadsheet screening tool, which can be used to calculate concentrations of pollutants that are most likely to exceed the WHO guidelines and EU limit values are at user specified distances from the nearest road edge. This spreadsheet tool has not been updated since 2007, so it contains emission factors that are out of date for the UK vehicle fleet. However, at present new vehicles entering the UK fleet were Euro 4 standard (from January 2005 to September 2009) and according to the United Nations Environment Programme (UNEP) report "*Vehicle emissions, fuel quality standards and fuel economy policies in Kazakhstan*"[4], Euro-4 vehicles were expected to be introduced in January 2014. Therefore, the use of the screening tool for this assessment is considered appropriate.

This screening tool uses Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph), and the percentage of Heavy Duty Vehicles[5] (HDVs), to predict pollutant concentrations at selected relevant locations. The traffic data for the assessment were approved by KazAutoZhol on the 5th May 2017 and are detailed below:

For the screening assessment, two scenarios have been considered:

- Scenario 1: Baseline 2018, Total AADT: 2,789, % HDVs: 32%, speed: 50kph; and
- Scenario 2: Opening year of 2021 with Project, Total AADT: 3,228, % HDVs: 32%, speed: 50kph.

It has been assumed that there will be no change in vehicle emission factors from 2018 to 2021 to provide a worst-case approach to the assessment.

Changes in concentrations of NO_2 and PM_{10} due to the increase in traffic volume generated by the Project have been predicted as these are the local air pollutants of most concern in the context of the Project. It has not been possible to predict total concentrations of these pollutants due to the absence of information on the background air quality in the local area in which the Project is located.

Details of the receptors considered in this part of the assessment are provided in the table overleaf and their locations shown in the figure overleaf.

[4] UNEP (2013). Vehicle Emissions, Fuel Quality Standards and Fuel Economy Policies in Kazakhstan, Stocktaking Analytical Report.
[5] Trucks, Buses and Coaches (i.e. vehicles over 3.5 tonnes).

Table 12 - Air Quality Human Receptors

ID	Description	Longitude	Latitude	Distance from Existing Road	Distance from New Road Alignment
1	Residential area of Kapshagai Town	77° 2'36.37"E	43°50'49.78"N	80	80
2	Farm 3	76°25'22.33"E	43°55'45.62"N	220	220
3	Farm 4	76°20'43.86"E	43°54'2.98"N	250 (230)	50
4	Farm 9	76°50'28.13"E	43°52'37.24"N	210	230
5	Farm 11	76°55'32.42"E	43°51'43.83"N	250 (230)	250

Figure 1 - Location of Receptors

5.2.3 SIGNIFICANCE CRITERIA

5.2.3.1 CONSTRUCTION PHASE

For the construction phase, IAQM guidance regarding the determination of a significant effect has been followed, where:

- *"IAQM recommends that significance is only assigned to the effect after considering the construction activity with mitigation"*[6]; and,
- *"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'"*[7].

5.2.3.2 OPERATIONAL PHASE

The impact descriptors and significance criteria for the assessment of operational effects have been described in accordance with ESIA methodology and are detailed in Chapter 4. Pollutant concentrations have been compared to EU and WHO limit values, in addition to the Kazakhstan objectives. This approach has been followed to determine whether or not local air quality impacts are likely to give rise to a significant effect, which may be adverse or beneficial.

In determining if an effect is significant the following have been considered:

- The magnitude of each change in ambient pollutant concentration at each receptor (i.e. the impact as given by the impact descriptors);
- The existing and future air quality in the absence of the Project; and
- The extent of current and future population exposure to the impacts.

5.3 BASELINE CONDITIONS

The United Nations Economic Commission for Europe (UNECE) Third Environmental Performance Review for RoK commenced in 2018. According to the second Environmental Performance Review[8] published in 2008, air pollution is an issue in Almaty, the closest city to the Project, and other industrial cities. The report states that the issues in Almaty are partly a result of its geographical location but also due to the poor environmental performance of industries. Overall, in large towns and cities in Kazakhstan the increase in private car ownership coupled with low quality fuel has led to an increase in mobile sources of pollution and emissions. Since the publication of the Second Review, work[9] has been undertaken to improve both the monitoring network and the industrial permitting regime in RoK.

The National Hydrometeorology Centre of the RoK "Kazhydromet" monitors air pollution[10] in the largest cities and industrial centres at 146 locations, including 56 manual, 90 automatic and 14 mobile monitoring stations. The pollutants monitored include NO_2, PM_{10} and $PM_{2.5}$. The location of the monitoring stations is shown in the figure below.

[6] Institute of Air Quality Management (2016). Guidance on the Assessment of Dust from Demolition and Construction.
[7] Institute of Air Quality Management (2016). Guidance on the Assessment of Dust from Demolition and Construction.
[8] United Nations (2008). Environmental Performance Reviews, Kazakhstan Second Review. Available at: https://www.unece.org/fileadmin/DAM/env/epr/epr_studies/kazakhstan%20II.pdf [Accessed on 17/07/2018].
[9] World Bank (2013) Joint Economic Research Programme, Towards Cleaner Industry and Improved Air Quality Monitoring in Kazakhstan. Available at: http://documents.worldbank.org/curated/en/132151468047791898/pdf/839150WP0P133300Box0382116B00OUO090.pdf [Accessed on 17/07/2018].
[10] Ministry of Energy, Hydrometeorology Centre. Environmental monitoring. Available at: https://kazhydromet.kz/en/p/monitoring-sostoania-okruzausej-sredy [Accessed 17/07/2018].

Figure 2 - Air Quality Monitoring Stations

There is no air quality monitoring undertaken in the vicinity of the Project, which is likely to be due to the lack of significant pollution sources in the area. The closest available monitoring is undertaken in Almaty City and will therefore not be representative of background concentrations in the area in which the Project is located.

A summary of the 20-minute monitoring data recorded at Almaty City is presented in the table below. It is evident that in large cities the pollutant concentrations are elevated with concentrations of NO_2 close to the Kazakhstan objective. It is anticipated that background concentrations along the route of the Project will be significantly lower and well below the relevant objectives, considering there are no significant sources of pollution in the area.

Table 13 - Air Quality Monitoring at Almaty City (µg/m^3)

Pollutant	20-minute Kazakhstan Objective	2016	2017	Q1 2018	Q2 2018
NO_2	85	80	70	50	56
PM_{10}	-	50	30	40	17
$PM_{2.5}$	-	20	9	20	7
Suspended Particles (Dust)	500	200	171	200	153

Concentrations recorded as part of baseline monitoring for the Shymkent-Tashkent (southern Kazakhstan) and Aktobe-Mortuk (northern Kazakhstan) road projects, based on the average of 2-3 consecutive 20-minute samples (Russian methodology РД 52.04.186-89) are presented in the table below. Shymkent-Tashkent connects Kazakhstan to Uzbekistan and Aktobe-Mortuk connects Kazakhstan with Uzbekistan. The roads experience significantly higher volumes of traffic than the road proposed and therefore concentrations recorded at roadside locations to the route of the Project will be much lower.

Table 14 - Air Quality Monitoring at Shymkent-Tashkent and Aktobe-Mortuk Road Projects (µg/m^3)

Pollutant	20-minute Kazakhstan Objective	Shymkent-Tashkent (March 2015)	Aktobe-Mortuk (April 2018)
NO_2	85	85	50-82
Suspended Particles (Dust) >20%SiO_2	500	120	52-95
Suspended Particles (Dust) <20%SiO_2		52	-

5.4 POTENTIAL IMPACTS

5.4.1 CONSTRUCTION PHASE

5.4.1.1 INCREASE IN DUST AND PM_{10} GENERATED BY ON-SITE ACTIVITIES

During the construction phase, there will be a number of activities that are likely to generate and / or re-suspend dust and PM_{10}. Their likely effects have therefore been evaluated using the risk assessment approach published by the IAQM.

The main sources of dust and PM_{10} during the construction phase will include:

- Site clearance and preparation;
- Preparation of the Construction Sites and Road Material Sites;
- Earthworks;
- Materials handling, storage, stockpiling at the Road Material Sites, spillage, and disposal;
- Movement of vehicles and construction traffic within along the road (including dumper trucks);
- Exhaust emissions from NRMM, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of roads and areas of hardstanding at the construction sites and road material sites; and
- Site preparation and restoration after completion of the road construction.

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

5.4.1.2 ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

The results of the assessment are summarised below.

Demolition

It is understood that there will not be significant demolition works, apart from the removal of a section of the existing road during realignment. Therefore, the potential dust emission magnitude is considered to be slight for demolition activities.

Earthworks

The earthwork activities are mainly associated with the excavation of embankments, which will be undertaken at a number of locations along the route of the Project during the construction phase. Therefore, the earthworks area at any one point is assumed to be between 2,500- 10,000 m^2. The total material that will be moved is estimated to be more than 100,000 tonnes. Therefore, the potential dust emission magnitude is considered to be large for earthwork activities.

Construction

The main construction activities that will be undertaken are the construction / alteration of the Project. It is understood that there will be a concrete batching plant on site during the construction phase of the Project. Therefore, the potential dust emission magnitude is considered to be large for construction activities.

Trackout

It is understood that there will be over 50 HDV movements associated with the construction phase of the Project in any one day travelling on a moderately dusty surface. Therefore, the potential dust emission magnitude is considered to be large for trackout.

The table below provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 15 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Slight
Earthworks	Large
Construction Activities	Large
Trackout	Large

5.4.1.3 ASSESSMENT OF SENSITIVITY OF THE STUDY AREA

The wind direction in the Almaty Region, according to data obtained from the weather station in Almaty, is predominantly from the north-east, followed by winds from the north-west. Therefore, the sensitive receptors to the south-west and south-east are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

Depending on wind speed and turbulence, it is likely that the majority of dust would be deposited in the area immediately surrounding the dust source.

The route of the Project, is assumed to also be the main construction route that will be taken by construction vehicles to access the Project and along it there are less than ten residential properties located within a distance of 50 m. Given the existing high dust concentrations in Almaty and the elevated regional PM_{10} and dust concentrations, it has been assumed that background PM_{10} and dust will be elevated but below the EU objective of 40 µg/m^3. There are no designated ecological sites within 50 m of the Project.

Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM_{10} has been derived for each of the construction activities considered. The results are shown in the table below.

Table 16 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low	Low
Human Health	Medium	Medium	Medium	Medium

5.4.1.4 RISK OF IMPACTS

The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. The table below provides a summary of the risk of dust impacts for the Project. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 17 - Summary of Construction Effects on Air Quality

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Minor	Minor	Minor
Human Health	Minor	Medium	Medium	Medium

Considering all of the above, in accordance with the IAQM guidance the overall risk of the surrounding area in terms of dust soiling low and for human health effects it is medium. Therefore overall, there is likely to be a direct, temporary, short term medium adverse effects (significant) on sensitive receptors, prior to the implementation of mitigation measures.

5.4.1.5 INCREASE IN POLLUTANT CONCENTRATIONS (NAMELY NO_2 AND PM_{10}) AS A RESULT OF EXHAUST EMISSIONS ARISING FROM CONSTRUCTION TRAFFIC AND PLANT ON LOCAL AIR QUALITY

The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access and along the likely routes taken by construction traffic to access the Project.

Final details of the exact plant and equipment likely to be used on site will be determined by the appointed contractor. The number of plant and their location within the site are likely to be variable over the construction period.

Due to the number and proximity of sensitive receptors to the potential routes that will be used by construction vehicles, and the area in which the plant is operating, the magnitude of the effects of their emissions on local air quality are negligible (not significant).

5.4.2 OPERATIONAL PHASE

The two tables below present the results of the DMRB exercise.

The maximum change in annual mean NO_2 concentrations as a result of the operation the Project is 0.08µg/m^3. Taking into account the expectation that NO_2 background concentrations are likely to be within the relevant EU annual mean objective.

The maximum change in PM_{10} concentrations as a result of the operation of Project is 0.01µg/m^3. There is no available PM_{10} data for the local area. However, as the change in PM_{10} concentrations as a result of the Project is very small.

Overall the magnitude of the effects of their emissions on local air quality are negligible (not significant).

Table 18 - Predicted Annual Mean NO_2 Concentration - EU Objective 40µg/m^3

Receptor	2018 Baseline	2021 with Project	Change	% Change of the Obj.	Effect
1	0.60	0.68	0.08	0.2	Negligible
2	0.03	0.03	0.00	0.0	Negligible
3	0.01	0.01	0.00	0.0	Negligible
4	0.05	0.01	-0.04	-0.1	Negligible
5	0.01	0.01	0.00	0.0	Negligible

Table 19 - PM_{10} Concentration - EU Objective 40µg/m^3

Receptor	2018 Baseline	2021 with Project	Change	% Change of the Obj.	Effect
1	0.07	0.08	0.01	0.0	Negligible
2	0.00	0.00	0.00	0.0	Negligible
3	0.00	0.00	0.00	0.0	Negligible
4	0.00	0.00	0.00	0.0	Negligible
5	0.00	0.00	0.00	0.0	Negligible

5.5 MITIGATION MEASURES

5.5.1 CONSTRUCTION PHASE

Based on the assessment results, the mitigation measures that are recommended to be implemented to eliminate the identified risk of dust impacts associated with the various activities of the construction phase of the Project are listed below.

General communication:

- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

Site management:

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in place to avoid reoccurrence;
- The complaints log should be made available to the local authority on request; and
- Any exceptional incidents that cause dust and/or air emissions, either on- or offsite should be recorded, and the action taken to resolve the situation recorded in the log book.

Preparing and maintaining the site:

- The site layout should be planned so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Where practicable, solid screens or barriers should be erected around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Site runoff of water or mud should be avoided; and
- Site fencing, barriers and scaffolding should be kept clean using wet methods.

Operating vehicle / machinery and sustainable travel:

- It should be ensured that all vehicle operators switch off engines when stationary with no idling of vehicles; and
- The use of diesel or petrol-powered generators should be avoided and mains electricity or battery powered equipment used where practicable.

Operations:

- Cutting, grinding or sawing equipment will be fitted or used in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- It will be ensured that an adequate water supply will be on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate;
- Enclosed chutes and covered skips will be used;
- Drop heights from loading shovels, hoppers and other handling equipment will be minimised and fine water sprays used on such equipment wherever appropriate; and
- It will be ensured that equipment is readily available on site to clean any dry spillages, and spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.

Waste management:

- Bonfires and the burning of waste materials will be avoided in accordance with national laws.

Measures specific to earthworks:

- The surface area of stockpiles will be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- Where practicable, windbreak netting / screening will be positioned around material stockpiles and vehicle loading / unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the site and the surroundings;

- Where practicable, stockpiles of soils and materials will be located as far as possible from sensitive properties, taking account of the prevailing wind direction; and
- During dry or windy weather, material stockpiles and exposed surfaces will be dampened down using a water spray to minimise the potential for wind pick-up.

Measures specific to construction:

- All construction plant and equipment will be maintained in good working order and not left running when not in use.

Measures specific to trackout:

- It will be ensured that vehicles entering and leaving the site are covered to prevent escape of materials during transport; and
- A wheel washing system will be implemented (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

5.5.1.1 RESIDUAL EFFECTS

The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice are considered to be not significant.

The residual effects of emissions to air from construction vehicles and plant on local air quality are considered to be not significant.

5.5.2 OPERATION PHASE

There no mitigation measures proposed for the operational phase of the Project, as these are not considered to be necessary given the magnitude of the predicted change in concentrations.

5.5.2.1 RESIDUAL EFFECTS

The residual effects of the operational phase on local air quality are considered to be not significant.

6 BIODIVERSITY AND LIVING NATURAL RESOURCES

6.1 LEGISLATION

Applicable laws, directives and guidance are outlined in the table below.

Table 20 - Biodiversity and Living Natural Resources Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Law of the Republic of Kazakhstan about Protection, Reproduction and Use of Fauna No. 593-II.	2004
Law of the Republic of Kazakhstan on Specially Protected Natural Areas No. 175.	2006
EU Directives	
EU Habitats Directive 92/43/EEC	1992
EU Birds Directive 2009/147/EC	2009
Guidance	
EBRD. Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.	2014
Chartered Institute of Ecology and Environmental Management (CIEEM). Guidelines foe Ecological Impact Assessment in the UK and Ireland.	2016

6.2 ASSESSMENT METHODOLOGY

The methods for assessing the effects upon biodiversity and natural resources as a result of the Project broadly follow guidance published by CIEEM. This methodology is summarised within the following sections.

6.2.1 COLLECTION OF BASELINE DATA

Baseline data has been obtained through a combination of a high-level site reconnaissance visit, and desk-based review of third party / consultation information. The desk-based review has been informed by the following resources:

- Protected areas information (as obtained from online resources[11]);
- Red List of Kazakhstan[12];
- Original EIA for the Project[13];
- CBD national biodiversity review[14];
- IUCN species information[15]; and
- Aerial imagery[16].

[11] Protected Plant (2018). WDPA Dataset. Available at: www.protectedplanet.net [Accessed: 27/07/18].
[12] Red List (2018). The Red List of Republic of Kazakhstan. Available at: http://www.redbookkz.info/en/ [Accessed: 27/07/18].
[13] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

[14] CBD (2009). The fourth national report on progress in implementation of the convention on biological diversity republic of Kazakhstan.

[15] International Union for Conservation of Nature (2018). Available at: www.iucn.org [Accessed: 27/07/18].
[16] As obtained via Google Earth Pro [Accessed: 27/07/18].

6.2.2 RECEPTOR EVALUATION

Upon collection / receipt of baseline information, an evaluation was completed to identify those receptors of sufficient value[17] to warrant full assessment.

6.2.3 DESCRIPTION OF IMPACT MAGNITUDE

The nature of the potential impacts was then described within the context of the valued receptors identified, both in terms of temporal and spatial scale.

6.2.4 EFFECT SIGNIFICANCE

The nature of the impact described in terms of its effect upon the valued receptor was then assessed to qualitatively define its significance.

6.2.5 DESCRIPTION OF REQUIRED MITIGATION MEASURES

Where significant effects are identified, mitigation measures are described in order to reduce the residual effects to a level that is considered acceptable within the context of the valued receptor in question. Additionally, general mitigation is included for the purposes of reducing non-significant effects also.

6.2.6 SUMMARY OF RESIDUAL EFFECTS

The final stage of assessment is a summary of residual effects. Given the relatively high-level nature of baseline data collection, the subsequent assessment has necessarily adopted a precautionary approach.

6.3 BASELINE CONDITIONS

6.3.1 DESIGNATED SITES

The Project does not bisect any areas designated for their importance to nature conservation (or equivalent). The closest such area is the Altun Emel National Park (IUCN Management Category II[18]), which is located approximately 135 km to the east of the Project at its closest point.

6.3.2 HABITATS

The Project is located within / close to both the 'temperate grasslands, savannas, and shrublands' and the Deserts and Xeric shrublands biome, within the Palearctic biogeographic region (as defined by WWF[19]), although ground conditions across the site are indicative of a heavily modified landscape in which semi-natural habitats have been lost to support agricultural land use across the region. Aside from a sprawling field network, the only other notable habitat features include those such as access tracks and field boundaries inherently linked to agriculture; and tree lines that have been planted to provide 'natural' barriers to drifting snow.

6.3.3 FLORA AND FAUNA

The floral assemblages across the site are significantly influenced by the prevailing agricultural land use, with 'escapees' likely to be present outside of the field boundaries.

Faunal assemblages across the Site are likely to be limited (again, by virtue of the dominant agricultural land use). Marmot sp. were observed on site, along with species of birds of prey overflying the Project. The habitats are suitable for use by rodents, common mammals and other fauna (e.g. common reptiles and invertebrates).

RoK supports internationally important populations of ungulates (such as Saiga Antelope and Kulan). No such species have been recorded within or around the Project; the closest population is considered likely to be approximately 135 km east, within the Altun Emel National Park (Kulan).

[17] 'Value' is assessed against a broad array of parameters, including (but not limited to): naturalness, rarity, importance to ecosystem functioning, scale/extent, diversity, etc.
[18] Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.
[19] Olson, *et al.* (2001). Terrestrial Ecoregions of the World: A New Map of Life on Earth. Bioscience Vol. 51 No. 11. P933-938.

6.4 POTENTIAL IMPACTS

6.4.1 RECEPTOR EVALUATION

The information collected to inform this assessment would suggest that the Site supports a biodiversity resource that is of limited value. The heavily-managed, open agricultural landscape will be very limited in terms of the opportunities provided to rare or protected fauna / flora; furthermore, potential use of the site in the vicinity of the Project by rare ungulates (known to be present in pockets across RoK) is not considered applicable following consultation with the Forestry and Wildlife Committee of the Ministry of Agriculture. Birds of prey were observed overflying the Project, although the vicinity of the Project itself does not appear to offer any features of particular importance to such birds (in particular those included on the Red List). It is likely that birds of prey forage over the agricultural landscape, feeding on rodents, other small mammals and road kill.

With this in mind, those features of greatest value are considered to be the linear extents of treelines, scrub, etc., which are infrequently scattered in the vicinity of the Project. Such features will not only provide a localised shelter resource, but will also serve as a foraging resource for fauna such as terrestrial mammals and bats. Such features are considered to be of local value within the context of the Project.

The potential impacts are described in terms of their occurrence during the construction or operational phases of the Project as follows.

6.4.2 CONSTRUCTION PHASE IMPACTS

6.4.2.1 HABITAT LOSS AND DEGRADATION

The Project will result in the loss of fragments of tree lines and scrub. These losses will be permanent and irreversible.

Given the low sensitivity of the receptor (habitat value), slight magnitude of the impact (the footprint of the Project), the effects of this loss are considered to be minor (not significant).

6.4.2.2 DISTURBANCE/DISPLACEMENT

Construction activities will result in localised disturbance that may disturb fauna to the extent that they are displaced from the area. However, given the low sensitivity of the receptor (habitat value), slight magnitude of the impact (the footprint of the Project), the effects of this loss are considered to be minor (not significant).

6.4.2.3 SEVERANCE

A potential impact associated with road projects / linear projects is the severance of migration / commuting routes, with the road forming a barrier to animal movement. Given the known presence of internationally significant ungulate populations within Kazakhstan, and their habitual migration behaviour, this impact was considered relevant to the Project. However, in the absence of any such ungulate populations within sufficient proximity to the Project (e.g. the closest confirmed Kulan population is approximately 135 km to the east)

Given the high sensitivity of the receptor (ungulate populations), slight magnitude of the impact (due to the distance from closest confirmed Kulan population), the effects of this loss are considered to be minor (not significant).

6.4.3 OPERATION PHASE IMPACTS

6.4.3.1 COLLISION/RTAS

The operation of the Project has the potential to increase the risk of collisions and road traffic accidents involving animal (livestock / wildlife) by virtue of increasing traffic volumes. However, the design of the Project to include a mesh fence and cattle underpasses should mitigate and reduce the risk. Furthermore, increased roadkill may have local positive effects upon local scavenging fauna (e.g. potentially the birds of prey known to be present). There are no known important faunal assemblages in proximity to the Project.

Given the low receptors (animal, livestock and faunal assemblages), slight magnitude of the impact (due to the use of mesh fence and cattle underpasses), the effects of this loss are considered to be negligible (not significant).

6.5 MITIGATION MEASURES

The potential for significant effects has not been identified in relation to the Project; however, this conclusion is drawn with a recognised confidence limit as a result of the limited extent of baseline data collected to inform

this assessment. With this in mind, the following standard mitigation measures should be implemented in order that the negative impacts to biodiversity are reduced where possible:

- Removal / loss of semi-natural habitat should be minimised throughout. This is particularly relevant to the tree-lines and scrub scattered across the site. Where this is not possible, it will be necessary for a suitably qualified ecologist/biodiversity specialist undertakes a walkover of these areas in order to inform more detailed mitigation proposals to compensate for losses (both in terms of habitat/features and also potential effects to fauna associated with these areas).
- Any vegetation clearance should be programmed to be completed outside of the breeding bird season. Where this is not possible, it will be necessary for a pre-clearance walkover to be completed by a suitably qualified ecologist to check for the presence of active bird nests. Should any nests be identified, it is recommended that these are excluded from works until such time that the young birds have fledged the nest - detailed advice in this regard should be sought from the ecologist upon completion of survey.
- A general animal welfare impact exists during construction activities with the potential for injury or death to mobile fauna as they access the active construction site. In order to reduce this, all open excavations, hazardous materials, and plant machinery should be secured and made safe when not in use. Furthermore, a fence is proposed for the boundary of the site which will help to prevent site access by wildlife, minimising the potential impacts from the construction activities.

On the assumption that baseline conditions are corroborated during pre-construction walkovers, it is considered that the Project will not result in significant residual effects upon biodiversity and living natural resources.

7 CLIMATE CHANGE

This chapter considers the impacts and effects of the Project in terms of;

- The contribution of the Project to climate change: the greenhouse gas (GHG) emissions assessment; and
- The vulnerability of the Project to climate change: climate change resilience and adaptation assessment.

7.1 LEGISLATION

Applicable laws, treaties, and guidance are outlined in the table below.

Table 21 –Climate Change Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Treaties	
United Nations Framework Convention on Climate Change.	1995
Kyoto Protocol.	1997
Doha Amendment to the Kyoto Protocol.	2013
The Paris Agreement.	2015
Guidance	
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control.	2014
IEMA. EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance.	2017
BSI. PAS 2080: Carbon Management in Infrastructure.	2016
IEMA. Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.	2015

7.2 GREENHOUSE GAS EMISSIONS ASSESSMENT

7.2.1 ASSESSMENT METHODOLOGY

7.2.1.1 INTRODUCTION

A qualitative assessment has been carried out to identify the potential impacts of the Project on the climate. This has identified the principle potential sources of GHG emissions due to the Project, and has provided an indication of the likely magnitude of each potential emissions source, based on professional judgement. It is likely that a full quantitative assessment of Project related GHGs as required by EBRD Performance Requirement 3 (PR3), will not be required. However, in line with best practice and the 2014 amendment to the EIA Directive, and in light of the potential for indirect impacts on climate (emissions), it is recommended that a full assessment is undertaken. The scope of this assessment, the data required and the methods to use when undertaking a full assessment have also been provided.

7.2.1.2 EBRD REQUIREMENTS

EBRD PR3, aims to promote the reduction of Project-related GHG emissions. The GHG section of the requirements states that:

- The client's environmental and social assessment process will consider alternatives and implement technically and financially feasible and cost-effective options to avoid or minimise Project-related GHG emissions during the design and operation of the Project. These options may include, but are not limited to, alternative Project locations, techniques or processes, adoption of renewable or low carbon

energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.

- For Projects that currently produce, or are expected to produce post-investment, more than 25,000 tonnes of CO_2e annually, the client will quantify these emissions in accordance with EBRD Methodology for Assessment of Greenhouse Gas Emissions (This Project is unlikely to exceed this threshold). The scope of GHG assessment shall include all direct emissions from the facilities, activities and operations that are part of the Project or system, as well as indirect emissions associated with the production of energy used by the Project. Quantification of GHG emissions will be conducted by the client annually and reported to the EBRD.

7.2.2 BASELINE CONDITIONS

In the baseline (do nothing) scenario, GHG emissions occur constantly and widely as a result of human and natural activity including energy consumption, industrial processes, land use and land use change. The GHG assessment will consider where the Project results in additional or avoided emissions in comparison to the baseline scenario.

7.2.3 POTENTIAL IMPACTS

The impacts of GHGs relate to their contribution to climate change. These impacts are global and cumulative in nature, with every tonne of GHGs contributing to impacts on natural and human systems. GHG emissions result in the same global effects wherever and whenever they occur and, therefore, the sensitivity of different human and natural receptors is not considered.

GHGs are natural and man-made gases occurring in the atmosphere which absorb and emit infrared radiation thereby maintaining the Sun's energy within the Earth's atmosphere. There is a scientific consensus that the major increase in the concentration of GHGs from man-made sources is contributing to global warming and climate change.

The seven main GHGs defined by the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. In combination, these GHG emissions are commonly expressed in terms of carbon dioxide equivalents (CO_2e) according to their relative global warming potential. For this reason, the shorthand 'carbon' may be used to refer to GHGs.

The potential impacts of GHG on the Project may affect the receptors and aspects such as:

- Natural Systems - Alterations to geographic ranges of protected species through climate change; and
- Human Systems - Alterations to winds, flood, drought regimes affecting crop viability, flood risk for housing farms and infrastructure.

7.2.3.1 POTENTIAL EMISSIONS SOURCES

The qualitative assessment of emissions is presented in the table below.

