Senj Sant Cement Plant, Urgun Soum, Mongolia

Non-Technical Summary

Date: August 2012

SENJ SANT LLC

Contents

1 INTRODUCTION

Senj Sant Cement are proposing to develop a cement plant and limestone quarry in Urgun, in the Dornogobi Province, Mongolia. This will involve the construction of a 53.3km of overhead power line, a 10km below ground water pipeline, a road network, railway extension and workers accommodation. The boundary fence of the cement plant site has already been constructed and the ground has been prepared for the proposed railway extension. Figure 1 shows the layout plan for the cement project. The construction stage of phase 1 is scheduled to start in March 2013 and end in March 2014.

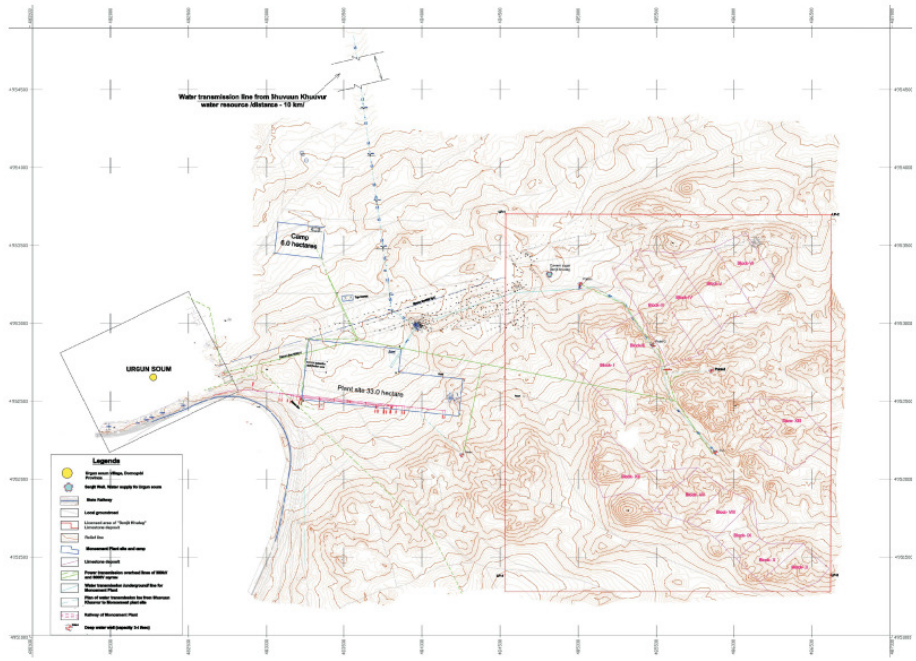

Figure 1: Senj Sant Cement Project Layout Plan

This Non-Technical Summary provides a description of the project and describes the potential benefits and impacts associated with its construction and operation. It also describes how these will be mitigated and managed through all phases of the project. It addition, it also provides a summary of the Best Available Techniques review and public consultation activities. Best Available Techniques is a term applied to address pollutant discharges with regard to the abatement strategy enshrined in European Union legislation.

2 WHAT DOES THIS PROJECT INCLUDE?

The main elements of the proposed project include the limestone quarry, a long belt conveyor, the cement plant and associated infrastructure including approximately 53.3km of overhead power lines, a 10km underground water pipeline, a railway extension, site roads and provision of workers accommodation. Brief descriptions of each are provided below.

2.1 THE QUARRY

The limestone resource is located at the surface (see Figure 2) which will reduce the amount of waste soils produced as a result of operations. The quarry operations will not extend beyond 50m below current ground level.

Figure 2: Limestone outcrop

Blasting will be used to break up the limestone in the quarry, which will generally occur one a week. No explosives will be stored in any significant quantity on site as a separate specialist contractor used for all blasting activities. The system for the transportation and storage of explosives will be developed following a full risk assessment and agreement of the methods with the state authorities. Explosives will be transported to the facility taking account of the need to segregate types of material which are potentially incompatible, the need for specific handling processes and the need for adequate security. A designated store will be provided for temporary storage of a small level of material for immediate use only. This store will be designed following the full design risk assessment and

will include blast safety