Table 22 - Potential Emissions Sources

Lifecycle Stage (as per PAS 2080)		Potential Sources of Emissions (not exhaustive)	Within EBRD Requirements	Predicted Magnitude
Construction	Product stage (manufacture and transport of raw materials to suppliers) A1-320	Embodied emissions associated with extraction and manufacturing of the required raw materials.	Not within EBRD PR3 requirements scope - not direct emissions	Medium
	Transport of materials to site	Emissions from fuel and electricity used in	Not within EBRD PR3 requirements scope - not	Medium

[20] PAS2080 Lifecyle reference codes

Lifecycle Stage (as per PAS 2080)		Potential Sources of Emissions (not exhaustive)	Within EBRD Requirements	Predicted Magnitude
	A4	vehicles transporting materials to site.	direct emissions.	
	Plant and equipment use during construction A5	Emissions from fuel and electricity used in plant and equipment on site.	Not within EBRD PR3 requirements scope - not direct emissions.	Medium
	Transport of waste A5	Emissions from fuel/energy used in vehicles transporting materials to away from site.	Not within EBRD PR3 requirements scope - not direct emissions.	Medium
	Disposal of waste A5	Emissions from the final disposal of waste materials.	Not within EBRD PR3 requirements scope - not direct emissions.	Small
	Land use, land use change and forestry A5	Change in emissions associated with the clearance and disposal of vegetation (biomass).	Not within EBRD PR3 requirements scope - not direct emissions.	Small
Operation	Operation B1	Electricity used for lighting.	Within EBRD PR3 Requirements scope.	Small
	Maintenance, repair, replacement, refurbishment B2-5	Embodied emissions, and emissions from transport and plant associated with maintenance, repair, replacement, and refurbishment.	Emissions from transport and plant within EBRD PR3 Requirements scope, all other emissions not within EBRD PR3 requirements scope - not direct emissions.	Small
	Land use, land use change and forestry B8	Change in emissions associated with the existence of the Project hindering or promoting the sequestration of carbon dioxide into vegetation (biomass).	Not within EBRD PR3 requirements scope - not direct emissions.	Small
	End-user emissions (regional traffic flows) - traffic B9	Vehicles using highways infrastructure affected by the Project.	Not within EBRD PR3 requirements scope - not direct emissions.	Large
End of Life	Decommissioning process C1	Emissions from decommissioning work (i.e. fuel/electricity).	Not within EBRD PR3 requirements scope - not direct emissions.	Small
	Transport and disposal of materials C2-4	Emissions sources as fuel/energy consumption from the transport of materials to disposal sites or recovery.	Not within EBRD PR3 requirements scope - not direct emissions.	Small

7.2.4 MITIGATION MEASURES

7.2.4.1 CONSTRUCTION PHASE

The magnitude of greenhouse gas emissions associated with the construction phase of the Project can be minimised using the following methods:

- Minimising materials required for construction;
- Maximising the use of construction materials and products with recycled or secondary and low carbon content, from renewable sources, and offering sustainability benefit;
- Using locally-sourced materials where available and practicable to minimise the distance materials are transported from source to site; and
- Using more efficient construction plant and delivery vehicles, and/or those powered by electricity from alternative/lower carbon fuels.

7.2.4.2 OPERATIONAL PHASE

The magnitude of greenhouse gas emissions associated with the operational phase of the Project can be minimised by, amongst others:

- Designing, specifying and constructing the Project with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and all associated emissions);
- Designing, specifying and constructing the Project with a view to maximising the potential for reuse and recycling of materials/elements at the end-of-life stage;
- Specifying high efficiency mechanical and electrical equipment such as lighting (LED lights) and telecoms; and
- Operating, maintaining and refurbishing the Project using best-practice efficient approaches and efficient plant and equipment.

7.2.5 FURTHER STUDY

7.2.5.1 EBRD REQUIREMENTS

It is very unlikely that the Project will produce more than 25,000 tCO_2e from direct emissions per year during operations, and would therefore require emissions quantification as per the EBRD PR3 requirements. This is because the quantity of emissions expected to be emitted from maintenance plant and vehicles, and due to lighting either end of the Project, is expected to be small (less than 25,000 tCO_2e). Therefore, no further studies are required to comply with EBRD PR3.

However, even though emissions do not need to be quantified due to EBRD PR3 requirements, it is recommended that if practical, emissions are quantified in line with the 2014 amendment to the EIA Directive and best practice. This should be undertaken during the consultation period to determine the significance of emissions due to the Project. The scope of this type of assessment, and the data required to undertake this type of assessment is presented in Section 7.2.5.2.

7.2.5.2 PROPOSED SCOPE OF FURTHER STUDY

The table below summarises GHG emissions scoped in and gives details of proposed further assessment.

Table 23 - Potential Emissions Sources

Effect	Scoped In	Scoped Out	Level of Assessment	Justification / Reasoning	Data Required
Construction					
Product stage (manufacture and transport of raw materials to suppliers) A1-3	✓		Simple	Raw materials required the Project will result in embodied emissions and have the potential to be large.	Types and quantities of construction materials.
Transport of	✓		Simple	Construction stage emissions	Distance

Effect	Scoped In	Scoped Out	Level of Assessment	Justification / Reasoning	Data Required
materials to site A4				from fuel / energy consumption due to the delivery of material to site have the potential to be large.	materials will need to be transported.
Plant and equipment use during construction A5	✓		Simple	Construction stage emissions due to the use of fuel / energy on site have the potential to be large.	Predicted fuel use of construction plant.
Transport of waste A5	✓		Simple	Emissions from fuel / energy consumption due to the transport of waste materials, particularly fill, have the potential to be large.	Distance waste will need to be transported.
Disposal of waste A5		✓	N/A	Emissions from the disposal of waste are unlikely to be large.	N/A
Land use, land use change and forestry A5		✓	N/A	Emissions from the disposal of biomass are not expected to be large	N/A
Operation					
Operation B1	✓		Simple	Emissions from lighting although expected to be small are direct operational emissions from the Project, and therefore should be quantified.	Electricity consumption for lighting.
Maintenance, repair, replacement, refurbishment B2-5	✓		Simple	Maintenance, repair, replacement and refurbishment associated with the Project are not considered to be large emissions sources. However, the use of fuel in vehicles and equipment are direct operational emissions from the Project, and therefore should be quantified.	Predicted fuel use for maintenance transport and plant.
Land use, land use change and forestry B8		✓	N/A	The reduction in carbon sequestration due to the Project is not considered to be large.	N/A
End-user emissions (regional traffic flows) - traffic B9	✓		Simple	Changes to regional traffic flows are expected and this has the potential to result in a large change in GHG emissions.	Traffic modelling outputs - changes in vehicle type, speed, quantity, and distance, with and without the Project.

Effect	Scoped In	Scoped Out	Level of Assessment	Justification / Reasoning	Data Required
End of Life					
Decommissioning process C1		✓	N/A	Expected timescales for decommissioning are so far into the future that there is insufficient certainty about the likelihood, type or scale of emissions activity to determine their likely magnitude, even if they take place at all. As such these emissions sources will not be considered.	N/A
Transport and disposal of materials C2-4		✓	N/A		N/A

7.2.5.3 EMISSIONS CALCULATIONS

Emissions calculations should be completed in line with best practice carbon quantification methodologies (such as the GHG protocol)[21], and the EBRD GHG methodology[22]. Values should be reported as tonnes of carbon dioxide equivalents (tCO_2e).

7.2.5.4 ASSESSMENT OF VALUE, MAGNITUDE AND SIGNIFICANCE OF EFFECTS

There are currently no agreed thresholds for what level of greenhouse gas emissions is considered significant in an EIA context. Using guidance from the Institute of Environmental Managers and Assessors (IEMA)[23] professional judgement should be made regarding the potential significance and the need for assessment.

[21] World Resources Institute and WBCSD (2018). Greenhouse Gas Protocol. Available at: https://ghgprotocol.org/ [Accessed: 28/07/18].
[22] EBRD (2010). EBRD Methodology for Assessment of Greenhouse Gas Emissions.
[23] IEMA (2017). Assessing Greenhouse Gas Emissions and Evaluating their Significance.

7.3 VULNERABILITY OF THE PROJECT TO CLIMATE

7.3.1 ASSESSMENT METHODOLOGY

The assessment of vulnerability of the Project to the impacts of climate change has been informed by high level information on historic and projected change in climate variables. The assessment of potential impacts has been based on professional judgement.

The World Bank Climate Knowledge Portal[24] provides data on historic and projected climate for Kazakhstan from CMIP5 for the end of the century (2080-2099), RCP 8.5. This source has been used for the baseline conditions.

Details of the methodology for assessing vulnerability and risk associated with climate variables has been set out in Chapter 8.4.5 and will contain a simple assessment of climate resilience as follows.

- Climate change vulnerability assessment: considers the sensitivity of the Project to climate change and how exposure might change over the Project's lifetime;
- Climate change risk assessment: based on the likelihood and consequence of climate impacts for vulnerable infrastructure elements (identified in the previous stage); and
- Consideration of primary mitigation measures already incorporated into the Project design and any residual climate risks.

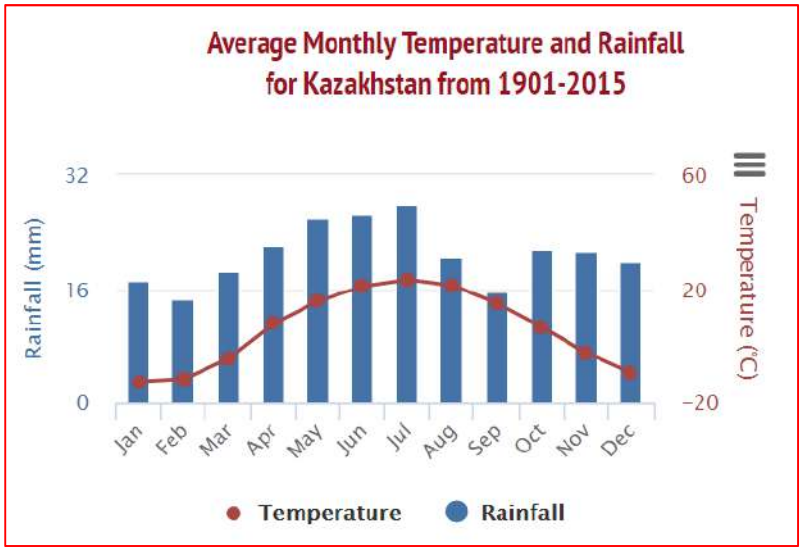
7.3.2 BASELINE CONDITIONS

The World Bank Climate Knowledge Portal was used to determine the exposure of the Project to climate change. This was based on a comparison of recent observed historical climate conditions, as well as future projections for key climate parameters.

7.3.2.1 Current Climate

The figure below shows the long-term average monthly temperature and rainfall for Kazakhstan from 1901-2015. It shows a large annual range in temperatures from a minimum of -12.6ºC in January to a maximum of 23.1ºC in July, with an average annual temperature of 5.7ºC. Rainfall is more consistent throughout the year, with an annual average rainfall of 21mm and ranging from a minimum of 14.5 mm in February to a maximum of 27.9 mm in July.

Figure 3 - Average Monthly Temperature and Rainfall for Kazakhstan from 1901 - 2015



[24] The World Bank Group (2015). Climate Change Knowledge Portal. Available at: http://sdwebx.worldbank.org/climateportal/index.cfm [Accessed 17/07/2018].

7.3.2.2 Projected Climate

Information on projected changes in different climate variables was taken from the World Bank Climate Knowledge Portal for Kazakhstan[25]. The portal uses CMIP5 models which were used in the latest IPCC's Fifth Assessment Report (AR5) and which are the most up-to-date Global Climate Model (GCM) projections available. Probabilistic projections of a range of climate variables are presented for the different Representative Concentration Pathways (RCP)[26], and for a range of time slices to the end of the 21st Century[27]. For projected climate, the worst-case approach has been taken, and so the 2080-2099 time slice has been used focusing on RCP 8.5. Summer values have been calculated from the average of June, July and August (JJA) and winter values have been averaged from December, January and February (DJF).

In general, climate change is projected to lead to wetter winters and drier summers (although there is some uncertainty around the direction of change under this RCP), with more extreme rainfall events likely to punctuate these average changes. CMIP5 suggests that by the end of the century, mean winter precipitation is expected to increase from the historical average of 17.2 mm by up to 7.1 mm (50th percentile), under RCP8.5. For the summer, by the end of the century, mean summer precipitation is expected to decrease from 25mm by -0.7mm (50th percentile), under the same scenario. The table below summarises the changes in mean winter and summer precipitation for the 2080-2099 time slice under RCP8.5.

Table 24 - Changes in Mean Winter and Summer Precipitation (mm) by the End of the Century Under RCP8.5

Period	RCP 8.5		
	10th	50th	90th
Summer	-12.8 mm	-0.7 mm	9.4 mm
Winter	-3.2 mm	7.1 mm	19.9 mm

In addition to projected changes in seasonal rainfall, the projections suggest that more rainfall will be delivered by intense events in winter, although less rainfall may be delivered by intense events in summer (note, there is some uncertainty in the direction of change). The variable produced by CMIP5, 'projected change in monthly rainfall of very wet days', indicates how much of the precipitation in an area comes from extreme rainfall events, which can be defined as a percentage of the heaviest 5% of precipitation events compared to the total. An increase in this number means extreme rainfall events will become more dominant. The table below shows the CMIP5 projections for changes in extreme precipitation by the end of the century under RCP8.5 and shows that a decrease of up to 0.5% (50th percentile) in rainfall of very wet days in the summer and an increase of up to 1.9% (50th percentile) in rainfall of very wet days in the winter have been projected for 2080-2099.

Table 25 - Percentage Changes in Monthly Rainfall of Very Wet Days in Winter and Summer by the End of the Century Under RCP8.5

[25] The World Bank Group (2015) Climate Change Knowledge Portal. Available at: http://sdwebx.worldbank.org/climateportal/index.cfm [Accessed 17/07/2018].
[26] CMIP5 shows data for 4 RCPs: 2.6, 4.5, 6 and 8.5. These are four greenhouse gas concentration trajectories adopted by the IPCC and are named after the possible range of radiative forcing values. More information on the nature of these trajectories can be found in the IPCC's Fifth Assessment Report (AR5) in 2014.
[27] CMIP5 projections are given for four-time periods: 2020 to 2039, 2040 to 2059, 2060 to 2079 and 2080 to 2099.

Period	RCP 8.5		
	10th	50th	90th
Summer	-2.6 %	-0.5 %	4.2 %
Winter	-0.9 %	1.9 %	6.1 %

In general, climate change is projected to lead to warmer summers and winters. CMIP5 suggests that by the end of the century, mean winter temperature in Kazakhstan is expected to increase from the historical average of -11.3 ºC by up to 5.8ºC (50th percentile) by the end of the century under RCP8.5. For the summer, by the end of the century, mean summer temperature is expected to increase by up to 5.8ºC (50th percentile) from 21.7 ºC under the same scenario. The table below summarises changes in mean winter and summer temperature for the end of the century under the RCP8.5 trajectory.

Table 26 - Changes in Mean Winter and Summer Temperature (ºC) by the End of the Century Under

Period	Rcp 8.5		
	10th	50th	90th
Summer	2.7 ºC	5.8 ºC	7.8 ºC
Winter	3.6 ºC	5.8 ºC	8.8 ºC

RCP8.5

In addition to changes in seasonal average temperatures, it is likely that there will be more extreme temperature events. By the end of the century, projections for maximum daily maximum summer temperature in Kazakhstan suggest increases of 5.4ºC. This indicates that the change in the warmest daily maximum temperature in each summer relative to the baseline conditions will be up to 5.4ºC higher. By the end of the century, change in the lowest daily minimum temperature in the winter relative to the baseline conditions will increase by up to 9.5ºC. The table below summarises changes in mean daily maximum temperature in summer and mean daily minimum temperatures in winter by the end of the century under RCP8.5.

Table 27 - Changes in Maximum Daily Maximum Temperature in Summer (ºC) and Minimum Daily

Variable	RCP 8.5		
	10th	50th	90th
Change in Summer Maximum Daily	1.8 ºC	5.4 ºC	9.9 ºC
Change in Winter Minimum Daily	6.3 ºC	9.5 ºC	14.4 ºC

Minimum Temperature (ºC) in Winter by the End of the Century Under RCP8.5

7.3.3 POTENTIAL IMPACTS

The impacts in relation to climate resilience relate to how the changing climate may affect the Project itself in terms of the construction and operation of the infrastructure, its ability to function and the end-users.

These are the climate variables which roads are typically sensitive to:

Precipitation:

- Roads and cycle/footways are sensitive to high rainfall. An average increase in winter rainfall may cause roads and footways to become flooded due to flooding of local watercourses (fluvial flooding) or surface water flooding (pluvial flooding). Flooding may mean that roads and footways are impassable

and cause loss of amenity. Flooding may also cause damage to paved surfaces (leading to increased maintenance requirements);

- Roads, bridges and footways are also sensitive to extreme rainfall events which, in addition to flooding, may also lead to destabilisation of soils and earthworks, potentially leading to temporary or permanent loss of amenity. Any electronic control equipment associated with the bridge will also be sensitive to flooding; and
- Roads and footways are also sensitive to low rainfall or drought. Prolonged dry periods may lead to drying out and cracking of earthworks and soils.

Temperature:

- Roads, bridges and footways are sensitive to extreme temperatures. High temperatures may cause damage to paved surfaces, including potential melting and deformation. An increase in solar radiation can also cause more rapid deterioration of materials and associated infrastructure such as signage; and Bridges are sensitive to high temperatures which affect thermal expansion joints and increase earth pressures.

Wind:

- Bridges are sensitive to high winds which increase wind loading on the structure. High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation. High winds can also cause wind-driven rain infiltration into building materials and surfaces which can increase maintenance costs and operational disruption. High winds also increase risk to bridge users (particularly high sided vehicles) and may lead to temporary closure. Road and footway users may also be sensitive to high winds. Associated infrastructure such as signage or signals could also be damaged by high winds; and
- Bridges are also sensitive to storms, particularly the risk of lightning strike. Electronic control equipment associated with bridges is likely to be highly sensitive to lightning strike.

Soils:

- Roads, bridges and footways are all sensitive to soil stability. Soil stability can be reduced as a result of extreme rainfall or prolonged periods of rainfall which can lead to waterlogging, as well as extreme temperatures and drought which can causes soils to dry out and crack. Earthworks and embankments associated with roads, bridges and footways are particularly sensitive to changes in soil stability; and
- Water availability can cause a number of impacts to water quality and soils. For example, greater water volumes can increase the mobilisation of pollutants in soils whilst water scarcity can increase the accumulation of chemicals and pollutants which may cause increased salinity and acidification. Sea level rise could also lead to increasing soil salinity. More acidic soils and/or water will increase the deterioration of building materials.

The potential impacts of climate change on the Project are diverse and may affect the receptors and aspects set out in the table below.

Table 28 - Impacts of Climate Change on Receptors and Aspects

Receptor	Potential Impacts of Climate and Weather-Related Risks
Geotechnics	Erosion.
	Stability of earthworks and compaction.
	Earthworks construction across existing landslip.
	Scour and erosion of earthworks.
	Stability of slopes, change in water levels/pore pressure.
	Drainage ditches.
Pavements	Design of foundations.
	Materials integrity, specification and construction details.
	Construction - laying surface dressing, microsurfacing, temperature susceptible materials.
	Skid resistance.
	Maintenance.

Receptor	Potential Impacts of Climate and Weather-Related Risks
Restricting Network Use	High winds.
	Flooding.
Restraint Systems	Renewal and repair.
Signs and Signals	Stability.
	Renewal and repair.
Soft Estate	Landscape, ecology.
Structures (Including Gantries)	Thermal actions (loads) applied to superstructure.
	Wind actions (loads) applied to superstructure.
	Thermal range giving rise to earth pressures for integral bridges.
	Earth pressures used in design affected by change in ground water level.
	Foundation settlement affected by change in ground water level.
	Design for increased scour risk for foundations.
	Design of structure drainage.
	Use of temperature sensitive components or materials in construction or rehabilitation (e.g. epoxies used in fibre reinforced plastic (FRP) strengthening).
	Design, management and maintenance of bearings and expansion joints.
	Climatic constraints on construction and maintenance activities.
	Optimum timing of maintenance interventions, in response to changes in deterioration rates.

7.3.4 MITIGATION MEASURES

This section outlines the possible mitigation measures that can be included in the design in order to increase the resilience and reduce vulnerability to climate change. The following adaption options are possible and could be considered:

- Appropriate structural designs, surfaces and construction;
- Use different (harder) binders in asphalt;
- Changes to concrete mixes and reinforcing; and
- Accounting for climate risks in maintenance regimes.

The following measures have been incorporated into the design to take account of climatic variations:

- Snow levels recorded by RPE have been used to calculate the location the snow protection fences. If snow levels increase further additional snow protection fences can be added as part of the maintenance activities.
- If flood levels rise additional drainage pipping can be added as part of the maintenance activities.
- Asphalt melting has been accommodated in Kazakhstan through the incorporation of stone mastic asphalt (contains polymers) as standard practice on highways, as this avoid problems associated with the fine grain asphalt that was previously used, which rutted during period of elevated temperatures.

7.3.5 FURTHER STUDY

This section outlines the full approach to the assessment of climate vulnerability and risk in the EIA process. This approach aligns with the following UK and international guidance:

- IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation[28];
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment[29] ;
- European Commission (2016) Climate Change and Major Projects[30] ; and
- European Commission Non-Paper Guidelines for Project Managers: Making Vulnerable Investments Climate Resilient[31].

The full approach consists of 4 steps:

- Step 1: Identify receptors and analyse policy context;
- Step 2: Climate vulnerability assessment;
- Step 3: Risk assessment; and
- Step 4: Adaptation measures.

The results of Steps 1 and 2 will be presented in order to determine the level of vulnerability of the Project to the impacts of climate change and assess which vulnerabilities should be scoped in for further assessment (following Steps 3 and 4) at the next stage of the ESIA process.

The sub-sections that follow provide more detail on each of these steps.

7.3.5.1 STEP 1: IDENTIFY RECEPTORS AND ANALYSE POLICY CONTEXT

This step has already been carried out in Sections 7.3.2 and 7.3.3. Relevant receptors that may be affected by climate change have been identified with consideration given to the impact of extreme weather and changes in climate on the Project over its lifetime. These receptors may comprise both known (i.e. receptors affected by historic weather events) and unknown (new) receptors. This stage included a definition of the policy context.

7.3.5.2 STEP 2: CLIMATE VULNERABILITY ASSESSMENT

This stage comprises an assessment of the vulnerability of the receptors identified in step 1 to projected climate change and extreme weather variables. The vulnerability of a receptor to extreme weather and climate change is a function of:

The typical sensitivity of the receptor to climate variables - based on literature review and expert judgement.

The exposure of the receptor to projected change in climate variables - based on information on observed climate and projected climate (from CMIP5).

For each element of the vulnerability assessment (i.e. sensitivity and exposure), a vulnerability categorisation is assigned to each climate variable in relation to each receptor based on the following scale:

- High: High climate sensitivity or exposure.
- Medium: Moderate climate sensitivity or exposure.
- Low: No significant climate sensitivity or exposure.

This is a qualitative assessment informed by expert opinion and supporting literature.

The vulnerability of receptors to climate variables is determined from the combination of the sensitivity and exposure categorisation, using the matrix shown in the table below. At this point ‘Low’ vulnerabilities are scoped out of further assessment, whilst ‘High’ and ‘Medium’ vulnerabilities are taken forward to Steps 3 and 4.

[28] IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.
[29] European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.
[30] European Commission (2016). Climate Change and Major Projects.
[31] European Commission (undated). Non-paper Guidelines for Project Managers: Making Vulnerable Investments Climate Resilient.

Table 29 –Vulnerability Matrix

Sensitivity	Exposure		
	Low	Medium	High
Low	Low	Low	Low
Medium	Low	Medium	Medium
High	Low	Medium	High

7.3.5.3 STEP 3: RISK ASSESSMENT

Firstly, hazards related to the 'Medium' and 'High' vulnerabilities are identified. Typical hazards are shown in the table below.

Table 30 - Typical Hazards Associated with Climate Variables

Climate Variable	Climate Related Hazard
Average air temperature change (annual, seasonal, monthly).	High temperatures, longer growing season.
Extreme air temperature (frequency and magnitude).	Heatwaves.
Average precipitation (annual, seasonal, monthly).	Flooding (fluvial, pluvial), ground stability, soil moisture deficit, snow, ice and hail.
Extreme rainfall (frequency and magnitude).	Flooding, ground stability.
Average wind speed change (annual, seasonal, monthly).	Wind loading.
Gales and extreme winds (frequency and magnitude).	Storms (tracks and intensity), including storm surge.
Humidity.	Fog.
Solar radiation.	High temperatures, storms and lightning.
Sea level.	Coastal flooding.

The risk assessment is undertaken by considering the consequence and the likelihood of climate hazards to the Project receptors. These determinants are then combined to develop a climate risk rating for each Project element in respect to specific climate hazards. The risk assessment is a qualitative assessment based on expert judgment, engagement with the Project team and a review of relevant literature. This process is supplemented with quantitative data and information where available.

Table 31 - Risk Rating Matrix

Likelihood of Hazard Occurring	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Low	Medium	High	Extreme	Extreme
High	Low	Medium	Medium	High	Extreme
Medium	Low	Low	Medium	High	Extreme
Low	Low	Low	Medium	Medium	High
Very Low	Low	Low	Low	Medium	Medium

7.3.5.4 STEP 4: ADAPTATION MEASURES

In the final step, adaptation measures for the Extreme, High and Medium risks are identified through consultation with the Project team and expert opinion. Taking account of the contribution of incorporated adaptation measures, a summary of the level of climate resilience of the Project elements to climate change is applied:

- High - a strong degree of climate resilience, remedial action or adaptation may be required but is not a priority;
- Moderate - a moderate degree of climate resilience, remedial action or adaptation is suggested; and
- Low - a low level of climate resilience, remedial action or adaptation is required as a priority.

Recommendations for supplementary climate change adaptation measures are then identified where necessary.

8 CULTURAL AND ARCHAEOLOGY HERITAGE

8.1 LEGISLATION

Applicable laws, treaties, and guidance are outlined in the table below.

Table 32 –Climate Change Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Law on Culture of the Republic of Kazakhstan No. 207 (as amended by No. 446-V)	2006 (amended 2016)
Law on Protection and Use of Objects of Historical and Cultural Heritage of the Republic of Kazakhstan No. 1488-XII (as amended by No. 479-V)	1992 (amended 2016)
Treaties	
Convention concerning the Protection of the World Cultural and Natural Heritage	1994
Convention for the Safeguarding of the Intangible Cultural Heritage	2012
Guidance	
EBRD. Performance Requirement 8: Cultural Heritage.	2014

8.2 ASSESSMENT METHODOLOGY

The following sources have been used to inform this summary: the previous EIA document[32], a technical summary document entitled “An Archaeological Review to identify and preserve Oektov Kultunogo historical heritage corridor” (translated from Russian), notes taken during an in-country reconnaissance visit conducted by WSP in July 2018, the UNESCO-World Heritage Centre Website and a rapid review of internet sources. Both reports described above, refer to a scientific archaeological report which had been completed in accordance with state guidance and reviewed by the Ministry of Culture and Sport of the Republic of Kazakhstan. This report was not accessible at the time of writing this report.

8.3 BASELINE CONDITIONS

The technical summary document indicates that aerial photography, topographical survey and test pits and soil sampling has been undertaken along the Project corridor. The results reported to of the Ministry of Culture and Sport of the Republic of Kazakhstan concluded that there are no known archaeological or heritage assets which will be impacted by the Project. Addition research at the World Heritage Centre website confirmed that there were no World Heritage Sites within the Project corridor or in close proximity. No additional internet sourced information suggested the likelihood of Cultural heritage assets within the Project corridor. The in-country site visit identified several memorials along the road.

8.4 POTENTIAL IMPACTS

From the information obtained there are no known heritage assets that will be impacted within the Project corridor. There is a low potential that unknown archaeological remains of significance would be discovered

[32] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

and negatively impacted during the construction phase. No Known heritage assets will be negatively impacted during the operational phase of the Project.

8.5 MITIGATION MEASURES

I is recommended that a chance find procedure is put into place for this project, in accordance with EBRD PR 8, due to the potential for unknown heritage assets to be present. This procedure will be set out in a Cultural Heritage Management Plan (CHMP). The overall objective of the CHMP is to preserve and protect cultural heritage sites or artefacts from adverse impacts associated with Project activities. The CHMP will aim to minimise the chance of damage to any archaeological or culturally significant sites during construction, and will present a methodology and procedure for adequately mitigating for “chance finds” should they be discovered. The plan outlines the cultural heritage management principles and procedures to be followed during construction and operations in accordance with the Project’s policies and national legal requirements. It is also recommended that a corresponding Cultural Heritage Management Implementation Plan (CHMIP) is developed by the contractor to show how the procedures and requirements of the CHMP will be implemented by them. The following topics would typically be covered by this document:

- Plan operation and maintenance activities to take into account potential cultural heritage discoveries;
- Code of conduct, awareness raising, and training for workers and personnel involved during the construction phase;
- Implement chance find procedures; and
- Implement monitoring and reporting requirements that must be adhered to by the Contractor during the construction phase.

9 MAJOR ACCIDENTS AND DISASTERS

9.1 LEGISLATION

Applicable laws and guidance are outlined in the table below.

Table 33 - Major Accidents and Disasters Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Guidance	
EBRD. Performance Requirement 1: Assessment and Management of Environmental and Social Impacts and Issues.	2014
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control.	2014
EBRD. Performance Requirement 4: Health and Safety.	2014

9.2 ASSESSMENT METHODOLOGY

Although there is the potential for a wide range of major accidents and disasters that could occur, the probability likelihood and frequency is very low, often due to the management of a risk under the established legislative requirements, construction and operational contractor processes or during the design process.

'Disaster risk' can be characterised as a hazard which has potential to incur community losses, encompassing assets, life, health and livelihoods, giving significance to disaster events at a personal and local scale. Disaster risk can also be defined as, hazards which could cause a locality to require assistance from an outside state, which could relate to international aid, or a local authority requiring assistance from another local authority. 'Accident' can be defined as, an undesirable event resulting in damage or harm.

9.3 POTENTIAL IMPACTS

Potential major accidents and disasters that may have an impact on the environment or human health largely include but are not restricted to:

- Seismic events: There is a risk that an earthquake could occur in the locality of the Project and that impacts to the Project itself and consequential adverse effects on the environment could occur as a result. However, compared to current road, the Project is not considered likely to increase the vulnerability of the Project to seismic events, as the Project will be designed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads and any appropriate earthquake risk guidelines.
- Extreme weather event (e.g. flooding, heavy snow): The Project design will not increase the vulnerability of the Project to most extreme weather events relative to the current road. The Project will have a beneficial effect on flood risk associated with snow melt as the Project includes substantial drainage pipes (on average one pipe each 1.5 km of the road). The Project will have a beneficial effect on risks associated with heavy snow as the road will be raised above the existing ground level in more location which will reduce the likelihood of snow accumulating on the road surface.
- Major construction accident: The potential for construction related accidents and disasters is recognised; however, they are generally mitigated through existing legislation (e.g. the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads) and management procedures around safe working practices. A CEMP will be prepared prior to construction commencing to ensure that such risks are mitigated appropriately.
- Major road accident: The Project design will have a beneficial effect on road safety relative to the current road, due to improved surfacing, improved visibility and the provision of two lanes in each

direction to allow safer overtaking. A road safety audit of the design has been undertaken, and the reccomendations have been issued to the designer, for inclusion in the design.

9.4 MITIGATION MEASURES

To summarise plans and procedures in order to prevent and manage potential major accidents and disasters shall be documented in the CEMP (for construction) and the Emergency Preparedness and Response Plan (or equivalent) once operational.

10 GEOLOGY AND SOILS

10.1 LEGISLATION

Applicable laws, directives and guidance are outlined in the table below.

Table 34 - Geology and Soils Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
EU Directives	
Water Framework Directive	2000
Guidance	
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control.	2014
Department for Environment, Food and Rural Affairs (DEFRA) and Environment Agency. Model Procedures for the Management of Land Contamination: Contaminated Land Report (CLR) 11.	2004
UK Environmental Protection Act (EPA) Part 2A: Contaminated Land.	1990
National House Building Council and Environment Agency. Guidance for the Safe Development of Housing on Land Affected by Contamination R&D 66.	2008
Highways Agency. DMRB, Volume 11, Section 3, Part 11 Geology and Soils.	2007
UK Construction (Design & Management) (CDM) Regulations.	2015

10.2 ASSESSMENT METHODOLOGY

The assessment has been undertaken in line with European best practice. Where appropriate, when considering geology and soils, EU legislation has been considered during the completion of this assessment. In addition, where deemed appropriate, UK guidance documents have been considered within this assessment on the basis that some UK guidance is in accordance with EU legislation.

The assessment methodology describing the magnitude of impact and significance is described in detail in Chapter 4.

The potential for land contamination has been broadly assessed with due regard to UK guidance such as Part 2A, best practice guidance from land contamination risk management set out in CLR11, R&D 66, DMRB and the CDM Regulations. Potential sources and receptors identified from the walkover and available information have been qualitatively assessed the possibility for land to be contaminated. The identification of potential sources and receptors has enabled an assessment to be undertaken in order to evaluate the plausible contaminant linkages and any changes (from baseline conditions) during construction and operational phases of the Project. The likely significance of the risk for each plausible linkage has been assessed and compared to determine beneficial and adverse effects of the Project against baseline conditions.

10.3 BASELINE CONDITIONS

10.3.1 EXISTING AND BASELINE KNOWLEDGE

The baseline information has been obtained from the site walkover/drive by survey conducted by WSP in July 2018; subsequent information provided by the Client; and information obtained to support the previous Non-Technical Summary[33].

10.3.2 CURRENT SITE SETTING

The site is predominately flat with some undulating land in places. The site comprises the existing road and land take required to facilities the construction of the widening Project. Overhead lines run across the site close to Kapshagai Town. Minor cracks noted along the road surface. The Ili District Roads Lead advised that there was no subsidence and the cracks were associated with road wear and age only.

In the surrounding area the primary land use is livestock farming. Businesses were noted at the road junction near NN. These included an Asphalt Plant; a closed Plastic Plant; a closed waste site; and a possible chemical factory. Access to the chemical factory business was not possible during the site walkover. However, it should be noted that the Project will not affect this business due to distance from the site.

The ground cover in the surrounding area generally comprises sparse vegetation with occasional lines of tress perpendicular to the road, particularly in the mid-section. During the walkover there was no evidence of invasive species although it was noted by the Roads Committee that a species of tumble weed has recently been causing maintenance problems, due to accumulation on the road, on the wider roads network.

The following potential sources of contamination were noted during the site walkover:

- Agricultural machinery on farms, with some potential for oil spills on bare ground;
- Potential presence of animal waste and animal carcasses on the farms;
- There was no sewage system available along the alignment and there were unlined pits at each property;
- The house near to S3.62 previously had an above ground oil tanker which has now been removed. There is likely to be further storage of chemicals and fuel on the farms;
- The backyard of the house at S3.62 also contained construction waste material from an old road project;
- The presence of large quantities of waste along the alignment - mainly bottles, cans, and food packaging. Fly-tipped materials were also present in various locations but along the route.
- There is 'waste' site labelled on mapping. The waste site is closed, the site but contained a mixture of waste streams including construction and municipal waste. Waste was stored both above and below ground as part of an un-capped landfill. There are no records of any other closed or operational landfills immediately adjacent to the Project;
- Opposite the closed waste site is an asphalt plant with a production capacity of 80 tonnes per hour;
- NS 1.8 is a closed plastic plant;
- Near SS a water/waste water treatment plant was present. There was no visual evident of effluent in proximity to the road near the treatment facility; and
- The presence of a surface water channel beneath the road that flows under a bridge.

10.3.3 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Given the agricultural use of the surrounding area, topsoil may be present in close proximity to the existing road. Made Ground may also be present beneath the existing road, associated with road construction materials.

Confined deep groundwater is abstracted in Kurty Village and Akshi. The wells are up to 7 m deep. Shallow unconfined groundwater is sporadic and is tapped by the farms for the cattle.

There is a surface water channel which runs beneath the existing road corridor. From a visual inspection it appears as though the channel flows very gently from south to north. The nearby farm advised that the livestock drink from the channel.

[33] Non-Technical Summary (2018). Kapshagai Town - Kurty Village 67km Road Project, Part of the Reconstruction of the 'Centre-South' Linking Astana to Almaty.

To the west of the Project is the Kurty River which flows through the territory of the Almaty region. It is the last left-bank tributary of the Ili River. The Kurty River originates on the northern slope of the Chu-Ili Mountains. The river has very a low water level and is used for irrigation of adjacent fields. In the 1990s a dam was built, to form the Kurty Reservoir. The length of the River is 125 km, and the area of the basin is 12,500 km².

Small and medium seasonal streams are present along the route, which only flow during spring snow melt and during intense rainfall. These watercourses pass under the road through pipes which are 1.5 m in diameter. The catchments of all the large periodic watercourses that cross the highway are located on the Karaoy Plateau, which is located to the south and west of the route.

It is understood there is limited surface water along the road alignment and one farmer had received a subsidy to drill a borehole for groundwater. It is noted that the groundwater was not encountered and as such the well abandoned. Most farms obtain all their water by truck.

10.3.4 PREVIOUS INTRUSIVE INVESTIGATIONS

Anecdotal evidence from a nearby farmer suggests that the concrete tubes identified near to the two marked memorials during the walkover were from previous drilling that took place in the area approximately 40 years ago to identify the presence of water. One farmer advised that he had received a grant to drill for groundwater, but that the drilling had been unsuccessful.

10.3.5 POTENTIAL SOURCES OF CONTAMINATION

The following sources of contamination on site and in the immediately surrounding areas have been identified:

- Made Ground associated with the construction of the existing road;
- Construction and non-hazardous waste sites and fly-tipped waste;
- Agricultural machinery;
- Above ground fuel tanks or possible other chemical storage;
- Sewage; and
- Industrial activities (asphalt and plastic plants, chemical factory, water/waste water treatment plant).

10.3.6 SENSITIVE RECEPTORS

The following receptors may be impacted:

- Construction workers;
- Groundwater and surface water bodies;
- Future site users (including road and pavement users and maintenance workers);
- Off-site users in the immediate vicinity of the Project (including nearby residents);
- Off-site properties and foundations; and
- Underground services and concrete.

10.4 POTENTIAL IMPACTS

Table 35 - Assessment of Impacts on Geology and Soils

Impact	Spatial Scale	Receiving Environment		Significance of Impact		Effect	Significance of Effect			Frequency and Duration of Effect		
		Receptor	Sensitivity	Impact Type	Magnitude		Significance	Direct / Indirect	Positive / Negative	Duration of Effect	Temporary / Permanent	Reversible / Irreversible
Construction												
Excavation of and contact with potentially contaminated soil during works.	Local	Construction workers	Low	Adverse	Moderate	Impact on health due to contact with potentially contaminated soils.	Minor Significance	Direct	Negative	Short Term	Temporary	Reversible
	Local	Adjacent residents / livestock	Low	Adverse	Moderate	Impact on health due to contact with potentially contaminated soils.	Minor Significance	Direct	Negative	Short Term	Temporary	Reversible
	Local	Groundwater	Medium	Adverse	Large	Impact to groundwater due to mobilisation and leaching from potentially contaminated soils.	Medium Significance	Direct	Negative	Short Term	Temporary	Reversible
	Local	Surface water	Medium	Adverse	Large	Impact to surface water due to mobilisation and leaching from potentially contaminated soils.	Medium Significance	Direct	Negative	Short Term	Temporary	Reversible
Contact with potentially contaminated groundwater/surface water.	Local	Construction workers	Low	Adverse	Moderate	Impact of health due to contact with potentially contaminated soils.	Minor Significance	Direct	Negative	Short Term	Temporary	Reversible
Accidental oil and/or petroleum leaks from machinery.	Local	Soil on site, groundwater and surface water	Medium	Adverse	Large	Contamination of soil, groundwater and surface water.	Minor Significance	Direct	Negative	Short Term	Temporary	Reversible
Suspended solids/silt release into surface waters.	Local	Surface waters	Medium	Adverse	Large	Contaminant within suspended solids/silt entering the water courses.	Minor Significance	Direct	Negative	Short Term	Temporary	Reversible
Operational												
Contact with contaminated soil/groundwater.	Local	Future site users	Low	Beneficial	No change	Impact on health due to contact with potentially contaminated soils.	Not Significant	Direct	Beneficial	Long Term	Permanent	Irreversible
Affect from ground gas accumulation.	Local	Maintenance workers and adjacent residents / livestock	Low	Adverse	Large	Asphyxiation or explosion due to the accumulation of ground gas.	Minor Significance	Direct	Negative	Short - Long Term	Temporary	Reversible
Degradation of below ground concrete/services due to aggressive ground conditions.	Local	Buried concrete and underground water pipes	Low	Adverse	Moderate	Degradation of concrete / service pipes.	Minor Significance	Direct	Negative	Short - Long Term	Permanent	Irreversible

10.5 MITIGATION MEASURES

The mitigation measures proposed to be implemented in order to reduce the potential impacts are detailed in the table below.

Table 36 - Mitigation Measures for Impacts on Soils and Geology

Impact / Effect	Mitigation Measure
Construction Phase	
Contact with potentially contaminated soil and groundwater.	Ground investigation and risk assessment to assess the potential risk to identified receptors.
Generation of soil stockpiles during excavation works; discharge of run off / suspended soils/silt into surface waters.	Completion of a CEMP, which will set out the principles of contaminated land mitigation, describe suitable containment measures and procedures.
Oil and/or petroleum leaks from machinery - impact to soil.	Provision of spill kits to contain oil / petroleum leaks or spills. Program to ensure good driver behaviour / maintenance of vehicles.
Operational Phase	
Contact with contaminated soil/groundwater.	Road surfacing will limit contact with the underlying ground.
Affect from ground gas accumulation.	Ground investigation and risk assessment to assess the potential risk to identified receptors.
Degradation of below ground concrete/water supply pipes due to aggressive ground conditions.	Ground investigation and risk assessment to assess the potential risk to identified receptors. Design and buried concrete and services to resist aggressive ground conditions.

11 LANDSCAPE AND VISUAL

11.1 LEGISLATION

Applicable laws and guidance are outlined in the table below.

Table 37 - Landscape and Visual Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Law of the Republic of Kazakhstan on Specially Protected Natural Areas No. 175.	2006
Law of the Republic of Kazakhstan on Protection and Use of Objects of Historical and Cultural Heritage No. 479-V.	2016
Guidance	
EBRD. Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.	2014
EBRD. Performance Requirement 8: Cultural Heritage	2014
Landscape Institute and Institute of Environmental Management and Assessment. Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition.	2013
Natural England. An Approach to Landscape Character Assessment.	2014

11.2 ASSESSMENT METHODOLOGY

11.2.1 SCOPE OF THE APPRAISAL

The methods for assessing the effects upon landscape and visual receptors as a result of the Project broadly follow guidance outlined above. This methodology is summarised as follows:

- A brief desk-based review of the relevant guidance and planning policy context (where possible);
- A brief description of existing land use within the site and its immediate surroundings;
- A high-level review of local landscape character, including the existing site and features on the site;
- A high-level review of surrounding potential visual receptors;
- Identification of potential landscape and visual receptors and the potential effects of the Project upon them; and
- Identification of potential Opportunities for mitigation and enhancement.

11.2.2 METHOD OF BASELINE DATA COLLECTION

A desk-based review was undertaken in order to determine existing landscape features, landscape character, and potential visual receptors. The baseline data has been obtained through a combination of a high-level site reconnaissance visit (undertaken by others), and desk-based review of third party/consultation information. The desk-based review has been informed by the following resources:

- Original EIA for the Project[34];
- Aerial imagery.

[34] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

- Desk-based review of existing publicly available on-line information.

11.2.3 RECEPTOR SENSITIVITY

Following the review and receipt of baseline information, the identified landscape and visual receptors were allocated an indicative value, based on the criteria outlined in the following table (and broadly in accordance with GLVIA, 3rd Edition).

Table 38 - Indicative Receptor Sensitivity

Receptor/ Resource	Context of View/ Number of Potential Viewers	Susceptibility to Change	Value
Very High	High concentrations of static receptors such as large residential estates.	Large residential areas; high quality public open space; visitors / users of recreational, historical or cultural sites where landscape is an integral part of its enjoyment (such as users of National Parks, World Heritage Sites). Very high susceptibility to any change.	Typically, strong landscape with many features worthy of conservation; infrequent detracting features. Typically, of international recognition such as World Heritage Sites.
High	Many viewers including static viewpoint such as residential property.	Residential areas; public open space; visitors / users of recreational, historical or cultural sites where landscape is a significant factor in its enjoyment (such as users of long distance trails). High susceptibility to change	Good quality, high value and often designated landscape. High importance.
Medium	Several viewers, longer transient views such as from public open space and recreational areas.	Retail areas, offices, formal sports facilities where the landscape is secondary to enjoyment of the sport; outdoor work spaces; users of scenic roads, railways or waterways; users of tourist routes, schools and other institutional buildings and their outdoor areas. Moderate susceptibility to change	A reasonably attractive landscape with a mix of attractive features and intrusive elements. Pleasant but unremarkable. Moderate importance.
Low	Several viewers, longer transient views such as from public open space and recreational areas.	Indoor workers in medium quality landscape; passengers in public transport on main arterial routes; users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities). Limited susceptibility to change	Typically, poor quality landscape of low importance, with detracting features and intrusive features but with occasional attractive features and elements.
Negligible	Very few viewers; fast, transient views such as from vehicles along a national road.	Industrial area, land awaiting development; indoor workers in poor quality landscape; users of large main roads (e.g. motorways and national roads).	A degraded or disturbed landscape, typically awaiting development. Many unattractive and intrusive features, litter and dirt. Poor quality landscape. Very low importance.

Receptor/ Resource	Context of View/ Number of Potential Viewers	Susceptibility to Change	Value
		Very limited susceptibility to change	

11.2.4 DESCRIPTION OF IMPACT MAGNITUDE

The nature of the potential impacts was then described within the context of the valued receptors identified, both in terms of temporal and spatial scale.

11.2.5 EFFECT SIGNIFICANCE

The nature of the impact described in terms of its effect upon the valued receptor was then assessed in order to qualitatively define the potential significance of the effect.

11.2.6 DESCRIPTION OF REQUIRED MITIGATION MEASURES

Where potentially significant effects are identified, mitigation measures are described that could potentially reduce adverse residual effects. Additionally, general mitigation is included for the purposes of reducing non-significant effects also.

11.2.7 SUMMARY OF RESIDUAL EFFECTS

The final stage of assessment is a summary of residual effects. Given the relatively high-level nature of baseline data collection, the subsequent assessment has necessarily adopted a precautionary approach.

11.2.8 ASSUMPTIONS AND LIMITATIONS

The following assumptions have been made in relation to this chapter:

- The temporal scope is considered to be of medium term duration for construction activities (i.e. between 2 and 10 years in duration) and long-term for operational effects of the Project (i.e. greater than 10 years duration); and
- It has been assumed that cumulative effects in relation to landscape and visual receptors are unlikely to occur and therefore they are not currently considered as part of this chapter.

The following limitations have been experienced in relation to this chapter:

- No specific site visit in relation to landscape and visual receptors has been undertaken. Site photographs and some general surrounding photographs have informed the visual assessment, along with a desk-based review of aerial photographs, maps and publicly available on-line data, which was highly limited;
- There was limited on-line information available in English relating to designations or landscape / visual related legislation, nor relating to public access rights of way or cultural areas and therefore these sections are limited in extent; and
- No consultation relating specifically to landscape or visual issues was undertaken.

This Chapter does not constitute a Landscape and Visual Impact Assessment in terms of GLVIA. Instead, it is a high-level qualitative appraisal of potential impacts of the Project on landscape and visual receptors.

11.3 BASELINE CONDITIONS

11.3.1 OVERVIEW OF THE SITE AND IMMEDIATE SURROUNDINGS

The Site is located primarily within a natural/ semi-natural landscape of low level sparse vegetation within extensive, rectangular agricultural fields and strips, broken up by field boundaries of tracks and lines of scrub/ trees. At the time of the site visit, photographs showed the landscape as being typically dry, brown savanna grasslands, gently undulating, but vast and expansive with large skies. Scattered trees throughout the grassland, along with tarmac principal roads and dust tracks provide some localised features in the landscape. Occasional lines of tress perpendicular to the road, particularly in the mid-section of the Project were planted to prevent snow drifting over large distances.

Groups of horses, sheep and cattle occasionally guided by herders, wander across the unlit road and wider landscape, which is further broken up by occasional blocks of trees, electricity pylons and telephone poles and wires.

Along the western section of the route, at Kurty Village, there is more activity, with interconnections with the M-36 highway and more varied topography. Scattered housing, gas station, café and numerous lorries create activity dust and noise in the local landscape.

Dirt tracks off the main existing P-18 highway lead to isolated properties (farmsteads) along the route, which is also bisected by seasonal streams, ditches and field boundaries. Occasional bridges, crossing at grade, allow the existing P-18 highway to cross waterbodies.

Chapter 8 (Cultural Heritage) identifies that there are no known areas of cultural or historic importance in the region of the construction and no natural monuments located in the area of operation. The site visit undertaken by WSP in 2018 did identify some local memorials alongside the existing highway at various locations.

11.3.2 LANDSCAPE DESIGNATIONS AND FEATURES

There was no information available at the time of writing relating to landscape designations along the route or in the immediate vicinity.

During the visit to the road, two memorials were seen. It is not thought that either contained burials under the memorial stones but some sites may be sensitive when it comes to relocation or limitation of access due to the spiritual culture of rural Kazakh people.

There are no tourist areas/ trails in the area and there are no locally important areas besides the memorials and the surface water channel which is it understood that the livestock use for drinking.

11.3.3 LOCAL LANDSCAPE CHARACTER

11.3.3.1 Character Area 1: Large scale agricultural farmland and isolated farmsteads

This area is characterised by larger-scale agricultural fields typically rectilinear in shape and primarily growing livestock feed for farmed livestock. Fields are often bounded by trees or dirt tracks, or with un-made boundaries. The agricultural fields are largely substitutable.

11.3.3.2 Character Area 2: Settlements

This area is characterised by single or 2-storey detached dwellings set within quite large plots. Small local businesses and industry are located within and adjacent to settlements, along with electricity pylons. Some artificial lighting is present.

11.3.3.3 Character Area 3: Riverine and Coastal Fringes

To the western and eastern ends of the Project, this character area contains a more varied topography, without the characteristic rectangular agricultural fields of character area 1. Dirt tracks pass through the area, which is further characterised by scattered trees and shrubs, occasional lakes and reservoirs, and dry ditches and streambeds (containing running water after snow melt).

11.3.4 ARTIFICIAL LIGHTING

The existing site is largely at grade and currently unlit. There is limited lighting within the residential areas of Kurty Village and Kapshagai Town but it is likely that there is minimal light spill into the surrounding area.

There are likely to be sources of artificial lighting during the construction phase, as well as use of traffic lights within the built-up and already lit area of Kapshagai Town. The designer advised that the majority of the highway will remain unlit along its length. Artificial lighting on landscape and visual receptors will therefore only be considered at construction.

11.3.5 VISUAL RECEPTORS

Visual receptors in relation to the Project are generally short-distance views of the Site from surrounding residential receptors, local businesses and users of surrounding access tracks and highways, and the surrounding fields.

Housing along the route (outside Kapshagai Town town) is typically small, single storey dwellings with agricultural machinery, tyres and equipment strewn around the dwelling. Single storey cattle / sheep sheds are also located in proximity to the dwellings, along with gas/oil tanks, and numerous vehicles.

Overall, around 20 farms have been identified as being visible from the existing road, as well as 4 properties in close proximity to the eastern section of the highway works in Kapshagai Town.

Of particular note due to proximity to the Project are Farm 4 which will be 50 m from the road junction; Farm 3, Farm 5, Farm 9 and Farm 11. In addition, a residential area in Kapshagai Town where a realigned section is to be located, will mean that the road is closer to numerous residents.

11.4 POTENTIAL IMPACTS

11.4.1 PROJECT OVERVIEW

The designed road is mostly on the same alignment as the current road, although there are five short sections which will be realigned. The Project will include upgrades or new features such as a junction, off ramps, rest areas, bus stops, cattle underpasses, agricultural machinery underpasses, drainage pipes, a bridge, lighting and an associated maintenance depot.

The Project will create a raised structure in a relatively flat, open, landscape, although the road is already raised in parts. There will be no tree felling required. There will be a large amount of stockpiling during construction, followed by reinstatement of bare ground. Some artificial lighting may be required at construction. Locations for workers camps are not yet known. Details of the quarry and basting activities are not known.

11.4.2 RECEPTOR EVALUATION

The information collected to inform this assessment has been summarised in the following tables to identify landscape and visual receptors that may be affected by the Project, and their potential sensitivity.

Table 39 - Indicative Sensitivity of Landscape Receptors

Receptor/ Resource	Sensitivity/ Value	Justification for Value
Site vegetation.	Low	Existing highway is unvegetated, although trees are located alongside part of the route. Agricultural fields and grassland/scrub are located alongside much of the Project. It is of limited aesthetic value.
Existing connectivity and access within the site.	Medium	There are no public access route and trails, although herders and farmers regularly cross the road at any point along its length with their animals for pasturing. Access for isolated properties directly onto the main highway is via dirt tracks.
Character Area 1: Agricultural farmland.	Medium	Larger-scale agricultural fields typically rectilinear in shape and primarily growing livestock feed for farmed livestock. Large areas are often bounded by trees or dirt tracks. Substitutable.
Character Area 2: Settlements.	Medium	Typically, single or 2-storey detached dwellings set within quite large plots. Small local businesses and industry are located within and adjacent to settlements, along with electricity pylons.
Character Area 3: Riverine and coastal fringes.	Medium	Varied topography, containing dirt tracks, scattered trees and shrubs, occasional lakes and reservoirs, and dry ditches and streambeds.

Table 40 - Indicative Sensitivity of Visual Receptors

Receptor/ Resource	Sensitivity/ Value	Justification for Value
Isolated farm properties.	High	Views are from a static location in close proximity to the site.
Residences and businesses within the village of Kurty Village.	Medium-High	Views are from a static location in close proximity to the site.
Residences and businesses within the town of Kapshagai Town.	Medium	Views are from a static location in close proximity to the site.

Receptor/ Resource	Sensitivity/ Value	Justification for Value
Users of the main P18 and M-36 highways.	Low	Views are transient and typically from faster moving vehicles and public transport.
Users of surrounding agricultural land and un-surfaced paths and tracks.	Medium	Views are relatively transient but in close proximity to the site.

The potential impacts on the above receptors are described in terms of their occurrence during both the construction and operational phases of the Project.

11.4.3 CONSTRUCTION PHASE IMPACTS

The use of construction machinery, construction works, and importation of materials will create increases in noise, dust and activity along the Project. There will also be traffic management requirements (to maintain access along the route during construction). During construction the traffic will be organised so that the existing road can be utilised even where widening, realignment and the construction of culvert pipes is taking place. A temporary road bypass will be constructed to maintain access during the bridge construction. The provision of alternative routes for dirt roads while intersections are constructed will be considered.

It will be necessary to make sure that access to existing memorials will not be blocked, even those that are far enough from the planned road to not be directly affected by the Project.

A summary of the potential effects on landscape and visual receptors at construction, prior to mitigation, is outlined in Section 11.6.

11.4.4 OPERATION PHASE IMPACTS

The Project will result in increased traffic volumes along the highway, and as such there is the potential for a greater number of animal collisions and road traffic accidents as well as noise, activity and visual intrusion from raised sections of the road and traffic movement. There will be far fewer available crossing points for animals, being largely restricted to designed underpasses, with the highway being far wider (approximately 25 m wide) and above existing ground level, making it more visually prominent in the local area. Traffic headlights will also be more visible in the local landscape, along with traffic lights within Kapshagai Town. Realigned sections of the route will also alter the local landscape character of the immediate area by introducing new hard-surfaced areas into existing undeveloped land.

A summary of the potential effects on landscape and visual receptors at operation, prior to mitigation, is outlined in Section 11.6.

11.5 MITIGATION MEASURES

The following mitigation measures may assist in reducing adverse impacts of the Project on surrounding landscape character and visual amenity during the construction phase:

- Removal / loss of semi-natural habitat should be minimised throughout. This is particularly relevant to the tree-lines and scrub scattered across the site;
- All open excavations, hazardous materials, and plant machinery should be secured and made safe when not in use. Furthermore, a fence for the boundary of the site should be installed which will help to prevent site access by animals and herders, minimising the potential impacts from the construction activities;
- Alternative routes for dirt roads while intersections are constructed should be identified and publicised
- Blasting activities, if required, should only occur during the day within reasonable working hours and publicised as to when it will take place;
- A suitable decommissioning and reinstatement plan for any quarries required should be identified and implemented;
- A CEMP, inclusive of Traffic Management Plans, should be developed to identify migrant worker housing, compounds, storage areas, blasting, material crushing, machinery and working methods and practices and environmental safeguarding methodologies;
- Minimise the use of artificial lighting on the site and where needed, use directional lighting;
- New tree and hedge / shrub planting to be planted within a suitable depth of appropriate topsoil to aid establishment;

- Protect and preserve memorials along the road; and
- Ensure a suitable number of underpasses are installed along the route.

The following mitigation measures may assist in reducing adverse impacts of the Project on surrounding landscape character and visual amenity during the operational phase:

- Reinstate all excavated and temporary land-take areas like for like or better;
- Ensure suitable establishment of any tree or scrub to maintain screening properties; and
- Protect and preserve memorial along the Project (further mitigation measures are outlined in Section 8.5).

11.6 RESIDUAL EFFECTS

11.6.1 CONSTRUCTION PHASE IMPACTS

The following table provides a summary of the potential impacts of the Project on landscape receptors during construction.

Table 41 - Indicative Impact of the Project on Landscape Receptors During Construction

Receptor/ Resource	Sensitivity /Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
Site vegetation.	Low	Slight	Minor Adverse	Negligible	Existing vegetation is limited, but trees provide local landmarks and variation in the landscape. New tree and scrub planting should be included. This effect will be direct, permanent and long-term.
Existing connectivity and access within the site.	Medium	Moderate	Moderate Adverse	Minor - Moderate Adverse	Access is currently unrestricted although informal across the existing highway. This will be altered during construction. This effect will be direct, permanent and long-term.
Character Area 1: Agricultural farmland.	Medium	Moderate	Moderate Adverse	Minor - Moderate Adverse	Construction activities will affect this character area, introducing uncharacteristic elements into the surrounding agricultural landscape, including additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting. This effect will be direct, temporary and medium-term.
Character Area 2: Settlements.	Medium	Slight	Minor Adverse	Minor Adverse	Construction activities will affect this character area, introducing additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting, although the settlements already experience a degree of disturbance from existing road networks.

Receptor/ Resource	Sensitivity /Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
					This effect will be direct, temporary and medium-term.
Character Area 3: Riverine and coastal fringes.	Medium	Slight	Minor Adverse	Minor Adverse	Construction activities will introduce additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting. This effect will be direct, temporary and medium-term.

The following table provides a summary of the potential impacts of the Project on Visual receptors at construction.

Table 42 - Indicative Impact of the Project on Visual Receptors During Construction

Receptor / Resource	Sensitivity / Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
Isolated farm properties.	High	Large	Major Adverse	Major Adverse	Residents will have direct, clear views of the construction activities, including construction plant and machinery, noise, dust and wind-blown litter, as well potential increases in traffic and lorries on access roads, storage piles and compounds and quarrying activities. Access across the highway to pasturelands will also be disrupted. Limited mitigation possible. This effect will be direct, temporary and medium-term.
Residences and businesses within the village of Kurty Village.	Medium-High	Minor - Moderate	Moderate Adverse	Minor - Moderate Adverse	Residents may have longer distance views of the construction activities across the valley, including the activity of construction plant and machinery, noise, dust and wind-blown litter, as well potential increases in traffic and lorries on access roads. This effect will be direct, temporary and medium-term.

Receptor / Resource	Sensitivity / Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
Residences and businesses within the town of Kapshagai Town.	Medium	Medium	Moderate Adverse	Minor - Moderate Adverse	Residents may have long distance views of the construction activities across the valley, including the activity of construction plant and machinery, noise, dust and wind-blown litter, as well potential increases in traffic and lorries on access roads. This effect will be direct, temporary and short-term.
Users of the main P18 and M-36 highways.	Low	Large	Moderate Adverse	Minor - Moderate Adverse	Users of the existing highway will be affected by traffic management and temporary access routes. They will have clear visibility of the construction activities, including the activity of plant and machinery, noise, dust and wind-blown litter, as well as the potential increases in traffic and lorries on access roads and artificial lighting. This effect will be direct, temporary and medium-term.
Users of surrounding agricultural land and un-surfaced paths and tracks.	Medium	Large	Moderate - Major Adverse	Moderate Adverse	Users of the surrounding landscape will have clear views of the construction activities on site due to proximity and limited tree cover. Noise, dust and wind-blown litter may also be readily discernible. This effect will be direct, temporary and medium-term.

11.6.2 OPERATIONAL PHASE IMPACTS

The following table provides a summary of the potential impacts of the Project on landscape receptors once operational.

Table 43 - Indicative Impact of the Project on Landscape Receptors During Operation

Receptor / Resource	Sensitivity / Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
Site vegetation.	Low	Slight	Minor Beneficial	Minor Beneficial	The existing vegetation is limited in extent, of generally low quality and easily substitutable, but provides a beneficial element to the character of the existing site. New planting will enhance the local character and provide some screening over time. This effect will be direct, permanent and long-term and not significant.
Existing connectivity and access within the site.	Medium	Slight	Minor Adverse	Minor Adverse	Access across the road will be permanently restricted. Ensuring adequate underpasses is necessary. No additional mitigation identified. This effect will be direct, permanent, long-term and not significant.
Character Area 1: Agricultural farmland.	Medium	Slight	Minor Adverse	Minor Adverse	Operation of the Project will slightly affect this character area, introducing more hard-surfacing and traffic into the wider agricultural landscape. Some agricultural land will be lost. This effect will be direct, permanent and long-term and not significant.
Character Area 2: Settlements.	Medium	No Change	No Change	No Change	Operation of the Project will have a limited impact on this character area, introducing slightly more hard-surfacing and traffic into the area. This effect will be direct, permanent and long-term and not significant.
Character Area 3: Riverine and coastal fringes.	Medium	Slight	Minor Adverse	Minor Adverse	Operation of the Project will slightly affect this character area, introducing more hard-surfacing, artificial topography and traffic into the natural landscape. This effect will be direct, permanent and long-term and not significant.

The following table provides a summary of the potential impacts of the Project on Visual receptors during the operational phase.

Table 44 - Indicative Impact of the Project on Visual Receptors During Operation

Receptor/ Resource	Sensitivity /Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
Isolated farm properties.	High	Moderate	Moderate - Major Adverse	Moderate Adverse	Residents will have direct, clear views of the Project, being much larger and visually prominent than the existing highway. New planting will, over time, help to provide some screening for properties. New access roads onto the highway would aid access and integration, along with additional underpasses. This effect will be direct, permanent and long-term and is significant.
Residences and businesses within the village of Kurty Village.	Medium-High	No Change	No Change	No Change	Residents may have longer distance views of the Project, with its increased traffic and elevation. This effect will be direct, permanent and long-term and not significant.
Residences and businesses within the town of Kapshagai Town.	Medium	No Change	No Change	No Change	Residents may have longer distance views of the Project, with its increased traffic and elevation. This effect will be direct, permanent and long-term and not significant.
Users of the main P18 and M-36 highways.	Low	Slight	Minor Beneficial	Minor Beneficial	Users of the existing highway will have enhanced journeys, accessibility and movement. No mitigation is necessary. This effect will be direct, permanent and long-term and not significant.
Users of surrounding agricultural land and un-surfaced paths and	Medium	Minor - Moderate	Moderate Adverse	Minor - Moderate Adverse	Users of the surrounding landscape will have clear views of the Project

Receptor/ Resource	Sensitivity /Value	Magnitude	Impact Prior to Mitigation	Residual Impact	Commentary
tracks.					although proposed planting will, over time, provide some screening. Accessibility across the road will be reduced and the Project will be more visually intrusive than previously. This effect will be direct, permanent and long-term and not significant.

With the exception of local visual receptors surrounding the Project, particularly isolated properties from the limited baseline information available, it is not anticipated that the Project would have significant adverse effects on local landscape character or visual receptors following the implementation of mitigation measures during the operational phase.

12 MATERIAL RESOURCES AND WASTE

12.1 LEGISLATION

Applicable laws, directives and guidance are outlined in the table below.

Table 45 - Material Resources and Waste Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
EU Directives	
Waste Framework Directive	2006
Guidance	
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention Control.	2014
Highways England. Interim Advice Note 153/11 (IAN 153/11): Guidance on The Environmental Assessment of Material Resources.	2011

12.2 ASSESSMENT METHODOLOGY

In line with UK best practice, the following methodology has been taken from the Highways England Interim Advice Note IAN153/11, as updated by further guidance released by Highways England to refine the assessment process. It is considered that this assessment approach is highly appropriate to the Kapshagai Town-Kurty Village project, and will be applied subject to the availability and provision of suitable information and data ready for interpretation and analysis.

The assessment considers the immediate impacts and effects resulting from the consumption of materials (and the influence of recovering arisings that are exempt from waste management practice, and hence diverting it from landfill) and the production and disposal of waste by the Project.

12.2.1 ASSESSMENT OF VALUE, MAGNITUDE AND SIGNIFICANCE OF EFFECTS

12.2.1.1 MATERIALS

An assessment of the effects of consuming natural and other resources required during site construction (to 2022/23), will be undertaken by considering the origins and sources of materials, including their general availability (production, stock, sales) and the proportion of recovered (reused or recycled) materials they contain.

The reuse of excavated and other arisings (that meet waste exemption criteria) will be evaluated as part of the assessment of materials, to determine whether the adverse effects associated with the consumption of primary resources can be reduced.

The assessment has taken account of the nature of impacts (adverse/beneficial, permanent/temporary, direct/indirect) from materials, and used professional judgement to determine the significance of effect. The approach has also been informed by IAN 153/11.

The basis for the assessment will be determined by evaluating materials against the significance criteria set out in the table below.

12.2.1.2 LANDFILL CAPACITY

An assessment of the remaining capacity in local, regional and national landfill sites will be used to determine the impacts and effects of waste generated during site construction and (where appropriate) operation of the Project.

The assessment will consider the volume of waste to be generated by the Project and determine the potential impact of each on remaining landfill capacity; this will be completed for inert, non-hazardous and hazardous waste types. Wherever waste is recovered (diverted from landfill) the influence of this action will be taken into account in the assessment of significance of effect.

The assessment has considered the nature of impacts (adverse or beneficial, permanent or temporary, direct or indirect) from waste generated and disposed of, and used professional judgement to determine the significance of the effect. The approach has also been informed by IAN 153/11.

The basis for assessment will be determined by evaluating the waste capacity required for the Project against the significance criteria set out in the table below.

Table 46 - Significance Criteria

Sensitivity	Materials	Waste
Neutral	Sensitivity and Magnitude: No reduction or alteration in the availability of material assets at a regional scale in relation to the resources the Project will use.	Sensitivity and Magnitude: No reduction or alteration in the capacity of waste infrastructure at a regional scale.
Slight	Sensitivity: Comprises re-used and recycled aggregate at or above the accepted regional or national percentage, as relevant in Kazakhstan are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. Offers sustainable features and benefits compared to traditional materials. Magnitude: Requires ≤50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale).	Sensitivity: Waste infrastructure has sufficient capacity to accommodate waste from the Project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region. Magnitude: ≤1% reduction or alteration in the regional capacity of waste infrastructure.
Moderate	Sensitivity: Comprises re-used and recycled aggregate below the accepted regional or national percentage, as relevant in Kazakhstan. Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock. Offers some sustainable features and benefits compared to traditional materials. Magnitude: >50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic	Sensitivity: 1-50% of Project waste requires disposal outside of the region. Magnitude: >1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project.

Sensitivity	Materials	Waste
	scale).	
Large	Sensitivity: Comprises no re-used/recycled aggregate (alternative materials) are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock or are known to be insufficient regarding supply and stock. Offers little or no sustainable features and benefits compared to traditional materials. Magnitude: >50% of primary materials to be sourced internationally. Sterilises ≥1 mineral safeguarding site and/or peat resource.	Sensitivity: >50% of Project waste requires disposal outside of the region. Magnitude: >1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project.
Very Large	Sensitivity & Magnitude: (Refer to criteria for large category).	Sensitivity: The Project would require new (permanent) waste infrastructure to be constructed to accommodate waste. Magnitude: >1% reduction or alteration in national capacity of waste infrastructure, as a result of accommodating waste from a project.

The descriptions provided in the table below will be used to define any significance of effects identified.

Table 47 - Potential Impacts of Materials Consumption and Waste Generation

Significance Criteria (from)	Materials Significance of Effect	Waste Significance of Effect
Neutral	Not Significant	Not Significant
Slight	Not Significant	Not Significant
Moderate	Not Significant	Significant
Large	Significant	Significant
Very large	Significant	Significant

12.3 BASELINE CONDITIONS

The following information describes the anticipated baseline material consumption and waste disposal for the current asset (Kapshagai Town-Kurty Village Road).

12.3.1 MATERIALS

The operation and maintenance of the current two-lane road, bridge and intersections are anticipated to require the consumption of a small number of specialist components (for example, signage) as well as some bulk products (asphalt for re-surfacing) for routine works and repairs of the road. Given that the asphalt for the existing road is past it's effective working life, operational maintenance to repair the road surface is considered likely to continue to increase in future baseline scenarios, should the upgrades not be taken forward.

Limited information on the available of materials locally, regionally and national is available. Desktop research has identified information on the construction capacity of the Kazakhstan market of building materials between 2014 and 2016[35], as presented in the table below.

Table 48 - Capacity of the Kazakhstan Market of Building Materials 2014 - 2016

Product	Period	Tons Produced	Tons Exported	Tons Imported
Commercial Concrete	2014	17,023,899	≤0	884
	2015	18,241,616	≤0	979
	2016	16,071,350	≤0	1,029
Brick	2014	128,738	1,107	5,408
	2015	150,788	876	8,815
	2016	126,825	866	5,913
Building Mortars and Mixes	2014	842,780	358	213,551
	2015	882,148	193	172,629
	2016	819,704	1,232	113,806

As the figures in the previous table indicate, the import market is significantly greater than the export market suggesting that demand for material resources for the construction industry typically outweighs supply. A search for data on asphalt availability has yielded no results.

Despite the absence of data (actuals), it is anticipated that the current consumption of construction and other material resources on the existing Project is negligible in relation to the availability or material resources.

12.3.2 WASTE

The operation and maintenance of the current two-lane road, bridge and intersections are considered likely to generate small volumes of waste from routine maintenance such as repairs to the road surface, signage replacement, clearance of vegetation and litter from all drainage channels and the surface water channels.

Desktop research indicates that within Kazakhstan the majority (~90%) of landfill site operate illegally, with only 307 authorised waste disposal facilities. Furthermore, only the city of Astana has landfill sites designed in accordance with international standards. Technology and infrastructure shortfalls, a lack of economic incentives and weak enforcement are noted to be reasons for current poor waste management practices within Kazakhstan[36].

Recycling and recovery figures indicate that less than 5% of municipal solid waste is processed due to a lack of incentive for local authorities and business to minimise waste to landfill[36].

A search for information on landfill capacity in the region of the Project has yielded no results. However, on the presumption that waste is disposed of legally, the anticipated impacts of waste for the current 'do nothing' scenario are considered negligible in the context of available regional capacity.

12.4 POTENTIAL IMPACTS

The consumption of construction materials and the generation and disposal of waste during the construction and operation of the Project has the potential to have adverse environmental impacts and effects. The associated impacts (both direct and indirect) will occur principally during construction. Impacts arising during the operational lifecycle stage are expected to be negligible.

[36] Inglezakis V.J., Moustakas K., Khamitovac G., Tokmurzin D., Rakhmatulina R., Serik B., Abikak Y., Poulopoulos S.G. (2017). Municipal Solid Waste Management in Kazakhstan: Astana and Almaty Case Studies.

Impacts (and any resultant effects) are likely to occur on-site, off-site within Kazakhstan and, potentially, internationally.

The table below summarises the impacts and effects associated with materials consumption and waste generation and disposal.

Table 49 - Environmental Impacts and Effects Associated with Materials and Waste

Element	Direct Impacts	Direct Effects	Indirect Impacts
Materials	Consumption of natural and non-renewable resources.	• Depletion of natural and non-renewable resources; and • Degradation of the natural environment.	• Release of greenhouse gas emissions; • Water consumption and scarcity; and • Nuisance to communities (visual, noise, health).
Waste	Generation and disposal of waste.	• Reduction in landfill capacity; and • Degradation of the natural environment.	• Release of greenhouse gas emissions; and • Nuisance to communities (visual, noise, health).

Based on Project information provided to date acquired through:

- The completion of a site visit by WSP;
- The existing EIA[37] for the Project; and
- The application of professional judgement.

The potential impacts of materials consumption, waste generation and disposal is provided in the table below.

Table 50 - Potential Impacts of Materials Consumption and Waste Generation

Delivery phase	Impacts	
Construction	Materials	• The road surface will be asphalt. Information provided in the existing EIA[37] identifies the following volumes of 'PPP' which is believed to comprise the asphalt material. Volumes comprise: • 203,877m^3 for the Kapchagai - Kurty Village highway; • 7,699m^3 for the Karagandy - Kapchagai transport interchange; • 96,594m^3 for the Almaty - Akshiy transport interchange; • 75m^3 for the pathways to electrical substations; • Other material resources are considered likely to comprise sub-base materials (aggregate), concrete for underpasses, steel for structural aspects, timber for formwork, bituminous materials, metal and plastic elements for signage, lighting and possibly drainage; • Construction materials are likely to be sourced from one of the quarries located near to Kapshagai Town. Further assessment will be undertaken

[37] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

Delivery phase	Impacts	
		to ensure there is sufficient availability of material and the quarry is licenced; • Information gathered during the site visit indicated that primary materials consumption will be reduced by the reuse of material generated through demolition and excavation arisings (precise commitments, information and data regarding reuse have not been made available); • No adverse impacts from material consumption are anticipated during the demolition phase of the project; • During site remediation/preparation and construction works, the impacts associated with material resource consumption are considered to be adverse, permanent and direct; and • Based on the limited data currently available on the availability of materials within the region, materials volumes required for the Project and the recycled content of those materials, it is not considered possible to assess the sensitivity, magnitude of change and therefore significance of effect. Further studies would therefore be required to obtain the necessary information needed to make an assessment.

	Waste	• Information provided in the existing EIA[37] identifies the following volumes of earthwork removal for the project:
		  • 1,787,307m^3 banked ground;
		  • 1,736,950m^3 of ditches; and
		  • 1,616m^3 cutting of unsuitable ground.
		• The EIA report does not specify if this waste will be re-used on or off site, or be disposed of to landfill;
		• Information provided in the existing ESA[37] identifies the following volumes of other waste generated during construction:
		  • 22,080 tonnes 'LKM' waste (presumed to be a chemical finishing or paint product) per year;
		  • 953 tonnes oily rags per year;
		  • 1,633,286 tonnes solid waste per year; and
		  • 390 tonnes electrode stubs per year
		  • 183,341 tonnes construction waste per year.
		• Other construction waste is unconfirmed, but may include broken out concrete, road planings, bituminous materials, plastics, surplus material (e.g. metal, concrete, asphalt) contaminated land, vegetation;
		• Information gathered during the site visit indicated that that all demolition and excavation waste arising will be reused on site, thus reducing any impact on landfill capacity;
		• During the site visit it was noted that there is an intention to re-use material generated from demolition activities; material will be processed by a crusher to allow re-use, thus diverting waste from landfill;
		• The Ili District Roads Lead has advised that signs would be re-used for other road projects;
		• Based on consultations undertaken during the site visit, waste which cannot be diverted from landfill is likely to be transported to a licenced landfill site accepting solid non-hazardous waste, located on the edge of Kapshagai Town. A second licenced landfill for solid non-hazardous waste is reported to be located near to Akshi village;
		• Information provided during the site visit stated that waste arising during the construction phase will be reused and / or recycled on or off site, with beneficial effect. However, where diverting site arisings from landfill is not possible, the impacts associated with disposing of waste would be adverse, permanent and direct; and

Delivery phase	Impacts	
		• Based on the absence of data currently available on the capacity of waste recovery and landfill sites within the region, and limited data on the anticipated volumes of waste arising, it is not considered possible to assess the sensitivity, magnitude of change and therefore significance of effect. Further studies would therefore be required to obtain the necessary information to make an assessment.
Operation	Materials	• Minimal quantities of materials are anticipated to be required during operation and maintenance following the completion of the project. Materials resources required are anticipated to be similar to the current baseline and include specialist components (for example signage and lighting) as well as some bulk products (asphalt) for routine works and repairs of the road surface; • Any materials required will impact on the consumption of natural resources resulting in the depletion of natural resources and local / regional stocks, resulting in an adverse, permanent and direct impact on the consumption of construction materials; and • Despite the limited information currently available, professional judgement indicates that the effects are likely to be *not significant* (based on the criteria and descriptions in Section 12.2), however further information on the likely operational / maintenance activities would need to be obtained in order to verify this precisely.
	Waste	• Waste generation associated with operational activities and routine maintenance is anticipated to be minimal. Where wastes are not recovered, the impact on landfill capacity would be adverse, permanent and direct; and • Based on the limited information currently available, and using professional judgement, it is considered likely that the operational effects associated with waste will be not significant (based on the criteria and descriptions in Section 12.2), however further information on operational waste generation and the capacity of waste recovery and landfill sites within the region would need to be obtained in order to make a full assessment.

12.5 FURTHER STUDIES

To make a full assessment of the significance of effects that the Project would have in relation to material resources and waste, further studies to obtain the following data will be required:

- The type and volume of materials (major materials types by volume) to be consumed during the construction of the project. This may comprise a schedule of work or bill of quantities, or estimates of material consumption based on key Project details. The data should also include the recycled content / other sustainability features of materials, and the source of the material (local, regional, national or international). This information would be obtained from a principal contractor and / or design team;
- An assessment of the local, regional and national availability of bulk materials required for construction (e.g. asphalt, aggregate, concrete, metal etc). This information could (for example) be gathered by reviewing available stocks, sales and / or production volumes in Kazakhstan. This data can be used in conjunction with the anticipated material volumes for the Project to assess the impact (consumption of materials) that the Project will have on material availability in line with the criteria set out previously. Data may need to be obtain through direct discussion with the quarries / suppliers, or through information requested from the relevant government body;
- The type and volume of materials to be consumed during the operation of the project. Data should include the recycled content / other sustainability features of material, and the source of the material (local, regional, national or international). This information may need to be obtained from the principle contractor and / or design team; and

- The type and volume of waste arisings anticipated during the Project construction. This information should include the cut and fill balance, and the quantification of wastes that will be recovered (reused or recycled) or disposed of to landfill.

Details of licenced waste sites locally, regionally and nationally, to (a) ascertain the waste types they accept and (b) determine remaining capacity available. Data can be used in conjunction with the anticipated waste volumes to assess the impact (reduction in capacity) that the Project will have on the waste sites in line with the criteria set out previously. Data may need to be acquired through direct discussions with site operators, or through information requests from the relevant government body.

12.6 MITIGATION MEASURES

A number of measures should be applied to minimise the impact of material consumption and waste to landfill. Measures could include:

- The reuse of materials generated through demolition and excavation arisings. This will be increased through the use of a crusher to process arisings. Further best practice guidance can be sought from BES 6001 Responsible Sourcing of Construction Products[38]; and
- The re-use of signs for other road projects.

Further examples of potential design, mitigation and enhancement measures include, but are not limited to:

- Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a Project goal;
- Design for off-site construction: maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction;
- Design for the future: considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstruct ability and demount ability of elements can be maximised at end-of-first-life;
- Identify opportunities to minimise the export and import of material resources;
- Develop and implement a CEMP, incorporate a Design Site Waste Management Plan and a Materials Management Plan in accordance with best practice (CL:AIRE Definition of Waste: Code of Practice)[39];
- Engage early with contractors to identify possible enhancement and mitigation measures (for example, waste exemption licenses), and to identify opportunities to reduce waste through collaboration and regional synergies;
- Design for recovery and reuse: identifying, securing and using material resources at their highest value, whether they already exist on site, or are sourced from other projects;
- Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse;
- Working to a proximity principle, ensuring arisings generated are handled, stored, managed and re-used or recycled as close as possible to the point of origin;
- Identify areas for stockpiling and storing wastes that will minimise quality degradation and leachate, and will minimise damage and loss;
- Ensure waste are appropriately managed to ensure they are disposed of in an environmentally sound manner and their environmental harmfulness is reduced as far as practicable;
- Ensure contractors used for the disposal of waste and the waste disposal sites are reputable, legitimate enterprises, licenced by the relevant regulatory authorities and operating to acceptable standards; and
- Implement measure to ensure the use of hazardous substance and materials is avoided or minimised. Where avoidance is not possible, appropriate risk management measure will need to be implemented.

[38] British Research Establishment (2014). BES 6001: The Framework Standard for Responsible Sourcing of Construction Products.
[39] CL:AIRE (2018). Definition of Waste: Code of Practice. Available at: https://www.claire.co.uk/projects-and-initiatives/dow-cop [Accessed: 20/07/18].

13 NOISE AND VIBRATION

13.1 LEGISLATION

Applicable laws and guidance are outlined in the table below.

Table 51 - Noise and Vibration Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Guidance	
EBRD. Performance Requirement 3: Resource Efficiency and Pollution Prevention Control.	2014
International Finance Corporation. Environmental, Health, And Safety (EHS) Guidelines. General EHS Guidelines: Environmental.	2007
World Health Organisation. Guidelines for Community Noise.	1999
UK Department of Transport. Calculation of Road Traffic Noise (CRTN) Memorandum.	1988
Highways Agency. DMRB, Volume 11, Section 3, Part 7: Noise and Vibration.	2007

Details with regards to noise and vibration levels and generic mitigation measures outlined in each of the guidance documents referenced above are provided below.

13.1.1 INTERNATIONAL FINANCE CORPORATION GUIDELINES

Section 1.7 of the EHS guidelines consider the impact of noise beyond the property boundary of the facilities.

The guidelines note that noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a Project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception.

The guidelines describe various mitigation control measures, including the following which could be applied to this type of project.

- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 to minimise the transmission of sound through the barrier. To be most effective, barriers should be located as close to the source or to the receptor location as possible.
- Relocating noise sources to less sensitive areas to take advantage of distance and shielding.
- Siting permanent facilities away from community areas if possible.
- Taking advantage of the natural topography as a noise buffer during facility design.
- Reducing Project traffic routing through community areas wherever possible.

The IFC guidance on noise levels and change states that: "*Noise impacts should not exceed the levels presented in Table 1.7.1 (reproduced below)), or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site*"[40]. A footnote to Table 1.7.1 confirms that these guideline values relate to

[40] International Finance Corporation (2007). Environmental, Health, And Safety (EHS) Guidelines: General EHS Guidelines: Environmental.

noise levels measured out of doors and the reader is directed to the Guidelines for Community Noise, published by the World Health Organisation (WHO) (1999).

Table 52 - Noise Level Guidelines

Receptor	One-hour LAeq (dBA)	
	Daytime 07:00 - 22:00	Night-time 22:00 - 07:00
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

The noise section concludes with guidance on noise monitoring should that be necessary and appropriate.

Section 4.0 of the EHS guidelines provides specific guidance on prevention and control of community health and safety impacts that may occur during Project development.

The guidelines identify that noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. The recommended noise reduction and control strategies to consider in areas close to community areas include:

- *"Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance;*
- *Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines; and*
- *Avoiding or minimising Project transportation through community areas"*[41].

The IFC also provides industry sector guidance in addition to this general guidance.

13.1.1.1 IFC ENVIRONMENTAL, HEALTH, AND SAFETY (EHS) GUIDELINES - GUIDELINES FOR TOLL ROADS

These apply to the construction of large sealed roads projects. The section on noise under the sub-heading 'Environment' states the following:

"Traffic noise is generated by vehicle engines, emission of exhaust, aerodynamic sources, and tire / pavement interaction. For vehicle speeds over 90 kilometres per hour (km/h), the noise from the tire / pavement interaction predominates. Traffic noise can be a significant nuisance and may be loud enough to interfere with normal conversation and can cause stress in children and raise blood pressure, heart rates, and levels of stress hormones. Traffic noise levels are reduced by distance, terrain, vegetation, and natural and manmade obstacles.

Management practices to prevent, minimise, and control noise include:

- *Consideration of noise impacts during road design to prevent adverse impacts at nearby properties through the placement of the road right-of-way and / or through the design and implementation of noise control measures discussed below; and*
- *Design and implementation of noise control measures may include the following:*
  - *Construction of the road below the level of the surrounding land;*
  - *Noise barriers along the border of the right-of way (e.g. earthen mounds, walls, and vegetation);*
  - *Insulation of nearby building structures (typically consisting of window replacements); and*
  - *Use of road surfaces that generate less pavement / tire noise such as stone-matrix [also known as stone mastic] asphalt"*[42].

[41] International Finance Corporation (2007). Environmental, Health, And Safety (EHS) Guidelines. General EHS Guidelines: Environmental.

[42] International Finance Corporation (2007). Environmental, Health, And Safety (EHS) Guidelines. General EHS Guidelines: Environmental.

13.1.2 INTERNATIONAL GUIDANCE

13.1.2.1 WORLD HEALTH ORGANISATION GUIDELINES FOR COMMUNITY NOISE

The WHO's Guidelines for Community Noise consolidate scientific knowledge on the health effects of community noise and provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic, industries, construction and public work and neighbours.

As the guideline noise values for noise sensitive receptors, such as dwellings, are much lower than for other less sensitive receptors (see the previous table above), this assessment concentrates on residential receptors.

The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. The relevant guideline values are summarised in the table below. Also specified is the length of time (time base) over which the guideline values apply.

Table 53 - WHO Guideline Values for Community Noise in Specific Environments[43]

Specific Environment	Critical Health Effect(s)	LAeq (dB)	Time Base (hours)	LAFmax (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

The WHO external guideline values for dwellings presented above align with those adopted by the IFC.

13.1.3 UK GUIDANCE

13.1.3.1 THE CALCULATION OF ROAD TRAFFIC NOISE (CRTN) MEMORANDUM

This memorandum sets out a step-by-step method for predicting road traffic noise levels (in terms of LA10) at a distance from the highway and has been used to support this assessment. The factors taken into account in determining the source noise levels include traffic flow, associated speeds and vehicle mix. The road surface and gradient are also important factors in determining the source levels.

Other factors that influence the attenuation of noise are the separation distance and type of intervening ground cover between road and receptor, the presence of screening (from barriers, buildings and topography), the angle of view of the traffic and reflections. The CRTN methodology generates noise levels under moderately adverse meteorological conditions.

The method facilitates the prediction of LA10 over a 1-hour period or over an 18-hour period between 06:00 and midnight. In this case, as the IFC guideline values relate to a 1-hour period (see Table 52), any road traffic noise predictions will need to be over the same period.

13.1.3.2 THE DESIGN MANUAL FOR ROADS AND BRIDGES

Part 7 of the DMRB identifies that a change in road traffic noise of 1 dB LA10,18h in the short term (e.g. when a Project opens) is the smallest that is considered perceptible. In the long term (typically 15 years after a Project opens) a more gradual change of 3 dB LA10,18h is considered perceptible. A different magnitude of impact should, therefore, be considered for short-term and long-term changes in noise.

Table 54 summarises the classification of magnitude of noise impacts associated with short and long-term changes in noise levels, as set out in DMRB HD 213/11.

Table 54 - DMRB Classification of Magnitude of Noise Impacts[44]

Magnitude of Impact	Noise Change, dB (LA10,18h)

[43] WHO (1999). WHO Guidelines for Community Noise.
[44] Highways Agency (2007). DMRB, Volume 11, Section 3, Part 7: Noise and Vibration.

	Short-Term	Long-Term
No change	0	0
Negligible	0.1 - 0.9	0.1 - 2.9
Minor	1.0 - 2.9	3.0 - 4.9
Moderate	3.0 - 4.9	5.0 - 9.9
Major	+5.0	+10.0

When assessing operational road traffic noise, DMRB Part 7 specifies that the baseline year should be taken as the opening year of the road project, whilst the future assessment year for operation should typically be the 15th year after the opening year of the road project. The table above shows that a change of 3 dB or more in the long term would be described as a noise impact of at least minor magnitude.

13.2 ASSESSMENT METHODOLOGY

13.2.1 CONSTRUCTION PHASE

Disruption due to construction is temporary and for the most part impacts are more localised compared to the situation once the Project has opened to traffic. One UK study has shown that at least half the people living within 50 metres either side of the site boundary were seriously bothered by construction works, but that beyond 100 metres less than 20% of the people were seriously bothered[45].

Whilst prediction methods are available to determine the level of noise during construction activities, the precision of any such predictions is necessarily limited by the number of assumptions that must be made regarding the number and type of plant to be utilised, their location and detailed operating arrangements. Some of this information will be clarified as the Project design progresses and later when resources are mobilised, but other information (such as exactly where the plant operates and for how long) will remain uncertain, even after works have commenced.

At this early stage and with no contractor appointed it is considered appropriate for a qualitative assessment to be made of the temporary impacts likely to arise from construction works, based on available information and professional judgement.

13.2.2 OPERATIONAL PHASE

Based on the IFC EHS guidelines (see Table 52 and the paragraph immediately above that) consideration needs to be given to both the likely change in noise and the absolute level of noise arising as a result of the proposed road improvements.

Therefore, the available traffic data (as summarised below) have been used to determine the likely change in noise level at residential receptors.

The Project designer has provided a breakdown of 24-hour traffic data for all years between 2015 and 2040. The table below Table 55 presents relevant traffic data used in the assessment for the year of opening and 15 years after that.

The road traffic speed limits will be set at 50 km/h and that this is and will be enforced by traffic police, as is the case across the wider road network.

Table 55 - Traffic Data for Noise Assessment

Year	Scenario	24-Hour Flow	1-Hour Flow			Heavy Vehicles	Vehicle Speed
			Average 1	Day 2	Night 3		
2021	Opening	3228	135	404	101	31.9 %	50 km/h

[45] C.J.Baughan and TRRL SR562 (1980). Nuisance from road construction: a study at the A31 Poulner Lane Diversion, Ringwood.

Year	Scenario	24-Hour Flow	1-Hour Flow			Heavy Vehicles	Vehicle Speed
			Average 1	Day 2	Night 3		
2036	Future	6712	280	839	210	31.9 %	50 km/h

Notes:
1. the 24-hour flow divided by 24.
2. the 24-hour flow divided by 24 and then multiplied by a notional factor (of 3.0) to reflect that flows will not be even throughout the day and that a typical daytime peak hour flow will be higher than the 24-hour average.
3. the 24-hour flow divided by 24 and then multiplied by a notional factor (of 0.75) to reflect that night-time flows are likely to be less than the 24-hour average and less than the daytime flows.

If the predicted change in the long-term (comparing data for 2021 and 2036, as required by the DMRB - see previous section) at any dwelling is at least +3 dB, then consideration will be given to the likely noise level at sensitive receptors. If noise levels at dwellings are found to be above the IFC target values of LAeq,1h of 55 dB day and 45 dB night, then consideration will be given to relevant mitigation measures.

13.3 BASELINE CONDITIONS

This section identifies noise sensitive receptors that could potentially be affected by the Project during and post construction. No noise measurement survey has been conducted, but baseline conditions in terms of the likely existing noise climate are described, based on a site walkover and a desk-top review of available maps, Project plans and traffic data.

The road corridor runs on relatively flat terrain in a steppe / desert landscape between Kapshagai Town in the east and Kurty Village in the west. Small streams mostly dry cross the road, as does a water channel over which the road passes on a bridge. The area surrounding the road is mainly used for non-intensive herding.

At its eastern end, the road commences in the built-up area of Kapshagai Town. The first realigned section, a short distance to the west of the grade-separated junction with the A-3 (the Almaty to Kapshagai Town Highway), passes close (within 100 m) to an enclave of dwellings on the western fringe of Kapshagai Town. The closest approach of these dwellings to the existing road is in excess of 200 m, so the new alignment is much closer. In the vicinity of this first realignment, are a few industrial installations including a plastics factory and an asphalt plant. There are four other realigned sections of road outside of Kapshagai Town, although none as notable as the first.

Beyond Kapshagai Town, the road passes approximately twenty isolated farms that can be viewed from the road. These are relatively small-scale farms with livestock including cattle, sheep and horses connected by predominantly dirt roads. All these dwellings are currently set back from the road by more than 200 metres and for the majority this minimum set-back is retained in the future. The exceptions are at the eastern end where, as noted above, the new alignment passes within about 80 metres of a number of dwellings and at the western end, where a single farm would be located within about 65-70 metres of a new slip road linking the improved highway with the minor road heading north out of Kurty Village.

The fact that dwellings are set-back from the road allied to the sparse nature of the road corridor means that existing noise levels are likely to be low and most likely below the IFC guideline noise levels of 55 dB during the day and 45 dB LAeq,1h during the night. An exception could be at the eastern end near Kapshagai Town where the industrial installations that are located there may increase noise levels.

13.4 POTENTIAL IMPACTS

13.4.1 CONSTRUCTION PHASE

Temporary noise and vibration effects are defined as those that occur between the start of advance works and the end of the road Project construction period. Where materials need to be transported to or from the site, the effects of the additional traffic along access routes are likely to extend beyond the immediate construction site.

Some activities and operations are likely to generate potentially significant levels of noise and vibration, such as demolition/construction of structures, piling and earthworks. Consequently, the need for such works should be identified at the earliest opportunity, along with the likelihood of any night-working, as all can increase the chance of disturbance. The Project is likely to require night-time working, due to the limited period of time when the weather conditions are suitable for construction to take place during the year.

The following details regarding the construction activities and process have been extracted from the limited information that is currently available:

- The construction works will for the most part be 'on-line', although there are five 'off-line' sections to straighten the road, the most notable of which is the section furthest to the east, both in terms of the magnitude of deviation from the existing alignment and bringing the road closer to dwellings on the western edge of Kapshagai Town;
- The height of the road will vary with a maximum embankment height of 4 m, with the general aim of improving the level of safety (by levelling the road, increasing visibility especially around bends and reducing the likelihood of snow build-up and flooding during snow melt). The existing embankment may be lowered or raised in height;
- In total there will be eleven passes under the road. Eight will be for livestock (6 m by 2.5 m) and three will be for machinery and livestock (6.5 m by 4.5 m). There will be an extensive number of drainage pipes as well as a new bridge over the water channel;
- The noisiest construction activities are considered to be earthworks (i.e. bulldozing) and the laying of the new road surface. Heavy plant, including bulldozers will be used to reprofile the road embankment and the existing road surface will be removed on on-line sections, with a crusher being used to break-up the arisings. The laying of the road surface will proceed at approximately 500 metres per day and last two to four months in total. As such the longest time a farm would be exposed to such an activity would be a few days; and
- Although the majority of the works will be undertaken during daytime hours, there will be no limit on construction hours and contractors are likely to intensify to the construction period when the conditions are favourable.

Given the specific construction activities and processes likely to be employed to improve the highway and the possibility of night-time working, it is inevitable that some disturbance to those living along the route would arise. However, the nature of the area through which the Project passes (and particularly the separation distance between the road corridor and the nearest noise sensitive receptors) as well as the temporary nature of the works, means that the potential for disturbance would be limited. Nonetheless, consideration should be given to mitigation measures to manage and control noise and vibration throughout the construction period.

13.4.2 OPERATIONAL PHASE

On the assumption that all variables, except traffic volume, remain the same over the period from 2021 to 2036, it is possible to determine the likely noise increase from a simple calculation as follows:

Change in road traffic noise level = 10 * log (flow in 2037 / flow in 2021) = +3.2 Db.

This long-term change would be described by DMRB HD 213/11 as an adverse impact of minor magnitude. It is also above the IFC change threshold of +3 dB. Therefore, it is necessary to consider whether the resulting operational noise levels in 2036 with the Project are likely to be above 55 dB LAeq,1h during the day or 45 dB LAeq,1h during the night.

Noise levels have been determined using the CRTN prediction methodology, with the following assumptions:

- Traffic data (flow, proportion of heavy vehicles and traffic speed);
- The road gradient is zero and road is laid with an impervious, bituminous surface (i.e. asphalt) in both 2021 and 2036;
- There is a full (180° angle) view of the road; and
- There is no barrier, but intervening ground cover between the road and nearest dwellings is acoustically absorbent (grazing land).

The CRTN prediction method predicts noise levels in terms of LA10,1h. To convert this to LAeq,1h, 3 dB has been subtracted in line with research findings described by the UK's Noise Advisory Council "*All these studies lead to the conclusion that for the majority of situations of practical interest a value of LAeq over a specified*

period of time may be derived from a value of L10 measured directly over the same period by the numerical subtraction of 3 dB" [46].

The road traffic calculations indicate that based on the assumptions set out above, most dwellings in proximity to the road (those beyond 200 metres) would have LAeq,1h levels below 55 dB during the day and 45 dB at night, even in 2036. However, for properties closer to the road (those within 100 metres, as present at each end of the Project in 2036) noise levels are predicted to exceed the IFC thresholds.

In conclusion, there is some potential for adverse impacts of minor magnitude and so consideration should be given to mitigation measures to reduce these impacts, as far as is practicable.

13.5 MITIGATION MEASURES

13.5.1 CONSTRUCTION PHASE

The noise and vibration effects arising during construction can be mitigated to an extent through contractual means. Contract conditions can be used to limit noise from a construction site, to control working hours (especially for potentially disruptive operations), to prevent access to sensitive areas, and to restrict construction traffic to suitable haul routes, etc.

It will be important to manage and control noise and vibration throughout the construction period and to this end it is expected that a mitigation strategy will be developed. It is anticipated that this strategy would be formalised within a CEMP, developed by the Contractor. The CEMP would include, but not necessarily be limited to, the following aspects:

- Environmental management responsibilities and activities;
- Monitoring and auditing processes;
- Complaints handling and response procedures; and
- Community and stakeholder liaison processes.

During the construction phase, the Contractor should apply best practicable means (BPM) to minimise any residual noise impact. General methods of noise control include:

- The appropriate selection of plant, construction methods and programming. Only plant conforming with relevant national or international standards, directives or recommendations on noise or vibration emissions should be used. Construction plant should be maintained in good condition with regards to minimising environmental noise and vibration as well as workers exposure to harmful noise and vibration;
- Construction plant should be operated and maintained appropriately, having regard to the manufacturer's written recommendations. All vehicles and plant should be switched off when not in use.
- The positioning of construction plant and activities to minimise noise at sensitive locations;
- The design and use of site hoardings and screens to provide acoustic screening at the earliest opportunity;
- Choice of routes and programming for the transport of construction materials, spoil and personnel;
- Vehicles and mechanical plant used for the purposes of the works should be fitted with effective exhaust silencers, be maintained in good working order and operated in such a manner as to minimise noise emissions;
- The use of mufflers on pneumatic tools; and
- Where practicable, rotary drills actuated by hydraulic or electrical power should be used for excavating hard materials.

The risk of significant construction noise and vibration effects will be minimised by appropriate measures contained in the CEMP, which should be applied throughout the construction phase.

Through the preparation of a CEMP and the adoption of a considerate approach throughout the construction phase (for example, adhering to construction working hours, keeping residents informed of progress and

[46] Working Party for the Technical Sub Committee of The Noise Advisory Council (1978). A Guide to Measurement and prediction of the Equivalent Continuous Sound Level LAeq.

particularly noisy activities and ensuring that best practicable means are adopted at all times to minimise noise and vibration levels) it is anticipated that all construction related activities can be undertaken whilst minimising disturbance to residents.

13.5.2 OPERATION

A number of generic measures are available that can be applied either in isolation or in combination, to mitigate the adverse effects of road traffic noise. These generic Project-related measures are set out below.

- Horizontal alignment - moving a route away from sensitive receptors;
- Vertical alignment - keeping a route low within the natural topography to exploit natural screening;
- Speed and volume restrictions - above about 40 km/h, noise level increases with the speed of the vehicle; the volume and composition of traffic can also have a direct effect on noise levels;
- Low noise road surface - most effective for noise generated by tyres of vehicles travelling at speeds more than 75 km/h; and
- Environmental barriers - in the form of earth mounding or acoustic fencing of various types, or a combination of the two.

The measures set out in the first two bullet points above should always be the primary objective when determining the vertical and horizontal alignment of new and/or altered roads. However, the road alignment is often driven by factors other than acoustics and that is the case here, where engineering and safety requirements have dictated the design.

Whilst the road will carry a substantial proportion of heavy vehicles, a speed limit of 50 km/h serves to limit the level of traffic noise. For example, were vehicles to travel at 100 km/h rather than 50 km/h, then source levels would be nearly 4 dB higher. Such an uplift is significant in that to achieve a comparable reduction in noise, more than a halving of traffic flow would be required.

As the speed limit for the road is 50 km/h, a low noise road surface would not be a particularly effective measure for controlling the level of traffic noise. This is because engine, transmission and exhaust noise tends to dominate at lower speeds, particularly where there is a high proportion of heavy vehicles, as is the case here.

Environmental barriers can provide reductions of 10 dB or more for well-screened locations relatively close to the source. But at further distances and particularly where the barrier provides only a small deflection of the transmitted sound, actual reductions may only be 1 or 2 dB. Beyond 200 to 300 m the effects are often zero as the attenuation of absorbent ground cover becomes a significant factor. Other considerations with respect to barriers are:

- The primary objective of any barrier should be to prevent a direct line of sight between the receptor and the noise source;
- The higher the barrier, the greater the sound reduction, although, there will come a point where the additional benefit will not be cost-effective;
- The closer a barrier is to the source, the greater will be the sound reduction;
- Where a road is located on an embankment, the most efficient location for the barrier will usually be on the embankment as close to the edge of the carriageway as possible;
- Where a road is in cutting, there will be less need for a barrier;
- A barrier will usually be less effective at screening upper floors of sensitive buildings; and
- Unless they are specifically designed and constructed to prevent this, a barrier can reflect sound, increasing noise levels at certain receptors located opposite barriers.

There is potential for adverse impacts of minor magnitude in terms of operational road traffic, particularly at dwellings at each end of the Project. To minimise these adverse impacts, consideration should be given to introducing acoustic barriers, most likely through reprofiled earthworks to create an earth bund to screen the road from the nearest dwellings.

14 WATER ENVIRONMENT

14.1 LEGISLATION

Applicable laws and directives are outlined in the table below.

Table 56 - Water Environment Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Water Code of the Republic of Kazakhstan No.481.	2003
EU Directives	
Water Framework Directive	2000
Groundwater Directive	2006

14.2 ASSESSMENT METHODOLOGY

The general approach to this assessment is summarised in Chapter 4.

The assessment of potential impacts to the water environment has been completed with due regard to best practice UK guidance as set out within the Design Manual for Roads and Bridges (DMRB) HD 45/0947. This promotes the following approach:

- Estimation of the importance of the attribute;
- Estimation of the magnitude of the impact; and
- Assessment of the significance of the impact based on the importance of the attribute and magnitude of the impact.

Estimation of the importance of the attribute considers the quality and rarity of the attribute as summarised in the table below.

Table 57 - Attribute Criteria

Importance	Criteria	Examples
Very High	Attribute has a high quality and rarity on regional or national scale.	Large or medium watercourses with pristine / near pristine water quality supporting a wide range of significant species and habitats of international/national biodiversity value. Watercourse or groundwater body used for regional public water supply.
High	Attribute has a high quality and rarity on local scale.	Medium or small watercourses of good water quality supporting ecosystems of regional biodiversity value.

[47] Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 10 Road Drainage and the Water Environment (HD 45/09).

Importance	Criteria	Examples
		Watercourse or groundwater body supporting local drinking water supplies.
Medium	Attribute has a medium quality and rarity on local scale.	Small watercourses with moderate water quality supporting ecosystems of district / local biodiversity value. Watercourse or groundwater body for agricultural/industrial use.
Low	Attribute has a low quality and rarity on local scale.	Small, heavily modified watercourses with poor water quality or supporting ecosystems of less than local biodiversity value. Watercourses not supporting water abstractions.

Estimation of the magnitude of the impact is summarised in the table below.

Table 58 - Magnitude Criteria

Magnitude	Criteria	Examples
Large	Results in loss of attribute and / or quality and integrity of the attribute.	Significant temporary or long-term change in water quality, resulting in a permanent change in status. Loss or damage to existing habitats. Permanent/long-term loss of water supply. Loss of, or extensive change to, an aquifer.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute.	Moderate temporary change in water quality, resulting in a temporary change of status. Some changes and impacts on the water feature bed, banks and vegetated riparian corridor. Temporary/short-term loss of water supply. Partial loss or change to an aquifer.
Slight Adverse	Results in some measurable change in attribute's quality or vulnerability.	Relatively minor temporary changes in water quality. Limited impacts on the water feature bed, banks and vegetated riparian corridor. Temporarily reduced quality of water supply.
Negligible Adverse	Results in effect on attribute, but of insufficient magnitude to affect the use of integrity.	Very slight temporary change in water quality with no discernible effect on watercourse ecology or water supply. No measurable impact upon an aquifer.
No Change	Results in no change to the receptor.	No predicted adverse impact to the receptor.

The overall significance of an impact gives consideration to both the estimated importance of the receptor and the predicted magnitude of the impact, as summarised previously in Table 9.

14.3 BASELINE CONDITIONS

14.3.1 SOURCES OF INFORMATION

Information regarding baseline conditions has been largely obtained from the national EIA prepared in 2011, supplemented with information provided by local representation and site visit, and web-based sources of data.

14.3.2 WEATHER CONDITIONS

Average rainfall data recorded at the Kapshagai Meteorological station indicates the lowest rainfall occurs in late summer with an average minimum monthly rainfall of 12 mm recorded for September, and the highest rainfall occurs in spring with an average maximum monthly rainfall of 36 mm recorded in both April and May. Total average annual rainfall is recorded to be 267 mm[48].

The coldest temperatures are typically experienced in January with an average monthly temperature of minus 12.4℃. Snowfall is typically experienced during late winter and spring, with snow melt typically occurring in April[48].

14.3.3 SURFACE WATER FEATURES

The Project crosses a number of seasonal streams that are reported to be dry for much of the year but that convey flow resulting from snow melt and during heavy rainfall events. Peak flow with the highest risk of flooding is usually observed between March and April when rainfall falls on melting snow48. The largest seasonal streams are reported to include:

- Shoshkaly Stream, which crosses the Project three times at KM3+670, KM13+203 and KM17+498;
- Bolshoy and Malyi Kyzylespe Streams which cross the Project at KM59+292;
- Akkarasai Stream which crosses the Project at KM62+026;
- Keregetas Stream which crosses the Project at KM65+616; and
- Koshkara Stream, Tamshiy Stream and Kazanba Stream[48].

The Kurty Village River is located immediately to the west of the proposed P-18 and M-36 road junction. The watercourse flows in a northerly direction and discharges to the Kurty Village water storage reservoir that is located upstream of the Project. The reservoir was constructed in the 1990s by damming the River and has an approximate capacity of 120 million m^3 [49]. Unlike the other minor watercourses crossed by the Project, the Kurty Village River has a permanent baseflow that is reported to be sustained by a mixture of rainfall, snow melt and groundwater. It is described as shallow and used for irrigation of adjacent fields. The River measures approximately 125 km in length with a catchment basin of approximately 12,500 km^2 [48]. The River confluences with the Ili River approximately 60 km downstream of Kurty Village and subsequently contributes to flow to Lake Balkhash as discussed below.

The Ili River originates in the Tian Sham mountain range in China and flows west into the Kapshagai Reservoir to the east of Kapshagai. From here the Ili River flows north to Lake Balkhash approximately 230 km downstream of Kapshagai: this is the largest lake in Kazakhstan comprising an 8,000 km^2 delta of lakes, wetlands and marshes[50]. The River Ili is reported to have once provided 80-90% of freshwater inflow into the Lake, although this is reported to have reduced by two-thirds in the 1970s as a result of the Kapshagai Reservoir. The Kapshagai Reservoir sustains a permanent baseflow within the Ili River, however, the construction of the reservoir is reported to have had a significant adverse effect on water levels and water quality in Lake Balkhash due to the reduction in flows[51].

[48] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.
[49] CA Water (2018). Water Infrastructure: Reservoirs, Kazakhstan. Available at: http://www.cawater-info.net/bk/dam-safety/infrastructure_e.htm [Accessed: 20/07/2018].
[50] Wikipedia (2018). Ili River. Available at: https://en.wikipedia.org/wiki/Ili_River [Accessed: 20/07/2018].
[51] Encyclopaedia Britannica (2018). Lake Balkhash. Available at: https://www.britannica.com/place/Lake-Balkhash [Accessed 20/07/2018].

The Kapshagai Reservoir is the second largest lake in Kazakhstan (after Lake Balkhash) and measures approximately 2,000 km^2. The reservoir feeds the Kapshagai Hydroelectric Power Plant constructed between 1965 and 1970. The reservoir also supports essential water supplies for agriculture, fisheries, urban and industrial use, and is also popular for tourism during the summer months[52]. The reservoir is reported to have a total capacity of approximately 28,140 million m^3 and an active capacity of approximately 6,640 million m^3 [53].

The Project crosses a water channel at KM9+235 that is reported to convey treated wastewater. The bridge crossing comprises a twin box culvert as photographed in the figure below.

Approximately 60 drainage pipes (typically as illustrated in the figure below) pass beneath the Project along its length. These are presumably to allow the flow of rainfall, snow melt and floodwaters from one side of the Project to the other. The existing road is understood to shed runoff to adjacent ground, with no prior attenuation or treatment of runoff.

Figure 4 - Water Channel

Figure 5 - Typical Drainage Pipe

The surface water features within the Project area are not reported to support notable species of importance and have no statutory designation. The flow from the Kapshagai Reservoir and Kurty Village River is important for maintaining the downstream wetland habitats in Lake Balkhash.

14.3.4 GROUNDWATER RESOURCES

Groundwater is not a prominent source of water supply within the region, although some groundwater is reported to be abstracted from a confined aquifer in Kurty Village and Akshi from wells up to 7m deep. Shallow unconfined groundwater is also abstracted by farms for agricultural and farming purposes although again this is not a prominent source of water supply, with most farms obtaining their water by tanker which is presumably sourced from the Kapshagai Reservoir and Kurty Village Reservoir.

14.4 POTENTIAL IMPACTS

14.4.1 CONSTRUCTION IMPACTS

Impacts that are predicted to most likely occur during the construction phase include:

- Pollution risks to adjacent watercourses and underlying groundwater resources, that may pose risk to environmental, agricultural, industrial and potable water quality;
- Reduction in water supply for environmental, agricultural, industrial and potable water use caused by an increase in water demand during construction of the Project; and

[52] Wikipedia (2018). Kapchagai Reservoir. Available at: https://en.wikipedia.org/wiki/Kapchagay_Reservoir [Accessed 20/07/2018].
[53] CA Water (2018). Water Infrastructure: Reservoirs, Kazakhstan. Available at: http://www.cawater-info.net/bk/dam-safety/infrastructure_e.htm [Accessed: 20/07/2018].

- Increased flood risk to the proposed users of the road and properties elsewhere caused by temporary restriction to flood flow conveyance.

These potential impacts are discussed further below. The assessment considers mitigation measures that can be reasonably expected to be incorporated into the construction works, such as good site practice.

14.4.1.1 POLLUTION RISKS

The proposed construction works could adversely affect water quality in adjacent and downstream surface water features, most commonly associated with increased suspended solids in runoff from the road surface, earthworks and stockpiles. During construction there is also an increased risk of oils and other harmful substances entering surface water and groundwater features, most commonly associated with spillages and leaks from construction plant, and poor material and substance storage.

Risks to surface water quality are likely to be most significant when working immediately adjacent to a watercourse and during periods of heavy rainfall. Risks to groundwater resources are likely to be most significant when working within or close to excavations that extend into shallow unconfined groundwater resources, or if piling works are proposed that extend to the deeper confined groundwater aquifer. Impacts to surface water features are likely to be temporary with water quality in the affected receptor improving over time. Impacts to groundwater resources will be harder to treat and may have a longer-term effect, although as groundwater resources are suggested to be relatively non-productive the impacts are likely to remain localised and will disperse over time.

Good site practice that is tailored to the activities being undertaken on site should be sufficient to appropriately manage pollution risks to surface water and groundwater resources during construction. As such, risks to water quality should be minimal. It is recognised that a heightened risk may be present during periods of high rainfall or snowmelt that could more easily wash pollutants into adjacent and downstream surface water features, although it is also recognised that higher flows will also provide increased dilution. It is considered highly unlikely that pollutants will migrate towards the Kapshagai Reservoir, Ili River or Lake Balkhash given the substantial distance between the Project and these features.

Wastewater generated during construction will be managed via the use of bio-toilets at construction sites, with no wastewater proposed to be discharged to watercourses or to groundwater. The volume of wastewater generated during construction has been estimated as 378.8 m^3 per year[54]. It is assumed that wastewater will be disposed of appropriately without posing risk to the natural environment, and that all necessary permits will be obtained prior to construction.

Table 59 - Summary of Pollution Risk During Construction

Receptor	Importance	Impact	Magnitude	Significance
Kurty Village River	High	Pollution risks associated with overland migration.	Slight Adverse	Minor Adverse
		Pollution associated with wastewater discharge.	No Change	Not Significant
Seasonal Streams Crossed by the Project	Low - Medium	Pollution risks associated with overland migration.	Slight Adverse	Minor Adverse
		Pollution associated with wastewater discharge.	No Change	Not Significant

[54] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

Receptor	Importance	Impact	Magnitude	Significance
Kapshagai Reservoir	Very High	Pollution risks associated with overland migration.	No Change	Not Significant
		Pollution associated with wastewater discharge.	No Change	Not Significant
Ili River and Lake Balkhash	Very High	Pollution risks associated with overland migration	No Change	Not Significant
		Pollution associated with wastewater discharge.	No Change	Not Significant
Groundwater Resources	Medium	Pollution risks associated with uncontrolled release of pollutants to ground.	Slight Adverse	Minor Adverse
		Pollution associated with wastewater discharge.	No Change	Not Significant

14.4.1.2 REDUCTION IN WATER SUPPLY

It is proposed that water will be abstracted from the Kapshagai Reservoir, Ili River and Kurty Village River as a source of non-potable water supply during the three-year construction phase of the Project. The volume of non-potable water required during the construction phase has been estimated as 464,857 m^3 per year[55]. Abstractions will be fitted with nets to prevent the capture of fish fry.

It is proposed that the water supply of nearby villages including Kapchagai town, Kurty Village and Akshi village will be used for drinking water supplies. The volume of potable water required during the construction phase has been estimated as 541.8 m^3 per year[55]. It is proposed that water will be delivered via tanker and stored on site in tanks.

No known detailed water balance calculations have been undertaken to inform this assessment and to accurately quantify the potential impact of the proposed supplies on existing environmental, agricultural, industrial and potable water demands. However, it is understood that the required water supplies (potable and non-potable) have been approved by the Water Basin Inspection Authority (Balkhash-Alakol) and the applicable local authorities

A high-level comparison of the estimated construction phase water demand has been undertaken against the equivalent per-inhabitant water demand and the total volume of water reserves within the Kapshagai and Kurty Village Reservoirs to better understand the likely scale of any impact.

14.4.1.3 PER-INHABITANT COMPARISON

Per-inhabitant water demand is estimated to be approximately 1,300 m^3 per year for all potable, agriculture and industrial water uses; and approximately 54 m^3 per year for just municipal uses[56]. The required annual construction phase water demand of approximately 465,400 m^3 per year therefore broadly equates to a

[55] Kapshagai Town-Kurty Village 67 km Road Project EIA. National EIA developed in accordance with the rules, regulations and standards of the Republic of Kazakhstan (RoK) for the design and construction of roads. State Environmental Expertise Positive Conclusion on the EIA was obtained on the 13th March 2017.

[56] Food and Agriculture Organisation of the United Nations (2018). AQUASTAT - Kazakhstan. Available at: http://www.fao.org/nr/water/aquastat/countries_regions/KAZ/ [Accessed: 20/07/2018].

combined-uses water demand equivalent to 350 people, and a municipal-uses water demand equivalent to 8,600 people. By comparison, the approximate population of Kapshagai town is estimated to be just less than 40,000 in a 2009 census[57], and the approximate population of the wider Almaty Region is estimated to be almost 2 million in a 2009 census[58]. The percentage of the Almaty Region population served by the Kapshagai Reservoir, Ili River and Kurty Village River / Reservoir is currently unknown, although these features are known to be a predominant source of water supply within this area.

14.4.1.4 RESERVOIR VOLUME COMPARISON

As discussed in Section 14.3, the Kurty Village Reservoir is reported to have a capacity of 120 million m^3 [59], and the Kapshagai Reservoir is reported to have a total capacity of 28,140 million m^3 and an active capacity of 6,640 million m^3 [60]. The required annual construction phase water demand of approximately 465,400 m^3 per year therefore broadly equates to 0.4% of the capacity of Kurty Village Reservoir, and 0.007% of the active capacity of the Kapchagai Reservoir.

Based on the assessment above, the abstraction of water during the construction phase could have a slight adverse impact on the availability of water resources for other key uses within the region. Whilst the comparison with local population and reservoir volumes indicates an unlikely measurable impact, it is understood that water resources throughout Kazakhstan and within the in the Kapshagai region can be stressed hence an equivalent population increase of between 350 and 8,600 could have a slight measurable effect to the availability of supplies. It is considered unlikely that the abstraction of water for construction would have a notable impact on environmental water quality.

It is recommended that a more detailed water balance assessment is undertaken in consultation with the Water Basin Inspection Authority (Balkhash-Alakol) to ensure confidence of no unacceptable adverse effect. However, it should also be recognised that the potential impacts are temporary and will be limited to the planned construction duration of 3 years, plus the duration post-construction for any depleted water reserves to be replenished that is likely to be less than a year.

Table 60 - Summary of Water Supply During Construction

Receptor	Importance	Impact	Magnitude	Significance
Potable and non-potable supplies from surface water resources.	Very High	Reduced water availability and water quality caused by increased demand during construction period.	Slight Adverse	Minor Adverse

14.4.1.5 INCREASED FLOOD RISK

The Project crosses several existing seasonal streams and works will be required within these streams to widen the existing road and extend existing culverts. It may also be necessary to realign sections of the existing streams to enable widening of the road. The works could lead to an increased risk of flooding to users of the road or to adjacent property if the capacity of the streams and culverts cannot be maintained, or if flood mitigation measures are not installed to provide temporary attenuation and/or diversion of flood waters.

Flood risks during construction will be most significant during periods of heavy rainfall and when there is notable flow within the streams, and when the works are being undertaken in close proximity to adjacent property. Flows are likely to be highest during March and April, with little to no risk likely during the drier

[57] Wikipedia (2018). Kapchagai. Available at: https://en.wikipedia.org/wiki/Kapchagay [Accessed: 20/07/2018].
[58] Wikipedia (2018). Almaty Region: Available at: https://en.wikipedia.org/wiki/Almaty_Region [Accessed: 20/07/2018].
[59] CA Water (2018). Water Infrastructure: Reservoirs, Kazakhstan. Available at: http://www.cawater-info.net/bk/dam-safety/infrastructure_e.htm [Accessed: 20/07/2018].
[60] CA Water (2018). Water Infrastructure: Reservoirs, Kazakhstan. Available at: http://www.cawater-info.net/bk/1-1-1-1-3-kz_e.htm [Accessed: 20/07/2018].

months. It is assumed that the (approximate) 60 existing drainage pipes that pass beneath the Project will be maintained to assist with the movement of flood waters.

The assessment presented in the table below assumes a reasonable worst-case scenario when works to watercourses are required during periods of high flow and appropriate mitigation has not been adequately implemented. Some increase in the extent and depth of flooding may be experienced within the local area and as flood flow crosses the road and re-joins various channels downstream, but this is unlikely to be significant if the existing drainage pipes are maintained. This impact is temporary and of a local scale, and would not extend beyond the construction phase.

Table 61 - Summary of Flood Risk During Construction

Receptor	Importance	Impact	Magnitude	Significance
Road users and adjacent property.	High	Increased flood risk associated with works in flood flow paths.	Slight Adverse	Minor Adverse

14.4.2 OPERATIONAL IMPACTS

Impacts that are predicted to most likely occur during the operational phase include:

- Pollution risks to adjacent watercourses and underlying groundwater resources associated with long term discharge of road runoff and accidental spillage of pollutants, that may pose risk to environmental, agricultural, industrial and potable water quality;
- Increased flood risk to the proposed users of the road and properties elsewhere caused by permanent restriction to flood flow conveyance; and
- Increased flood risk to the proposed users of the road and properties elsewhere caused by an increase in the rate and volume of surface water runoff.

These potential impacts are discussed further below. The assessment considers mitigation measures that can be reasonably expected to be incorporated into the design of the Project, such as maintaining culvert capacity beneath the Project.

14.4.2.1 POLLUTION RISKS

Road runoff can contain high levels of hydrocarbons, heavy metals and sediment that is typically discharged to adjacent surface water features or to ground via infiltration. It is understood that the current drainage regime allows runoff to shed to adjacent ground with no prior treatment. The Project will increase traffic flow which in turn could increase pollution risk of adjacent surface water and groundwater features. It is assumed that the current drainage regime will be maintained, although the Project may offer an opportunity to improve the quality of surface water discharge through the provision of improved drainage and treatment systems.

Accidental spillages of harmful substances during operation can also pose pollution risk to adjacent surface water features and groundwater resources, typically associated with a road traffic accident. The risk of accidental spillages increases with an increase in predicted road traffic and HGVs, as well as at junctions. The Project is predicted to increase traffic significantly to provide a more direct and preferential route between Kapshagai and Kurty Village. However, the Project is also striving to reduce the risk of traffic accidents by avoiding the need for traffic to enter the lane of oncoming traffic when overtaking or avoiding potholes. Overall the Project is likely to lead to a slight increased risk of accidents, due to the increased vehicular numbers that may result in spillage of harmful substances.

The assessment presented in the table below assumes a worst-case scenario that no additional treatment will be provided and that surface water runoff will discharge to adjacent surface water features and underlying groundwater resources, although some natural treatment of runoff will occur as water percolates through the upper soil layers.

Table 62 - Summary of Pollution Risk During Operation

Receptor	Importance	Impact	Magnitude	Significance
Kurty Village River	High	Pollution risks associated with discharge of runoff.	Minor Adverse	Minoe Adverse
		Pollution risks associated with accidental spillage.	Minor Adverse	Neutral to Minoe Adverse
Seasonal Streams Crossed by the Project	Low to Medium	Pollution risks associated with discharge of runoff.	Minor Adverse	Neutral to Minoe Adverse
		Pollution risks associated with accidental spillage.	Minor Adverse	Neutral to Minoe Adverse
Kapshagai Reservoir	Very High	Pollution risks associated with discharge of runoff.	No Change	Not Significant
		Pollution risks associated with accidental spillage.	No Change	Not Significant
Ili River and Lake Balkhash	Very High	Pollution risks associated with discharge of runoff.	No Change	Not Significant
		Pollution risks associated with accidental spillage.	No Change	Not Significant
Groundwater Resources	Medium	Pollution risks associated with discharge of runoff.	Minor Adverse	Minoe Adverse
		Pollution risks associated with accidental spillage.	Minor Adverse	Minoe Adverse

14.4.2.2 INCREASED FLOOD RISK ASSOCIATED WITH STREAM CROSSINGS

As discussed above, the Project crosses several existing seasonal streams and works will be required within these streams to widen the existing road and extend existing culverts. It may also be necessary to realign sections of the existing streams to enable widening of the road. The bridge across the water channel will also need to be widened or reconstructed to accommodate the new road width.

The works could lead to an increased risk of flooding to users of the road or to adjacent property if the capacity of the streams and culverts is not maintained. However, it is assumed that the capacity of all existing culverts will be maintained and that no loss of flood flow capacity will be experienced. It is also assumed that the (approximate) 60 drainage pipes that pass beneath the will be maintained and extended.

The works should therefore cause no notable increase in flood risk associated with restriction to flood flow conveyance.

Table 63 - Summary of Flood Risk Associated with Culverts During Operation

Receptor	Importance	Impact	Magnitude	Significance
Road users and adjacent property.	High	Increased flood risk associated with reduction in culvert capacity.	No Change	Neutral

14.4.2.3 INCREASED FLOOD RISK ASSOCIATED WITH SURFACE WATER RUNOFF

The Project will widen the existing road from two lanes to four lanes. This will increase the area of impermeable surface and therefore increase the rate and volume of runoff that may subsequently increase flood risk to users of the road and elsewhere. It is understood that the current drainage regime allows runoff to shed to adjacent ground with no prior attenuation and that the current drainage regime will be maintained. The Project could therefore increase flood risk associated with surface water runoff, although the Project may also offer an opportunity to better control runoff through the provision of improved drainage and attenuation systems.

The assessment presented in the table below assumes a worst-case scenario that no additional attenuation of runoff will be provided, although it also recognises that the Project is predominantly located in a very rural area with significant opportunity for runoff to disperse and infiltrate to ground, thereby presenting limited flood risk potential to adjacent receptors.

Table 64 - Summary of Flood Risk Associated with Surface Water Runoff During Operation

Receptor	Importance	Impact	Magnitude	Significance
Road users and adjacent property.	High	Increased flood risk associated with increased surface water runoff.	Negligible to Minor Adverse	Slight Adverse

14.4.3 SUMMARY OF IMPACTS

A summary of the identified impacts and effects on the receiving environment are detailed in the table blow.

Table 65 - Summary of Impacts and Description of Effects

Impact	Spatial Scale	Receiving environment		Significance of impact		Effect	Significance of Effect			Frequency and Duration of Effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Beneficial/ Adverse	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
Construction phase												
Pollution risks associated with overland migration.	Local	Kurty Village River.	High	Adverse	Slight	Impact to water quality within the river.	Minor	Direct	Adverse	Short Term	Temporary	Reversible
	Local	Seasonal streams crossed by the Project.	Low - Medium	Adverse	Slight	Impact to water quality within the streams.	Not significant To Minor	Direct	Adverse	Short Term	Temporary	Reversible
	Local	Kapshagai Reservoir, Ili River and Lake Balkhash.	Very High	Adverse	No Change	Impact to water quality within the features.	Not significant	Indirect	Adverse	Short Term	Temporary	Reversible
	Local	Groundwater resources.	Medium	Adverse	Slight	Impact to groundwater quality.	Minor Significance	Direct	Adverse	Short Term	Temporary	Reversible
Pollution associated with wastewater discharge.	Local	Kurty Village River.	High	Adverse	No Change	Impact to water quality within the river.	Not significant	Direct	Adverse	Short Term	Temporary	Reversible
	Local	Seasonal streams crossed by the Project.	Low - Medium	Adverse	No Change	Impact to water quality within the streams.	Not significant	Direct	Adverse	Short Term	Temporary	Reversible
	Local	Kapshagai Reservoir, Ili River and Lake Balkhash.	Very High	Adverse	No Change	Impact to water quality within the features.	Not significant	Indirect	Adverse	Short Term	Temporary	Reversible
	Local	Groundwater resources.	Medium	Adverse	No Change	Impact to groundwater quality.	Not significant	Direct	Adverse	Short Term	Temporary	Reversible
Reduced water availability and water quality caused by increased demand during construction period.	Regional	Potable and non-potable supplies from surface water resources.	Very High	Adverse	Negligible	Reduction in water availability and water quality.	Minor	Indirect	Adverse	Short Term	Temporary	Reversible
Increased flood risk associated with works in flood flow paths.	Local	Road users and adjacent property.	High	Adverse	Slight	Increased flood risk following heavy rain and snowmelt.	Minor	Indirect	Adverse	Short Term	Temporary	Reversible
Operational Phase												
Pollution risks associated with discharge of runoff	Local	Kurty Village River.	High	Adverse	Slight	Impact to water quality within the river.	Minor	Direct	Adverse	Long Term	Permanent	Reversible
	Local	Seasonal streams crossed by the Project.	Low - Medium	Adverse	Slight	Impact to water quality within the streams.	Not significant to Minor	Direct	Adverse	Long Term	Permanent	Reversible

Impact	Spatial Scale	Receiving environment		Significance of impact		Effect	Significance of Effect			Frequency and Duration of Effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Beneficial/ Adverse	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
	Local	Kapshagai Reservoir, Ili River and Lake Balkhash.	Very High	Adverse	No Change	Impact to water quality within the features.	Not significant	Indirect	Adverse	Long Term	Permanent	Reversible
	Local	Groundwater resources.	Medium	Adverse	Slight	Impact to groundwater quality.	Minor	Direct	Adverse	Long Term	Permanent	Reversible
Pollution risks associated with accidental spillage.	Local	Kurty Village River.	High	Adverse	Slight	Impact to water quality within the river.	Minor	Direct	Adverse	Medium Term	Permanent	Reversible
	Local	Seasonal streams crossed by the Project.	Low - Medium	Adverse	Slight	Impact to water quality within the streams.	Not significant to Minor	Direct	Adverse	Medium Term	Permanent	Reversible
	Local	Kapshagai Reservoir, Ili River and Lake Balkhash.	Very High	Adverse	No Change	Impact to water quality within the features.	Not significant	Indirect	Adverse	Medium Term	Permanent	Reversible
	Local	Groundwater resources.	Medium	Adverse	Slight	Impact to groundwater quality.	Minor	Direct	Adverse	Long Term	Permanent	Reversible
Increased flood risk associated with reduction in culvert capacity.	Local	Road users and adjacent property.	High	Adverse	No Change	Increased flood risk following heavy rain and snowmelt.	Not significant	Indirect	Adverse	Short Term	Permanent	Reversible
Increased flood risk associated with increased surface water runoff.	Local	Road users and adjacent property.	High	Adverse	Negligible - Slight	Increased flood risk following heavy rain.	Minor	Indirect	Adverse	Short Term	Permanent	Reversible

14.5 MITIGATION MEASURES

14.5.1 CONSTRUCTION

Impacts that may arise during construction are best managed through the implementation of a robust Construction Environmental Management Plan (CEMP) that should be prepared by the contractor prior to starting works. The CEMP should include mitigation measures to protect the water environment and set out how construction activities will be undertaken in accordance with appropriate good practice guidance. At minimum, measures that should be included in the CEMP should address the following key work activities and sources of risk:

- Management of water that collects within excavations;
- Management of surface water runoff to intercept and, where necessary, treat runoff to prevent the migration of pollutants to receiving water features;
- Management of polluting substances that are being brought on site and used as part of the construction process, including appropriate storage of fuels and managing spills / leaks;
- Working methods for working within and in close proximity to the water channel;
- Working methods for the temporary diversion of streams, including maintaining flow routes during construction via diversion or pumping;
- Management of flood waters and appropriate relocation of construction plant and polluting substances during a flood event;
- Appropriate location of bio-toilets and procedures for the correct disposal and transportation of waste, as agreed with the relevant authorities; and
- It is understood that all water supplies (potable and non-potable) have been approved by the Water Basin Inspection Authority (Balkhash-Alakol) and the applicable local authorities. However, it is also recommended that measures are included in the construction works to reduce reliance on non-potable water as much as possible. This could include simple measures included in the CEMP such as turning off water supplies when not required and using water efficient systems. It could also include the temporary storage of water in tanks and lagoons, and the reuse of this water on-site as an alternative to new supplies.

14.5.2 OPERATION

Risks to water quality and flood risk associated with surface water runoff can be reduced through the inclusion of treatment and attenuation systems within the Project drainage design. Passive systems are likely to be most appropriate, such as the retention of surface water within vegetated basins prior to the discharge to an adjacent stream. These features can also reduce the likelihood of pollutants migrating to surface water and groundwater features following a traffic accident, along with the inclusion of cut off valves and penstocks that can be operated immediately following an accident. As discussed above, the Project may offer an opportunity to improve risks to water quality when compared to the current situation.

15 SOCIAL

This chapter provides an assessment of impacts of the Project on communities and individuals within the Project area. It considers the potential socio-economic impacts as a result of the Project, associated with the following issues:

- Land tenure and use;
- Employment and economic improvement;
- Livelihoods;
- Community benefits;
- Community health, safety and security;
- Infrastructure; and
- Gender.

15.1 LEGISLATION

Applicable laws and guidance are outlined in the table below.

Table 66 - Social Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
The Land Code of the Republic of Kazakhstan No. 464-IV.	2003
Labour Code of the Republic of Kazakhstan No. 414-V (as amended by No. 483-V).	2015 (amended 2016)
Law on Culture of the Republic of Kazakhstan No. 207 (as amended by No. 446-V).	2006 (amended 2016)
Law on the Procedure for Reviewing Inquiries from Individuals and Legal Entities No. 167.	-
Civil Code on Land Titles, Land Use and Rights of Land Owners and Land Users.	1994 (amended 2014)
Guidance	
EBRD. Performance Requirement 5: Land Acquisition, Involuntary Resettlement and Economic Displacement.	2014
EBRD. Performance Requirement 10: Information Disclosure and Stakeholder Engagement.	2014

15.2 ASSESSMENT METHODOLOGY

The social impact assessment methodology for this Project is based on the following:

- Field social observations - WSP team visit to the Project area in June 2018 covered visits to a selection of farms, businesses and houses located along the route;
- Interviews with Project Affected Communities (PACs) and affected land users or owners located along the route to gain local perceptions and identify social aspects; and

- Evaluate significance of impacts based on 'Sensitivity of a receptor vs Magnitude of an Impact' as described in the ESIA methodology section.

The Project mitigation measures will be implemented by the developer to ensure that significance of impacts will be reduced to low or negligible levels (See section xx). The methodology is based on sensitivity of a receptor and magnitude of an Impact. The key guidance to assessing and managing social impacts is contained in the EBRD PR1. There are impacts related to land acquisition and economic displacement; local discomfort associated with construction camps; permanent reductions in livelihood and life chances/options for improvement; intra- and inter- community conflict; and improvement in infrastructure.

The following tables have been produced as a guidance for assessment of sensitivity and magnitude of an impact.

Table 67 - Sensitivity Criteria

Receptor Importance/ Sensitivity	Examples
High	• A community depends on the affected resource(s) and there are no nearby alternatives; • Loss of more than half of farming lands which will affect local livelihood and income to an unacceptable extent; • Many households and business owners/operators perceive that the change will affect their ability to maintain their livelihood or quality of life to an unacceptable extent; and • A high level of concern was expressed about the impact by NGOs and many stakeholders in most of the affected areas / communities.
Medium	• A community depends on the affected resource, however there are nearby alternatives; • Loss of part of herding or farming lands, but will not affect local income or livelihood; • Some households and business owners/operators perceive that a change will affect their ability to maintain their livelihood, store of resources or quality for a significant time period (>1 year); and • Threats to health and well-being posed by Project-induced changes (increased traffic, trenches) understood by all adults.
Low	• Individuals or households (HH) or communities that use affected resource(s) have access to nearby alternatives, the use of which may cause limited adverse indirect impacts; • Highly skilled labour 'pool', but lack relevant experience; and • Few stakeholders expressed concern about the impact in affected communities.
Negligible	• No direct and indirect changes to local livelihood, and no harm associated with; and • No stakeholders expressed concern about the impact in the affected communities.

Table 68 - Magnitude Criteria

Magnitude	Examples
Large	• Permanent reduction in the ability of land owners and users to exploit their land, such that economic displacement (as defined in IFC P-S 5) affects more than 20 individuals or households in a PAC; • Households/individuals in a PAC may be able to adapt, but the transition period will be difficult for most individuals / households; and • Physical displacement (as defined in IFC P-S 5) of up to 10 households in a PAC.
Moderate	• Permanent reduction in the ability of land owners and users to exploit their land, such that economic displacement (as defined in IFC P-S 5) affects households; and • Households and individuals in a PAC (Project Affected Community) may be able to adapt to the loss or change of use of land, but the transition period will be difficult for some households/individuals (up to 5).
Slight	• Temporary (<1 year) or intermittent negative changes to some aspects of the ability of land owners and users to exploit their land that do affect the livelihoods, economic opportunities or options for improvement of the standard of living, but to which most individuals/households are expected to be able to adapt relatively easily.
No Change/ Beneficial	• No change to the current socio-economic environment associated with the Project (no change); • Employment opportunities for both men and women (beneficial); and • Improvement in social infrastructure and improved access (beneficial).

15.3 BASELINE CONDITIONS

The road is located in the Almaty region of Kazakhstan, which occupies 223,900 km^2 in the South-East of the country. The region is comprised of 17 districts, one of which is Ile. There are three cities in the region: Taldykorgan, Kapshagai Town and Tekeli.

The road starts in the city of Kapshagai Town. The road will pass through plots of lands mainly categorised as 'Pasture Lands 'of which small section will be acquired from each land plot. There are a few industrial and commercial businesses along the route, including a sewage facility and a café just outside Kurty village at the proposed junction. The first realigned section passes near to some properties in Kapshagai Town. There are four further realigned sections of road outside of Kapshagai Town. Beyond Kapshagai Town, the road passes by approximately 20 farms that can be viewed from the road. These are relatively small to medium-scale farms with livestock including cattle, sheep and horses connected by predominantly dirt roads. Currently animals cross the road. There will be a few sites along the road for ground storage of construction materials and construction compounds and a depot that will be constructed near to Kurty Village. There is only one bridge over a water channel.

The social baseline data is limited at the local level. However, WSP team conducted a visit to the Project area, and gathered social baseline data through their observations and interviews with head of road department in Ili district and local farmers living along the road. Regional social data for Almaty, and town of Kapshagai Town

and Kurty Village have also been obtained through secondary data source. The key data sources for secondary local baseline information include: Kapshagai City and Ile District Divisions of the Department of Land Cadaster and Technical Review of Hard Assets - Branch of Non-Commercial Joint Stock Company Government for People in Almaty Region.

15.3.1 DEMOGRAPHICS

15.3.1.1 ALMATY REGION

Although there have previously been some fluctuation in population across the region, the population has remained relatively constant for the past five years. The population in Almaty region as a whole has been slowly increasing since 2011, from 1,871 million people to 2.108 million people. Since 2011, the birth rate in the region has remained fairly stable, fluctuating at around 24 per 1000 people.

Table 69 - Population in Almaty Region (2011-2018)[61]

Demographic	2011	2012	2013	2014	2015	2016	2017	2018
Population (million)	1.873	1.909	1.956	1.986	2.016	1.948	2.011	2.018
Women	0.954	0.971	0.996	1.011	1.025	0.989	1.017	1.019
Birth rate	24.18	23.72	24.82	24.26	24.5	26.62	25.13	-
Mortality rate	8.27	7.14	6.99	6.24	6.58	6.97	6.79	-
Marriages	8.00	8.69	8.99	7.87	7.08	7.9	7.48	-
Divorces	2.11	1.89	2.01	1.944	2.22	2.63	2.78	-

There was small dip in population in 2016 (down from 2.016 million to 1.0948 million) which is explained by population migration into Almaty city during the economic crisis that year. It has since returned to original population levels with the addition of migrants from China and the Soviet Republics.

The ethnic composition of the region is very diverse. The prevailing ethnicity is Kazakhs (71.79%), with Russians (13.58%) and Uyghurs (7.72%) accounting for the other dominant populations. The region also comprises of Turks (1.84%), Azerbaijanis (0.86%), Koreans (0.75%), and Kurds, Tatars, Germans, Chechens, Uzbeks and Ukrainians, amongst others, making up the rest. The dominant language in the region is Russian.

The population density of Almaty is slightly higher than the average for Kazakhstan at 9 km^2 compared to 6.7 km^2.

15.3.1.2 KAPSHAGAI TOWN

Kapshagai Town is located within the region of Ile, which has a population of approximately 191,830. No historical population data was available for Kapshagai Town's town population.

No official data was available for migration movement.

The ethnic composition of the area is diverse, representing 26 different ethnicities. These include Kazakhs (61.3%), Russians (31.1%), Koreans (2.4%), Ukrainians (0.9%), Uighurs (0.8%), and the remaining 2.7% being made up by others.

15.3.1.3 KURTY VILLAGE

The population of Kurty Village, above, includes Akshi, the central village to the Kurty Village rural area. In the area of Kurty Village specifically, there are 246 residents, who occupy approximately 80 houses[62]. No historical or migration data was available, and data regarding the ethnic composition of the area was also not available.

[61] Kapshagai Town and Ile District Divisions of the Department of Land.
[62] Kapshagai Town and Ile District Divisions of the Department of Land.

15.3.2 ECONOMY

In the Almaty region, the dominant employment sector is agriculture. The cultivable land and ploughland areas are presented in the table below.

Table 70 - Cultivable Land and Ploughland Areas (2018)[63]

Agricultural Classification	Hectares (ha)		
	Almaty (ha)	Kapshagai Town	Kurty Village
Cultivable Land	1,156,600	14,714	9,218
Irrigable Cultivable Land	507,400	11,243	3,586
Ploughland	1,061,400	12,403	-
Irrigable Ploughland	473,600	9,700	-
Unused Land	115,200	-	-

In addition to agriculture, the town of Kapshagai Town is one of only two regions in Kazakhstan where casinos and slot hall businesses are lawful. In 2013, five casinos and 29 associated service businesses were opened in the water reservoir area of the town. Since then, 220 private recreational zones have been established in the area.

15.3.3 EMPLOYMENT RATES

Table below shows employment rates in Almaty region, Kapshagai Town and Kurty Village. The unemployment rate in Almaty region is high, as approximately 30% of economically active population is reported as 'Unemployed'.

Table 71 - Employment[64]

Employment	Almaty	Kapshagai Town	Kurty Village*
Economically Active People	1,479,500	-	96,951
Total Employed	988,400	24,992	93,827
Officially Employed	721,700	-	-
Self-Employed	266,900	4,476	25,533
Unemployed	491,100	1,220	3,124

* Data for the region of Ile.

15.3.4 EDUCATION

Education in Kazakhstan is universal and it is mandatory for all children to complete 11 years of education from the ages of 6 to 16. The curriculum is governed nationally and consists of three main phases:

- Primary education (grades 1–4);
- Basic general education (junior secondary school, grades 5–9); and
- Senior level education (senior secondary school, grades 10–11).

After the completion of basic education (9th grade), pupils have three choices:

[63] Kapshagai Town and Ile District Divisions of the Department of Land.
[64] Kapshagai Town and Ile District Divisions of the Department of Land.

- Proceed to Grades 10 and 11 within the State school system and take the Unified National Testing examination which will allow them to access tertiary education (e.g. University) if they achieve the required standard;
- Enrol in a technical college up to 11th grade and seek employment once this is completed; or
- Leave education at the 9th grade and find employment, while perhaps attending evening schools for Grades 10 and 11.

In the Almaty region, there are 1,771 educational establishments, covering all grades from pre-school to university. There are 610 kindergartens, 412 mini-centers, 758 day-schools, 5 evening-schools, 74 colleges and three universities.

There are 33 educational establishments in the Kapshagai Town area: 15 schools, one primary school, three evening schools, eight preschool establishments, "Kausar" boarding school, a professional sports center, Kapshagai Town professional college, "Baiterek" college, a Children's art center, a sports school, "Meruert" arts school and a correctional centre for children with disabilities.

No details regarding Kurty Village's educational provisions were available.

15.3.5 HEALTH

Life expectancy in the region of Almaty is currently around 74, and is predicted to continue increasing[65]. Overall however, Kazakhstan has the second lowest life expectancy in the European region[66].

Respiratory disease in the region is prevalent. The World Health Organisation reports that the Almaty region has higher on average tobacco consumption rates in the region, and the air quality from exhaust gases are higher[67].

The WHO have previously highlighted the presence of Tuberculosis (TB) in the region[68]. Although there has been a levelling off in global TB incidences, the has been an increase in TB cases in the Central Asia region since the dissolution of the Soviet Union. In Kazakhstan, there has been a stabilisation of TB cases in the recent years, with a reported rate of 81.7 cases per 100,000 population. The national TB programme oversees the care of TB patients in the country at no cost, including at district level. However, problems still remain with the diagnosis of TB in early treatment phases[69].

In the Almaty region, there are 75 hospital centres (either hospitals or health care centres), 324 medical and obstetrician centres, 235 outpatient clinics and 11 other medical establishments. In addition to the state-owned facilities mentioned, there are also private medical facilities.

No data related to health care provisions in Kapshagai Town or Kurty Village were obtained.

15.3.6 RECREATION, CULTURE AND CULTURAL HERITAGE

In the Almaty region, there are various facilities related to recreation, culture and cultural heritage as summarised in the table below. No data related to recreation, culture and cultural heritage were obtained for Kapshagai Town or Kurty Village.

Table 72 - Recreation, Culture and Cultural Heritage Facilities[70]

Facilities	Number
Cultural Establishments	546
Libraries	268

[65] Administration of Almaty (2018). Development Program. Available at: https://almaty.gov.kz/page.php?page_id=4083&lang=2 [Accessed: 20/07/18].
[66] World Health Organisation (1999). Highlights on Health in Kazakhstan.
[67] World Health Organisation (1999). Highlights on Health in Kazakhstan.
[68] World Health Organisation (2017). Global Tuberculosis Report.
[69] Iranian Journal of Public Health (2016). Risk Factors for Primary Pulmonary TB in Almaty Region, Kazakhstan: A Matched Case-Control Study.
[70] Kapshagai Town and Ile District Divisions of the Department of Land.

Facilities	Number
Museums and Clinics	26
Philharmonic Hall	1
Theatre	1
Other	5
Sports Facilities	3,439
Sports Arenas	2
Sports Centres	24
Stadiums	23
Sports Halls	831

15.3.7 GENDER ASPECTS

In both Almaty and Kapshagai Town, the gender balance remains relatively stable, with the female population being in a small majority. The gender data for Kurty Village was not available.

Table 73 - Population Gender Balance (2018)[71]

	Almaty	Kapshagai Town	Kurty Village
Total Population	2,018,000	45,916	6,305
Male	990,000	21,786	-
Female	1,019,000	24,130	-

As a country, Kazakhstan compares favourably in comparison to neighbouring countries in terms of its Gender Inequality Index (GII) and female labour participation, which measures the gender disparity in the country.

Table 74 - Gender Inequality Index[72]

Country	Female Labour Participation	Gender Inequality Index (GII)
Kazakhstan	66%	42
Kyrgyzstan	49%	90
Uzbekistan	48%	57

[71] Kapshagai Town and Ile District Divisions of the Department of Land.
[72] United Nations Development Programme (2015). Gender Inequality Index. Available at: http://hdr.undp.org/en/content/gender-inequality-index-gii [Accessed: 29/07/18].

15.3.8 SITE VISIT

As part of the Supplementary ESIA Report, a site visit conducted by WSP in July 2018. During the site visit, interviews were conducted with a few land owners/users living along the Project. The results of the interviews and social observations are summarised below. A map depicting the farm numbers is shown available in Appendix B.

Farm 4:

- There was a worker on site who undertakes livestock husbandry and he has been living there for about 10 years.
- The land leaseholder also was contacted and he lives in Akshi. He knows about the project, and he attended a consultation which was conducted two years ago. However, since then he has not been invited to any meeting.
- He has sheep and horses. About 18 ha of his 398 ha of land will be taken for the Project. The pasture land which will be taken for the Project is outside the site boundary where horses and sheep are kept.
- This land to be taken is used mainly for cattle herding.
- The farmer house will not be affected. However, there is a risk associated with obstruction of access rights and cattle passing.
- The land seems to be state owned with 49 years lease duration. Based on Kazakh land legislation, no compensation will be made to land leaseholder, and the state is free to use or take the land for public projects.

Photo 1: Farm 4

Farm 5:

- The farmer has leased the land for 49 years from the state and uses the land mainly for husbandry and keeping animals (sheep, camel, and horse).
- The land is 1,000 ha, and he has been told by the authorities that 1 ha of his land will be taken as part of the Project. No compensation will be allocated as per lease contract as the land is owned by the Government.
- The land user owns 600 sheep, 500 goats, 50 camels and 40 horses.
- The land user lives with his family and their main source of income is from animal husbandry.
- The Project will affect the land used for herding and husbandry activities. The land user did not express any concern with regard to the Project.

Photo 2: Farm 5

Farm 21:

- The Project is close to the farm.
- The land has been leased for 49 years from the state by the land user.
- There are other people working at this farm, and he has been informed and consulted by the Akimat in Kurty Village. No compensation is expected.
- He has been consulted by the Akimat in Kurty Village.
- However, no information on livestock underpasses has been disclosed and he was not aware of it.

Photo 3: Farm 21

Farm 11:

- The land is owned by the private land owner who has lived in the area for about 12 years.
- The land owner undertakes husbandry and used to grow hay when subsidies were provided to buy machinery for hey production. Currently, there is no hay production conducted.
- He is aware of the Project, and was consulted by the Akimat of Ili district in April 2017. It is not exactly known how much of his land will be taken, however, the major part of the land in front of his house and across the road will be taken.
- He lives with his extended family, and three workers are employed permanently to work at his business. There is a water channel nearby which is used by his livestock.
- A new bridge will be built over the water channel during the construction of the Project.

Photo 4: Farm 11



15.3.9 LAND ACQUISITION

15.3.9.1 PERMANENT LAND ACQUISITION

The land required for the road rehabilitation will be State reserved land (159ha), land acquired from the state enterprises (176 ha) and land acquired from private and commercial land owners and tenants (200 ha). The land is required for the five re-alignment sections and the Kurty Village junction, and along the road for accommodation of higher embankments to provide the requirements for the road category vertical visibility (detailed information about Land Acquisition and Compensation is available in the LRF).

15.3.9.2 TEMPORARY USE OF LAND

There is also a plan for construction of two workers' camps; one to be in Kapshagai Town, and another nearby Kurty Village. The details about the characteristics of these camps are not yet known. Temporary acquisition of lands will also be conducted for ground extraction, working and storage areas, haul roads, and the proposed detour around the bridge, 11 underpasses and 43 drainage pipes. The Engineering Procurement and Construction (EPC) contractor will be responsible for temporary land acquisition. Existent supplies will be used for construction. No new quarries are planned to be initiated, however there may be a need for new additional quarries in case of material shortage.

15.3.9.3 INFORMAL LAND USERS

The WSP team visit did not identify any 'Informal Land Users' within the Project area, however, a comprehensive census needs to be conducted by the authorities to ensure that no informal land users are present within the Project area. According to EBRD PR5, informal land users will be compensated for loss of livelihood (see the LRF).

15.3.10 SUMMARY

In general, the socio-economic characteristics of households along the Project appeared to be homogenous, and affected land users and owners along the route have relatively similar backgrounds (education, income and living condition). There are mainly households with the main occupation of farming and husbandry. There are a small number of businesses along the route, including, an asphalt plant, a sewerage treatment facility, a closed plastic making plant and a closed landfill with a security guard. The WSP team visit to the asphalt plant confirmed that this business has not been consulted on the Project. However, the head office is located outside the area, and workers confirmed that the head office may have been consulted by the Akimat. The plant mainly serves the local area, and the Project could potentially provide some further work opportunities for this plant.

Another anonymous business is located very close the junction towards Kapshagai Town. They were consulted by the Akimat and a route diversion will be built to provide alternative entrance for this business.

The population in the Project area is sparse, with the main population concentrated in the town of Kapshagai Town. Most young people with professional education background work in Almaty, and do not live along the route due to lack of resources and facilities. There is no water network in the Project area, and drinking water is transported from Kapshagai Town to the farms. There is also no electricity available, and the households

mainly use battery. No lighting is also available along the route. The site observations categorise the profile of affected households as families and individuals between the age of 30-70 mainly working in farming and animal husbandry sector. No informal and indigenous peoples were identified along the route during the team visit.

15.4 POTENTIAL IMPACTS

15.4.1 CONSTRUCTION STAGE

15.4.1.1 LAND TENURE / USE AND LOCAL LIVELIHOOD

The land acquisition will be undertaken prior to the commencement of the construction stage (Q1 / Q2 2019). The authorities have already initiated the consultation and compensation procedure for some land owners and users. There are no expected relocations of local households and individuals.

In total 52 land plots will be acquired permanently for the project. (Further information is available in the LRF). In addition, the 176 ha will be taken (no land acquisition will be involved as the land is owned by the Government) from the state enterprises and 159 ha of Government reserved land will be taken. The lands to be affected are mainly used for livestock herding and cattle breeding, and as a result, there will be reduced areas for cattle herding activities. Most of pasture lands visited are of large size and a specified area is allocated for cattle breeding. It is not anticipated that the permanent land acquisition will cause any significant impact on cattle productivity and farming yield (if any), and farmers can continue their activities as before. During the site visit, farmers who were interviewed did not raise any major concern with regards to the road project. Therefore, the significance of the effects related to local livelihood and incomes are assessed as minor (not significant) based on the planned mitigation measures.

The private land owners and non-Government owned land users will be compensated as per the Kazakh Land Code and EBRD standards (PR5). There are about 30 land users (referred here as 'tenants') who lease the lands from the State (for short term or long term). The land users will not be compensated based on the existing/ongoing Kazakh procedures. Key gaps in Kazakh land code will be addressed through implementation of the LRF and through a subsequent and detailed Resettlement Action Plan or a Livelihood Restoration Plan (LRP) which will be prepared by the developer. Therefore, the significance of the effects related to land tenure are assessed as minor (not significant) based on the planned mitigation measures.

15.4.1.2 LAND USE / ACQUISITION FOR QUARRIES AND CONSTRUCTION CAMPS

The head of road and vehicle department advised that there is a plan to use three quarries for the Project. This is expected to result in some impacts associated with reduced herding areas surrounding the quarries, as described for Farm 21. However, this effect will not be expected to be significant, and will be mitigated through allocation of alternative nearby areas for herding and isolation of quarries.

Farm 21 will be about 700 m away from the ground quarry 5 (25ha at km 59). Both the quarry and the farm are located on the State reserve land. The farm has sheep and cows that graze around the neighbouring lands. However, if the neighbours restrict the access, the livestock would have only the area around the quarry (300ha). This may be sufficient but this needs to be assessed further. The number of the livestock and the farmer's future plans are currently unknown, so the Project should establish the baseline status and monitor the number and composition of the livestock at the end of the vegetative period during construction. There is also risk of animals falling into the quarry if the quarry walls became unstable, the quarry would need to be fenced and constructed to the required standards. The livestock of farms 3 and 6, which are nearby, do not use the quarry area.

No further details are available on characteristics of quarries. It was indicated that existing supplies will be used. However, if there is further need for use of new quarries, affected land users/owners will be compensated for use or damage of lands surrounding new quarries (see LRF for further details). The temporary rental of lands for construction camps and potential new quarries (if any) will be undertaken by the contractor in accordance with LRF. The effect associated with temporary use of land are not considered to be significant.

15.4.1.3 EMPLOYMENT AND ECONOMIC IMPROVEMENT

The duration of the construction work is about three years, and it is expected that during this period, short term direct employment opportunities will be created. Most direct jobs will be in laying asphalt, ground work and manual machinery work. The details of the required workforce for construction are unavailable at present, and it is not yet confirmed whether the Project will employ local or international workforce. In addition to direct job

opportunities, there will be opportunities for indirect jobs in service industry, contractors' sector, workers' accommodation camps and catering facilities. The details on contractors and procurement suppliers are not available. However, it is anticipated that the scale of such employment will be of medium size and will involve skilled and semi-skilled labour.

The effect is assessed as minor beneficial (not significant), although the benefits could be improved if the local workforce is employed during construction. Enhancement measures for maximising this positive impact is listed in Section 15.5.

15.4.1.4 COMMUNITY BENEFITS - LOCAL ECONOMY AND BUSINESSES

The Project would potentially cause local economic improvements though spending incurred by construction workers and contractors within the Project area. Local businesses such as restaurants and farms would benefit from the increased expenditure and it is anticipated that several induced jobs would potentially be created. There are a few shops and restaurants along the road, and some farms could also provide catering facilities and accommodation/resting area to workers. During the team visit, farmers expressed their content about the Project and expressed that they can host workers and provide resting area for them. The effect of the Project on the local economy are assessed as minor beneficial.

15.4.1.5 COMMUNITY HEALTH, SAFETY AND SECURITY

It is not expected that there will be a large influx of workers into the Project area during the construction stage. However, the presence of workers, machinery, equipment and ground work activities could pose some risk to households living near the road. During construction, local households may find it harder to access areas outside their home, particularly the households living closest to the road. The road construction activities and increased traffic could cause increased health and safety risks to local people and cattle.

The road construction will be conducted in different stages and the area has sparse population, so locals and livestock will not be exposed to any major health and safety risks and will be able to cross the road and access areas outside the site through temporary route diversions. The Ili District Roads Lead and the Roads Committee also confirmed that access would be maintained throughout the construction period and the road would remain open at all times. While a section of the road is being construction one lane will remain open and while pipes are constructed a temporary road surface will be installed. Therefore, the significance of the effects related to local access rights considered to be minor (not significant) based on the planned mitigation measures.

The main health and safety impact is related to potential increased road accidents during the winter season, particularly due to the formation of ice on the road. Noise emissions resulting from vehicle movements and construction activities could also cause some disturbance in residential areas.

Farm 5 and the café 300 m south of the Kurty Village junction are thought to be vulnerable to blasting work and noise associated with it. The café is popular among the long-haul drivers. To ensure that any damage caused to their structures is accounted, pre-blasting survey shall be conducted with the presence of the owner. Therefore, the significance of the effects related to increased noise is considered to be minor (not significant) based on the planned mitigation measures.

It is also expected that local air quality will be affected slightly as a result of ground work activities, combustion emissions resulting from construction vehicles and trucks on the road. The population is sparse along the route and therefore it is not expected that community health would be significant effects.

15.4.1.6 CONSTRUCTION CAMPS PRESENCE AND THEIR IMPACT ON LOCAL COMMUNITIES

The presence of construction workforce may lead to risks associated with 'local influx' if expat/or inter-regional workers move to the Project area for jobs. At this stage, it is not expected that the Project will require a large workforce, and thus it is unlikely that the Project would lead to significant labour influx. In the unlikely event that the contractor uses a workforce from another county, an Influx Management Plan will be required, to reduce the potential tensions that could result from this approach.

Two accommodation camps will be built: one in Kurty Village and one in Kapshagai Town. The information on size of the camps and the exact location within vicinity of Kurty Village and Kapshagai Town is not yet known. However, the construction camps and possible influx of workers into the Kapshagai Town and Kurty Village could potentially cause some local discomfort and nuisance. Workers may spend spare time on recreational activities in shops and restaurants in Kapshagai Town, and potential conflicts may occur between local people and workers. However, as the workforce is not expected to be a large size, the impact associated with labour

influx and construction camps are not expected to be significant. It is anticipated that the mitigation measures will reduce this potential effect to minor (not significant).

15.4.1.7 LABOUR AND WORKING CONDITIONS ON SITE AND IN CONSTRUCTION CAMPS

Details about the employment procedures and workers' condition in construction camps and the site are not yet known. However, it is expected that the Project will comply with the Labour Code and will ensure that all employees, including permanent and temporary, will be provided with a contract. According to EBRD PR 2, the Project should ensure that any risk associated with child labour or forced labour will be reduced through implementation of a series of mitigation measures.

In Central Asia, there have been cases of child labour and forced labour, and this arise due to lack of supply chain monitoring. It is not expected that the Project will have an extensive supply chain, therefore, at this stage, the effects associated with child labour and forced labour is assessed as medium (significant) without mitigation. It is also considered that the Project will employ well known suppliers or contractors with good track record on employment practices.

It is also expected that the Project will be in compliance with labour code on working hours, working condition, occupational health and safety and management of non-employee relations and grievances. However, if not managed, there could be significant impacts associated with labour grievances, supply chain issues, occupational health and safety, child and forced labour.

The Project will ensure that related working procedures and labour or supply chain monitoring actions will in place. With mitigation measures in place the effects will be reduced to minor (not significant).

15.4.1.8 INFRASTRUCTURE

The construction of the road may cause some damage to the existing road condition, and this potentially could affect the local traffic. The Kapshagai Town-Kurty Village route is not considered as a busy road, and the traffic is relatively low. Therefore, the effect on local traffic is not considered to be minor (not significant).

15.4.1.9 GENDER ASPECTS

The road construction activities and construction camps may cause some discomfort particularly for women if access rights are affected. As the construction activities will be conducted in different stages, it is not anticipated that women's access rights will be affected significantly. In addition, there is a likelihood of safety and security risk to women who live in proximity to construction camps. The exact number of construction workforce is not known, although no major influx of workers is anticipated. Thus, it is unlikely that there will be a major safety and security concern for local women resulting from conflicts/interactions between locals and the camps' workforce. It is also expected that the workforce will be of Kazakh nationals, so they will be familiar with local rules and cultures. The effects associated with women's safety and security in relation to the Project workforce is assessed as medium (significant) without mitigation This impact will be reduced to minor (not significant) with the implementation of mitigation measures.

Most of unskilled and skilled labour jobs are expected to be undertaken by men. However, there will be good opportunities for local women to obtain jobs in catering, accommodation camps, service industry and administration. There will be also opportunities for women experts from Almaty to conduct technical work in planning, designing and mapping the Project. The road authority could provide internships and volunteering jobs for local women. The effects are assessed as minor beneficial (not significant).

15.4.1.10 VULNERABLE PEOPLE

Based on the EBRD definition of vulnerable people contained in PR5, this category includes people who, by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage or social status may be more adversely affected by displacement than others and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits.

Vulnerable groups in the context of displacement also include people living below the poverty line, the landless, the elderly, women- and children-headed households, ethnic minorities, or other displaced persons who may not be protected through national land compensation or land titling legislation.

Based on the data on affected individuals, there will be approximately 28 farmers and three commercial / industrial enterprises who are not land owners (leased from the Government) and as such can miss all compensation entitlements that are due to them based on the EBRD PR 5 requirements. This potential impact will be mitigated through the legal framework defined in LRF, and also through the implementation of a

subsequent LRP which will be based on detailed survey data to be provided by the developer. The effects are assessed as minor (not significant) with the LRF and subsequent LRP in place and implemented.

Women, elderly, people with chronic illness and the disabled who do not have access to sufficient facilities and due to their social status (such as poor background, or traditional factors limiting women to participate in consultation meetings) could potentially be exposed to higher level of risks arising from the Project activities. Therefore, the Project will implement mitigation measures to ensure that impact of the Project on vulnerable groups is minimised. If not managed, the impact on this group could be potentially significant.

15.4.1.11 PROJECT AFFECTED PEOPLE

In addition to those who can be subject to economic displacement caused by the project, individuals and households which are located within a very close distance (less than 500 m) to construction corridor and road development activities also belong to this category. These people would be exposed mostly to impacts associated with construction activities such as blasting, excavation of materials and vehicle movements. At this stage, these people are categorised as receptors and the following mitigation measures are suggested:

- Farm 5 and the café 300m south of the Kurty junction are classified as being subject to blasting work impacts. The café is popular among the long-haul drivers. As part of the drilling and blasting plan, an analysis of the safety of residential buildings and structures in the impact zone will be carried out. In case there is a risk of negative impact, a plan of measures to reduce, or compensate or restore, on the basis of appropriate examinations and additional studies, should be proposed. .
- Being only 50m from the Kurty junction, Farm 4 can be subject to construction air pollution, dust noise and vibration. Although the farm house is not the sole dwelling of the owner who lives in Akshi village and uses the farm house more as an office, this may change with time. The CLO or his designee shall visit the site with the owner prior to the earthwork and explain him the nature, lateral and temporal extent, overall scale of the work, expected impacts and possible impact mitigation measures (e.g. reducing the rollers vibration power if excessive vibration inside the house is reported by the owner). The CLO shall give the owner his contacts.

Therefore, the significance of the effects related to affected people are assessed as minor (not significant) based on the planned mitigation measures.

15.4.2 OPERATION STAGE

15.4.2.1 LAND USE AND LAND TENURE

There are no land tenure and land use restrictions during the operation stage.

15.4.2.2 EMPLOYMENT AND LOCAL ECONOMY

There will be limited employment opportunities in the operation stage. However, two road maintenance depots will be built along the route. The road maintenance depots will employ skilled experts to work on road maintenance. However, it is not expected that further employment opportunities will be created. The effects associated with employment is assessed as minor beneficial (not significant).

The new road would potentially bring new investments into the area, and could also lead to increased land prices. The new road will reduce travel times from Europe to China, and enable road users to bypass Almaty and Kaskelen (30 km from Almaty). Therefore, the new road will be the main route for inter-regional trips and increased number of road users would potentially bring additional income for local businesses and farmers. The effects associated with employment is assessed as minor beneficial (not significant).

15.4.2.3 COMMUNITY HEALTH, SAFETY AND SECURITY

The Project includes the construction of eight cattle and three machinery underpasses to be built along the route. It is anticipated that farmers may still need to walk a short distance to reach to the allocated cattle passing areas. It is anticipated that herders could easily use these underpasses to cross the road. It is expected that no issue would arise with regard to local access rights and cattle crossing the road.

It is expected that the levels of traffic on the new road will be higher, and therefore there are potential impacts associated with road accidents and injuries. The overall significance of the effects associated with road safety is assessed as medium (significant). However, the implementation of the mitigation measures will reduce the effects to minor (not significant).

15.4.2.4 COMMUNITY BENEFITS

As part of the Project local communities will obtain some social benefits including:

- Lighting will be provided at the junctions at each end of the Project;
- Several bus stops and resting areas with benches will be built along the new road;
- The new road will provide shorter route and thus faster trips to other regions; and
- Further local investments could be attracted to the area through opening new shops, restaurants, petrol stations etc.

The effects associated with community benefits are assessed as minor beneficial (not significant).

15.4.2.5 INFRASTRUCTURE

The new road will be maintained in a good condition, and there will be road maintenance shops and regular road inspectors to check the quality and condition of the road. The new road will improve the existing infrastructure and would add benefits to local infrastructure. The effects associated with infrastructure are assessed as minor beneficial (not significant).

15.4.2.6 GENDER ASPECTS

The operation of the Project is not expected to not cause any discomfort for local women, as relevant access rights (including cattle passing areas) will be made available.

There will be long term opportunity for local women to obtain jobs, training and internship programmes on operation of the new road. However, it is expected that some limited employment opportunities will be available. The effects are assessed as minor beneficial (not significant).

15.4.2.7 VULNERABLE PEOPLE

No significant effects are expected on these people during operation.

15.4.2.8 PROJECT AFFECTED PEOPLE

Minor (not significant) effects on this group may be expected during the operation stage due to an increased road traffic and associated noise from vehicles and reduction in air quality

15.5 MITIGATION MEASURES

Throughout both the construction and operational phases of the Project the exisiting SEP shall be developed and implemented.

15.5.1 CONSTRUCTION STAGE

15.5.1.1 LAND TENURE AND USE

The EBRD PR5 will be followed for implementation of mitigation measures with regards to land tenure and use. According to this PR, a LRF will be developed (already development) and a LRP will also be developed and implemented. As part of implementation of the LRP, the following measures will be conducted (further details are available in LRF):

- Consult with the Project Affected People (PAPs) resulting from permanent and temporary land acquisition;
- Promptly compensate economically displaced persons for loss of assets or access to assets. This process should be initiated prior to displacement. Where compensation is to be paid by a responsible government agency, the developer should collaborate with the relevant authorities to help accelerate the payments;
- Compensate, in cases where land acquisition affects commercial structures, the affected business owner for: (i) the cost of re-establishing commercial activities elsewhere; (ii) lost net income during the period of transition; and (iii) the costs of the transfer and reinstallation of the plant, machinery or other equipment, as applicable;
- Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national laws;

- Provide assistance that will offset any loss of a community's commonly held resources;
- Compensate economically displaced persons who are without legally recognisable claims to land;
- Provide additional targeted assistance (for example, credit facilities, training or job opportunities) and opportunities to restore, and where possible improve, their income-earning capacity, production levels and standards of living;
- In the case of businesses experiencing temporary losses or having to close as a result of project-related displacement, both the owner of the business and employees losing pay or employment are eligible for such assistance; and
- Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels and standards of living.

Based on the EBRD PR5, all land users will be compensated for loss of land or income or a deduction will be made on their monthly lease. Therefore, as part of a meeting need will be held between the related authorities to discuss provision of assistance, and compensation in cash or land to the State land users (See LRF for further details). According to local regulations, State land users are not entitled to compensation.

15.5.1.2 EMPLOYMENT AND LOCAL ECONOMY

The Project will create some direct, indirect and induced employment opportunities and the engagement of all non-employee workers should follow international best practice, with the main measures comprising the following:

- Develop and implement an Employment Managament Plan;
- Implement transparent and fair recruitment procedures;
- Ensure that all non-employee workers are engaged in line with both national legislation and applicable international (ILO) standards and recommendations;
- Provide a grievance mechanism for workers;
- Increase local content through use of local resources (i.e. skilled, semi-skilled jobs);
- Allocate internship and volunteering programmes for students;
- Post job opportunities on local newspapers and display job advertisements on community centre bulletin boards through local Akimats; and
- Monitor contractors and suppliers to ensure they comply with Kazakhstan labour regulations.

The following measures are recommended to enhance local economy and community benefits:

- Promote local investments and provide advice to local farmers on applying for assistance and loans for further projects; and
- Collaborate with local NGOs and volunteering organisation to promote local farming and cattle husbandry.

15.5.1.3 LABOUR AND WORKING CONDITION

The mitigation measures with regard to labour and working conditions are outlined below:

- Ensure that Project design and construction tendering process will include clauses and policies on minimum working age, normal working hours, freedom to collective bargaining, good working condition and eradicating any risk of forced labour;
- Include labour management clauses (as specified in bullet point above) in procurement contracts;
- Regular monitoring of suppliers to ensure avoidance of any risk associated with child labour and forced labour, and implement supply chain management plan;
- To ensure establishment of employment contract for all permanent and temporary employees in accordance with Labour Code;

- Develop the Project policy on labour and human resources;
- Develop and implement an employee grievance mechanism;
- Ensure that all employees and contractors have access to the Project human resources policies and procedures; and
- Regularly monitor labour performance and situation with regards to the EBRD PR2.

The mitigation measures listed above applies to labour and working condition throughout the Project lifecycle.

15.5.1.4 COMMUNITY HEALTH, SAFETY AND SECURITY

LOCAL ACCESS RIGHTS

The following additional mitigation measures will be implemented to ensure that the community access rights will not be affected:

- Ensure sufficient route diversions and temporary access routes are present during the construction stage;
- Prior to construction stage, local Akimats to conduct a meeting with affected farmers and land users to confirm the exact date for commencement of road construction;
- Communicate and distribute Project information on temporary access routes and route diversions to affected land users and owners; and
- Ensure the construction sites are fenced and construction materials are covered in an isolated area to avoid obstruction of access.

ROAD ACCIDENTS AND LOCAL HEALTH AND SAFETY

It is expected that there will be an increased traffic during the construction stage. The Increase in traffic (bringing equipment and materials to the site) could lead to more accidents in the local communities and reduced quality of life. These impacts will be managed with the implementation of the following measures:

- Develop and implement a traffic management plan;
- Establish safety speed limits;
- Deploy temporary traffic lights and road safety signs;
- Enforce workers code of conduct (guidance on safe driving); and
- Cooperate and coordinate with local health, safety and security facilities.

NOISE EMISSIONS (SEE MITIGATION MEASURES IN THE NOISE SECTION)

- Limit construction working houses particularly in residential areas;
- Minimise night time working, and undertake the activities that generate the most noise during the day; and
- Ensure noise screening barriers at the farms which will be exposed to ground work, blasting and material crushing.

CONSTRUCTION CAMPS AND LOCAL DISCOMFORT

It is not expected that there be a large influx of workers into the Project area. However, if camps are not managed and certain rules are not followed by camp workers, conflicts may occur between affected communities and camp workforce. The following mitigation measures will be implemented to minimise any impact associated with the Project construction camps:

- Develop and implement a Construction Camp Management Plan, an Influx Managemnent Plan and a Security Management Plan;
- Consult with local communities on location of construction camps to ensure no local discomfort;

- Where practicable, construction camps will be located away from nearby farms and businesses and be located adjacent to the road in order to reduce travel distances;
- Encourage contractors to hire local workforce, i.e. give preference to suitably qualified and experienced applicants from the local communities;
- Enforce workers code of conduct (including policies on alcohol consumption and drug abuse);
- Ensure 24-hour security personnel and CCTVs are deployed at the camp; and
- Cooperate and coordinate with local police on all the camp security issues.

15.5.1.5 INFRASTRUCTURE

The following mitigation measures will be made available to ensure that the existing quality of road condition will not be affected:

- Ensure regular inspection and maintenance of road and cover pitfalls;
- Ensure that sites are not covered with ice during the winter times;
- Develop a road maintenance and restoration plan and procedures; and
- Ensure route diversions and road signs are provided.

15.5.1.6 GENDER ASPECTS

The Project construction stage may provide some discomfort for local women in terms of access rights and potential interactions with the camps' workforce. The Project will reduce effects associated with local discomfort among women through the following measures:

- Develop and implement a Gender Policy;
- Ensure that the Project workforce is aware of local rules and culture;
- Ensure that location of construction camps is evaluated in relation to avoiding discomfort for local women and families;
- Ensure sufficient temporary safe access routes are provided with sufficient lighting;
- Ensure that regular collaborations are conducted with local police on potential interactions/conflicts between local women and the workforce and provision of safety support to women; and
- Set structures, policies and procedures for obtaining women's concerns and issues and incorporated their comments into road health, safety and security policies.

Employment of more women during the construction stage will be achieved through the following measures:

- Analyse all positions where women can be employed during construction;
- Give consideration to flexible working arrangement to encourage woman applicants;
- Encourage contractors to hire women, i.e. give consideration to suitably qualified and experienced woman applicants; and
- Provide internships and volunteering opportunities for female students.

15.5.1.7 VULNERABLE PEOPLE

The following mitigation measures will be undertaken to reduce effects on vulnerable people within the Project area:

- Identify presence of people with chronic health condition, elderly, and individuals living in poverty (no access to facilities and poor social status);
- Identify women (married or single headed) who based on traditional limiting factors may not be able to claim land compensation or attend consultation meetings;
- Identify presence of any informal people to ensure that their land use rights will be protected;

- Consult with vulnerable peoples (through focus groups and meetings) to identify their needs and concerns in relation to the Project;
- Implement the LRP prior to land acquisition as defined in the LRF; and
- Provide support and monitor health status of disabled people and pregnant women living close to the construction corridor.

15.5.1.8 PROJECT AFFECTED PEOPLE

The following mitigation measures will be undertaken to reduce effects on affect people:

- Provide in-kind compensation or allocation of another area for businesses or households located within a less than 500m from the construction corridor; and
- Implement the LRP as defined in the LRF.

15.5.2 OPERATION STAGE

15.5.2.1 LAND TENURE AND USE

No mitigation measures as there will not be any land tenure and use during this stage.

15.5.2.2 EMPLOYMENT AND LOCAL ECONOMY / LIVELIHOOD

As with construction related employment, the employment of any individuals for the operation of the Project will follow principles of international best practice and measures. Local economy and livelihood of farmers and local people will be enhanced through promotion of local investment and farming activities through collaboration with key authorities.

15.5.2.3 COMMUNITY HEALTH, SAFETY AND SECURITY

The following key mitigation measures will be implemented to reduce the effects associated with road accidents and injuries:

- Ensure that locals are aware about road signs and regulations (speed level etc) with regard to driving on motorway through information disclosure activities (local newspaper, TV);
- Consult affected locals on commencement of road operation and exact timing;
- Deploy sufficient road signs and traffic lights at junctions; and
- Ensure regular maintenance and inspection of road particularly during winter season.

15.5.2.4 INFRASTRUCTURE

This impact is assessed as ‘Positive’. Thus, no mitigation measures are listed.

15.5.2.5 GENDER ASPECTS

As with construction phase employment opportunities, an analysis will be made of the positions that could be provided to women. When hiring for new positions, consideration will be given to suitably qualified and experienced woman applicants.

The Project will reduce the effects associated with women’s safety and security through implementing the following:

- Consult with local women about commencement of road operation and it’s exact timing; and
- Develop a procedure and set structures (including grievance process) to receive any concerns and issues raised by women in relation to the operation of the new road.

15.5.2.6 VULNERABLE PEOPLE

Post monitoring of vulnerable people’s social and health status to ensure that they are not affected as a result of the Project.

15.5.2.7 PROJECT AFFECTED PEOPLE

The Project will undertake regular meeting with the affected people to ensure that their livelihoods are not affected.

16 CUMULATIVE ASSESSMENT

Cumulative effect interactions can occur as either:

- Interactions between effects associated with the Project; and / or
- Interactions between the effects associated with one or more other projects within the study area for the Project.

16.1 LEGISLATION

Applicable laws and guidance are outlined in the table below.

Table 75 - Cumulative Assessment Legislation, Policy and Guidance

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan No. 212.	2007
Guidance	
EBRD. Performance Requirement 1: Assessment and Management of Environmental and Social Impacts and Issues.	2014

The EIA Directive requires assessment of *"the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects…"*[73].

16.2 ASSESSMENT METHODOLOGY

The spatial scope of the cumulative effects taken to be the spatial extent of the Project with a 1km buffer around the proposed alignment. The temporal scope for the assessment is the construction period for the Project (2019 to 2021 / 22), with the operational phase commencing in summer 2021 / 22.

There are two roads which connect to the Project. The A3 on the outskirts of Kapshagai Town has been redeveloped and is operational. As this redevelopment has been completed it has formed part of the baseline environment for the assessments and thus a cumulative assessment is not required.

The M-36 on the outskirts of Kurty Village is part of the 228 km "Kurty-Buribaytal" Project, the adjacent stretch of this Project currently being disbursed by EBRD, it is expected to be completed in late 2019 / early 2020. Thus, there is the potential for inter-Project cumulative effects.

This assessment has therefore considered both:

- The cumulative effects likely as arising from the combined action of a number of different impacts upon a single resource or receptor identified during the construction phase, and when the Project is complete and operational; and
- Cumulative effects associated with the adjacent stretch of the 228 km "Kurty-Buribaytal" Project.

The assessment identifies the specific receptors that would experience a number of different impacts from the construction and operational stages of the Project.

For some environmental aspects, no interactions with other aspects can occur and so no combined cumulative effects could arise. For example, employment opportunities and noise and vibration. Where there is considered to be no potential for effect interactions this is stated.

[73] Directive 2014/52/EU of the European Parliament and of the Council amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.

16.3 CUMULATIVE EFFECTS

Cumulative effect interactions during construction and operation these have been identified as have the potential for adverse effects. The effects are summarised in the table below.

Table 76 - Summary of Cumulative Effects

Nature of Cumulative Effects	Temporal Stage	Environmental Discipline	Summary of Effects
Interactions between effects associated with the Project.	Construction and Operation	• Air Quality; • Noise and Vibration; • Traffic and Transport; Landscape and Visual; and • Social. •	• Nuisance and disturbance to local business and farms caused by noise, dust, visual impacts and increased traffic movements during both the construction and operational phases; and • Potential for business and farms to have views of the construction activities and the operational road; and • Potential for business and farms to experience dust and windblown litter during both the construction and operational phases.
Interactions between the Project and other projects within proximity of the Project.	Construction and Operation	• Air quality; • Noise and vibration; • Landscape and visual; • Biodiversity and living natural resources; • Geology and Soils; • Water environment; and • Material resources and waste.	• Localised nuisance and disturbance at the intersection of the Projects caused by noise and dust associated with combined construction activities and construction traffic. Mitigation measures to reduce such effects will be included in the CEMP. • It is understood that the operation of the “Kurty-Buribaytal” Project has been accounted for in the traffic projections presented previously in Table 3 and thus no further air quality and noise effects are anticipated once operational; • Localised adverse landscape and visual effects around Kurty Village during the simultaneous construction of both roads. Effects cannot be practicably mitigated, but are anticipated to be temporary (≤ 1 year). No operational effects are anticipated. • Potential effects associated with combined vegetation clearance and animal welfare risks due to the increased area covered by construction sites. Mitigation measures to reduce such effects will be included in the CEMP. • Once operational the “Kurty-Buribaytal” Project will include a mesh fence and cattle underpasses to reduce the risk of adverse effects on animals (livestock / wildlife), due to traffic collisions.. • There is potential for adverse cumulative effects associated with the potable and non-potable water required by the concurrent Projects. However, as all water will be provided by the Water Basin Inspection

Nature of Cumulative Effects	Temporal Stage	Environmental Discipline	Summary of Effects
			Authority (Balkhash-Alakol) and the applicable local authorities it will be their responsibility to ensure that there is sufficient supply for both Projects and all other users. The CEMP will specify that no groundwater or surface water sources along or in the vicinity of the Project are used as this could affect local livelihoods as livestock regularly use the water channel for drinking. • No cumulative operational effects on water resources are anticipated as both Projects will have a maintained drainage regime. • There are is the potential for adverse effects associated with the supply of materials and the disposal of waste during the construction phase. The risk of these effects will be reduced through the early engagement of suppliers and the identification of waste disposal facilities. • The Projects could generate beneficial cumulative effects if the crushed materials generated during demolition and excavation are shared across both Projects, thus minimise the export and import of material resources. Such mitigation measures will be included in the CEMP.

17 SUMMARY

Table 77 - Summary of Potential Impacts and Mitigation

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
Air Quality	Unlikely to exceed the EU, WHO and Kazakhstan objectives for NO_2, PM_{10} or dust.	Construction	Increases in dust and PM_{10} concentrations at existing receptors due to construction activities. Changes in ambient concentrations of NO_2 and PM_{10} at existing receptors as a result of exhaust emissions arising from construction plant and traffic.	Medium Adverse (Significant)	Implementation of good construction site management practices and the implementation of appropriate mitigation measures, adopted through a Dust Management Plan and a CEMP.	Not Significant
		Operation	Increases in pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) as a result of exhaust emissions from road traffic generated by the operation of the Project.	Negligible (Not Significant)	N/A	Not Significant
Biodiversity and Living Natural Resources	The area around the Project is dominated by an open agricultural landscape in which linear features and scrub represent the only notable variation from agricultural land.	Construction	Habitat loss. Risk of injury or death to animals (livestock / wildlife).	Minor Adverse (Not Significant)	Removal / loss of semi-natural habitat should be minimised throughout Any vegetation clearance should be programmed to be completed outside of the breeding bird season. Securing and making safe, all open excavations, hazardous materials, and plant machinery when not in use. The proposed boundary fence will provide further assistance in preventing site access by livestock / wildlife.	Not Significant
		Operation	Risk of injury or death to animals (livestock / wildlife).	Negligible (Not Significant)	Inclusion of mesh fence and cattle underpasses.	Not Significant
Climate Change	GHG emissions from fuel combusted by vehicles using the exiting road, lifecycle emissions associated with maintenance materials and fuel combusted by maintenance vehicles. Large annual range in temperatures from a minimum of -12.6ºC in January to a maximum of 23.1ºC in July, with an average annual temperature of 5.7ºC. Rainfall is more consistent throughout the year, with an annual average rainfall of	Construction	Increased GHG emissions associated with: • Embodied emissions associated with extraction and manufacturing of the required raw materials; • Emissions from fuel and electricity used in vehicles transporting materials to site; • Emissions from fuel and electricity used in plant and equipment on site; • Emissions from fuel/energy used in vehicles transporting materials to away from site; • Emissions from the final disposal of waste materials; and • Change in emissions associated with the clearance and disposal of any vegetation. Climate risks such as flooding, extreme temperatures, high winds and soil stability.	Not assessed as part of the Supplementary ESIA.	Minimising materials required for construction. Maximising the use of construction materials and products with recycled or secondary and low carbon content, from renewable sources, and offering sustainability benefit. Using locally-sourced materials where available and practicable to minimise the distance materials are transported from source to site. Using more efficient construction plant and delivery vehicles, and / or those powered by electricity from alternative/lower carbon fuels. Emissions calculations. Appropriate structural designs, surfaces and construction. Use different (harder) binders in asphalt. Changes to concrete mixes and reinforcing. Assessment of climate vulnerability and risk.	Not assessed as part of the Supplementary ESIA.
		Operation	Increased GHG emissions associated with: • Electricity used for lighting; • Embodied emissions, and emissions from transport and plant associated with maintenance, repair, replacement, and refurbishment; • Change in emissions associated with the existence of the Project hindering or promoting the sequestration of carbon dioxide into vegetation; • Increased vehicles using the Project. Climate risks such as flooding, extreme temperatures,	Not assessed as part of the Supplementary ESIA.	Designing, specifying and constructing the Project with a view to maximising the operational Project and minimising the need for maintenance and refurbishment (and all associated emissions). Designing, specifying and constructing the Project with a view to maximising the potential for reuse and recycling of materials / elements at the end-of-life stage. Specifying high efficiency mechanical and electrical equipment such as lighting (LED lights) etc. Operating, maintaining and refurbishing the Project using best-	Not assessed as part of the Supplementary ESIA.

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
	21mm and ranging from a minimum of 14.5mm in February to a maximum of 27.9mm in July.		high winds and soil stability.		practice efficient approaches and efficient plant and equipment. Emissions calculations. Accounting for climate risks in maintenance regimes. Assessment of climate vulnerability and risk.	
Cultural and Archaeology Heritage	There are no known archaeological or heritage assets which will be impacted by the Project. Low potential for unknown archaeological remains. Several memorials along the road.	Construction	Disturbance of unknown archaeological remains. Disturbance memorial(s).	Minor Adverse (Not Significant)	Chance Find Procedure. Cultural Heritage Management Plan. Cultural Heritage Management Implementation Plan.	Not Significant
		Operation	No know potential impacts.	Negligible (Not Significant)	N/A.	Not Significant
Major Accidents and Disasters	Potential for a wide range of major accidents and disasters that could occur, the probability, likelihood and frequency is very low, often due to the management of a risk under the established legislative requirements. Notable baseline major accidents and disasters include seismic events, extreme weather events and major road accidents.	Construction	The potential for a wide range of major accidents and disasters that could occur, the probability, likelihood and frequency is very low, often due to the management of a risk under the established legislative requirements, during the design process or construction and operational contractor processes. Notable potential major accidents and disasters include seismic events, extreme weather events, major construction accident and major road accidents.	Negligible (Not Significant)	Construction Environmental Management Plan.	Not Significant
		Operation		Negligible (Not Significant)	Emergency Preparedness and Response Plan.	Not Significant
Geology and Soils	Potential sources of contamination have been identified along the route including an Asphalt Plant, Plastic Plant, agricultural machinery, waste material and oil /	Construction	Excavation of and contact with potentially contaminated soil during works Contact with potentially contaminated groundwater / surface water Accidental oil and / or petroleum leaks from machinery. Suspended solids / silt release into surface waters.	Medium Adverse (Significant)	Ground investigation and risk assessment. Construction Environmental Management Plan.	Not Significant
		Operation	Contact with contaminated soil / groundwater. Affect from ground gas accumulation.	Minor Adverse (Not Significant)	Ground investigation and risk assessment. Appropriate design to mitigate risks associated with ground gas.	Not Significant

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
	chemical storage.		Degradation of below ground concrete / services due to aggressive ground conditions.			
Landscape and Visual	Natural / semi-natural landscape of low level sparse vegetation within extensive, rectangular agricultural fields and strips, broken up by field boundaries of tracks and lines of scrub / trees.	Construction	Changes to access and effects of traffic management (currently unrestricted although informal across the existing road). Removal of occasional trees/ shrubs which provide local landmarks and landscape variation. Introduction of uncharacteristic elements into the surrounding agricultural landscape, including additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting etc. Farms and businesses will have direct or long-distance views of the construction activities. Users of the surrounding landscape will have clear views of the construction activities on site due to proximity and limited tree cover.	Major Adverse (Significant)	Removal / loss of semi-natural habitat should be minimised throughout. New tree and hedge / shrub planting to be planted within a suitable depth of appropriate topsoil to aid establishment. All open excavations, hazardous materials, and plant machinery should be secured and made safe when not in use. A fence for the boundary of the site should be installed which will help to prevent site access by animals and herders. minimising the potential impacts from the construction activities. Alternative routes for dirt roads while intersections are constructed should be identified and publicised. Construction Environmental Management Plan. Minimise the use of artificial lighting on the site and where needed, use directional lighting. Protect and preserve memorial sites along the Project. Ensure a suitable number of underpasses are installed along the route.	Significant
		Operation	Access across the road will be permanently restricted. New planting will enhance the local character and provide some screening over time. Introduction of hard-surfacing and traffic into the wider agricultural landscape. Some agricultural land will be lost. Farms and businesses will have direct or long-distance views of the Project, being much larger and visually prominent than the existing highway. Users of the existing highway will have enhanced journeys, accessibility and movement. Users of the surrounding landscape will have clear views of the Project.	Medium - Major Adverse (Significant)	Reinstate all excavated and temporary land-take areas like for like or better. Ensure suitable establishment of any tree or scrub to maintain screening to farms and businesses. Protect and preserve memorial sites along the Project.	Not Significant
Material Resources and Waste	Operation and maintenance of the current two-lane road, bridge and intersections are anticipated to: • Require the consumption of a small number of specialist components (for example, signage) as well as some bulk products	Construction	Consumption of natural and non-renewable resources during construction. Generation and disposal of waste.	Not assessed as part of the Supplementary ESIA.	Reuse of materials generated through demolition and excavation arisings and sings for other road projects. Construction Environmental Management Plan (incorporating a Design Site Waste Management Plan and a Materials Management Plan). Ensure waste are appropriately managed. Ensure contractors used for the disposal of waste and the waste disposal sites are reputable, legitimate enterprises, licenced by the relevant regulatory authorities and operating to acceptable standards. Design for resource optimisation Further studies to: • Obtain data on the availability of materials within the region, materials volumes required for the Project and the recycled content of those materials; and • Obtain data on capacity of waste recovery and landfill sites within the region.	Not assessed as part of the Supplementary ESIA.

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
	(asphalt for re-surfacing) for routine works and repairs of the road; and • Generate small volumes of waste from routine maintenance such as repairs to the road surface, signage replacement, clearance of vegetation and litter from all drainage channels and the water channel.	Operation		Minor Adverse (Not Significant)	Ensure waste are appropriately managed. Ensure contractors used for the disposal of waste and the waste disposal sites are reputable, legitimate enterprises, licenced by the relevant regulatory authorities and operating to acceptable standards. Further information on the likely operational / maintenance activities. further information on operational waste generation and the capacity of waste recovery and landfill sites within the region.	Not Significant
Noise and Vibration	Dwellings on the western fringe of Kapshagai Town and approximately twenty isolated farms. Industrial installations and businesses including a plastics factory and an asphalt plant.	Construction	Noise generated by activities such as earthworks (i.e. bulldozing) and the laying of the new road surface. Disturbance to those residents, farms and businesses along the Project.	Minor Adverse (Not Significant)	Construction Environmental Management Plan. Design and use of site hoardings and screens to provide acoustic screening at the earliest opportunity.	Not Significant
		Operation	Change in road traffic noise levels of +3.2 dB. For properties closer to the road (those within 100 metres, as present at each end of the Project in 2036) noise levels are predicted to exceed the IFC thresholds.	Minor Adverse (Not Significant)	Introduction of acoustic barriers, most likely through reprofiled earthworks to create an earth bund to screen the road from the nearest dwellings.	Not Significant
Water Environment	The road crosses a number of seasonal streams that are reported to be dry for much of the year but that convey flow resulting from snow melt and during heavy rainfall events. Peak flow with the highest risk	Construction	Pollution risks to adjacent watercourses and underlying groundwater resources, that may pose risk to environmental, agricultural, industrial and potable water quality. Reduction in water supply for environmental, agricultural, industrial and potable water use caused by an increase in water demand during construction of the Project. Increased flood risk to the proposed users of the road and properties elsewhere caused by temporary restriction to flood flow conveyance.	Minor Adverse (Not Significant)	Construction Environmental Management Plan.	Not Significant
		Operation	Pollution risks to adjacent watercourses and underlying groundwater resources associated with long term discharge of road runoff and accidental spillage of	Minor Adverse (Not Significant)	Inclusion of treatment and attenuation systems within the Project drainage design.	Not Significant

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
	of flooding is usually observed between March and April when rainfall falls on melting snow. The road crosses a water channel. Approximately 60 drainage pipes (typically as illustrated in the figure below) pass beneath the road along its length.		pollutants, that may pose risk to environmental, agricultural, industrial and potable water quality. Increased flood risk to the proposed users of the Project and properties elsewhere caused by permanent restriction to flood flow conveyance and / or an increase in the rate and volume of surface water runoff.			
Social	Dominated by agricultural industry. Unemployment rate in Almaty region is high, as approximately 30% of economically active population is reported as 'Unemployed'. A total of 33 educational establishments in the Kapshagai Town. No details regarding Kurty Village's educational provisions. Presence of Tuberculosis.	Construction	Land acquisition. Construction activities and increased traffic could also cause some health and safety risks to locals, livestock and increased road traffic accidents. Short term direct employment opportunities. Local economic improvement though spending incurred by construction workers and contractors.	Medium Adverse (Significant)	Livelihood Restoration Framework. Stakeholder Engagement Plan. Develop a traffic management plan (potential inclusion as part of the Construction Environmental Management Plan). Develop and implement a Construction Camp Management Plan, Influx Managemnent Plan, Security Management Plan and a Gender Policy. Implement transparent and fair recruitment procedures. Provision of a grievance mechanism for residents, business and workers. Promote local investments and provide advice to local farmers on applying for assistance and loans for further projects. Communicate and distribute Project information on temporary access routes and route diversions to affected land users and owners. Ensure the design and construction tendering process will include clauses and policies on minimum working age, free collective bargaining, good working condition and eradicating any risk of forced labour. Regular monitoring of suppliers. Ensure establishment of employment contract for all permanent and temporary employees in accordance with the Labour Code. Develop a policy on labour and human resources.	Not Significant

Topic	Baseline	Phase	Potential Impact	Effect (without mitigation) *	Mitigation Measures **	Residual Effect (after mitigation)
		Operation	Investments into the area, and could also lead to increased land prices. Provision of lighting at the eastern and western ends of the Project and bus stops / resting areas would benefit the local community. Increased road traffic accidents. The two maintenance depots will employ skilled experts to work on road maintenance. Reduced travel times from Europe to china, and enable road users to bypass Almaty and Kaskelen.	Medium Adverse (Significant)	Consult affected locals on commencement of road operation and exact timing. Ensure regular maintenance and inspection of road particularly during winter season. Provision of a grievance mechanism for residents, business and workers.	Not Significant

*The highest scoring (worst) effect (without mitigation) for a single impact. Further details can be found in each discipline chapter.

**The mitigation measures listed are a summary only. Further details can be found in each discipline chapter.

Appendix A

PROJECT DRAWING

PUBLIC

Appendix B

SATELLITE MAPS

Appendix C

IAQM ASSESSMENT METHODOLOGY

SUMMARY

STEP 1 - SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there is:

- A 'human receptor' within:
  - 350 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- An 'ecological receptor' within:
  - 50 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible" and any effect will not be significant.

STEP 2 - ASSESS THE RISK OF DUST IMPACTS ARISING

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

The scale and nature of the works, which determines the potential dust e mission magnitude as small, medium or large (Step 2A); and

The sensitivity of the area to dust impacts (Step 2B), which is defined as low medium or high sensitivity.

These two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout).

STEP 2A - DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large. The following are examples of how the potential dust emission magnitude for different activities can be defined. Note that in each case, not all the criteria need to be met, and that other criteria may be used if justified in the assessment.

DEMOLITION

Example definitions for demolition are:

- Large: Total building volume >50,000 m^3 potentially dusty construction material (e.g. concrete), on-site blasting and screening, demolition activities >20 m above ground level;
- Medium: Total building volume 20,000 m^3 - 50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.

EARTHWORKS

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Example definitions for earthworks are:

- Large: Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;
- Medium: Total site area 2,500 m^2 - 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes - 100,000 tonnes; and,

- Small: Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months.

CONSTRUCTION

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s) / infrastructure, method of construction, construction materials and duration of build. Example definitions for construction are:

- Large: Total building volume >100,000 m^3, piling, on site concrete batching, sand material blasting;
- Medium: Total building volume 25,000 m^3 - 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- Small: Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

TRACKOUT

Factors which determine the magnitude class are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the magnitude categories. Example definitions of trackout are:

- Large: >50 HDV (>3.5t) outward vehicle movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- Medium: 10-50 HDV (>3.5t) outward vehicle movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m - 100m; and
- Small / Medium: <10 HDV (>3.5t) outward vehicle movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

STEP 2B - DEFINE THE SENSITIVITY OF THE AREA

The guidance to identify the sensitivity of different types of receptor to Dust Soiling, Health Effects and Ecological Effects are the tables below.

Table 78 - Sensitivity of People to Dust Soiling Effects

High Sensitivity Receptor
• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
Medium Sensitivity Receptor
• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.
Low Sensitivity Receptor
• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

Table 79 - Sensitivity of People to Health Effects of PM_{10}

High Sensitivity Receptor
• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium Sensitivity Receptor
• Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low Sensitivity Receptor

- Locations where human exposure is transient.
- Indicative examples include public footpaths, playing fields, parks and shopping streets.

Table 80 - Sensitivity of Ecological Effects

High Sensitivity Receptor
• Locations with an international or national designation and the designated features may be affected by dust soiling; or • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the red data list for Great Britain. • Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium Sensitivity Receptor
• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition. • Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low Sensitivity Receptor
• Locations with a local designation where the features may be affected by dust deposition; or • Indicative example is a local nature reserve with dust sensitive features.

The tables below present the how the sensitivity of the area can be determined for dust soiling, human health and ecological impacts respectively. The sensitivity of the area should be determined for each of the four activities: demolition, construction, earthworks and trackout. Only the highest level of area sensitivity from the tables need to be considered; it is not necessary to work through the whole of each table once it is clear that the highest level of sensitivity has been determined.

Whilst these tables are necessarily prescriptive, professional judgement may be used to determine alternative sensitivity categories - see full IAQM Construction Dust Guidance (2014) for further details.

Table 81 - Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
Low	>1	Low	Low	Low	Low

Table 82 - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration, $\mu g/m^3$	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
Low	-	>10	Low	Low	Low	Low	Low
	-	1-10	Low	Low	Low	Low	Low

Table 83 - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low

Receptor Sensitivity	Distance from the Sources (m)	
	<20	<50
Low	Low	Low

STEP 2C - DEFINE THE RISK OF IMPACTS

The potential dust emission class determined above in Step 2A should be combined with the sensitivity of the area determined in Step 2B to determine the risk of impacts. The tables below provide matrices to determine the risk of impacts.

Table 84 - Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 85 - Risk Category from Earthworks and Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 86 - Risk Category from Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

There is an extra dimension to the assessment of trackout, as the distance over which it might occur depends on the site. As general guidance, significant trackout may occur up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. These distances assume no site-specific mitigation.

STEP 3 - IDENTIFY THE NEED FOR SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is a low, medium or high-risk site. The general mitigation measures and those required for high, medium and low risk for each of the four activities can be seen below.

MITIGATION MEASURES APPROPRIATE FOR THE PROJECT

General Communication:

- A stakeholder communications plan that includes community engagement before work commences on-site should be developed and implemented; and
- The name and contact details of person(s) accountable for air quality and dust issues needs to be displayed on the site boundary. This may be the environment manager / engineer or the site manager. The head or regional office contact information should also be displayed.

General Dust Management:

- A Dust Management Plan (DMP), which may include measures to control other emissions in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority. In London, additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include a requirement for monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.

Site Management:

- Record all dust and air quality complaints and identify the cause(s). Take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked;
- Any exceptional incidents that cause dust and / or air emissions, either on- or offsite need to be recorded, and the action taken to resolve the situation recorded in the log book; and
- Regular liaison meetings with other high-risk construction sites within 500 m of the Site boundary need to be held, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport / deliveries which might be using the same strategic road network routes.

Monitoring:

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of Site boundary, with cleaning to be provided if necessary;
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked; and
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site:

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on-site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;

- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-Site. If they are being re-used on-site cover appropriately; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle / Machinery and Sustainable Travel:

- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable; and
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

Operations:

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management:

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition:

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- Avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
- Only remove the cover in small areas during work and not all at once;
- Stockpile surface areas to be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;

- Where appropriate, windbreak netting / screening can be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Site and the surroundings;
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction; and
- During dry or windy weather, material stockpiles and exposed surfaces could be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction:

- Avoid scrabbling (roughening of concrete surfaces) if possible;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust; and
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

Measures Specific to Trackout:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Where practicable, implement a wheel washing system (preferably with rumble grids) to dislodge accumulated dust and mud prior to leaving the Site;
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10 m from receptors where possible.

STEP 4 - DETERMINE SIGNIFICANT IMPACTS

The significance is best determined using professional judgement, taking account of the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. The sensitivity of the area needs to be defined.

The sensitivity of the area surrounding the construction / demolition site is combined with the risk of the site giving rise to dust impacts (from Step 2) to define the significance of the impacts for each of the four activities (demolition, earthworks, construction and trackout).

The preference in the IAQM Guidance is to only assign significance to the impact with mitigation. The residual impacts for most sites will be negligible as shown in the table below.

Table 87 - Significance of Impacts of Each Activity with Mitigation

Sensitivity of Surrounding Area	Risk of Site Giving Rise of Dust Impacts		
	High	Medium	Low
Very High	Slight Adverse	Slight Adverse	Negligible
High	Negligible	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

When assessment of the significance of the impacts without mitigation is required, the recommended significance criteria in the table below should be used.

Table 88 - Significance of Impacts of Each Activity Without Mitigation

Sensitivity of Surrounding Area	Risk of Site Giving Rise of Dust Impacts		
	High	Medium	Low
Very High	Substantial Adverse	Moderate Adverse	Moderate Adverse
High	Moderate Adverse	Moderate Adverse	Slight Adverse
Medium	Moderate Adverse	Slight Adverse	Negligible
Low	Slight Adverse	Negligible	Negligible

The final step is to determine the overall significance of the impacts arising from the construction phase of the Project. This will be based on professional judgement but should take account of the significance of the impacts for each of the four activities.

Appendix D

PROJECT LOCATION

2 London Square
Cross Lanes
Guildford, Surrey
GU1 1UN

wsp.com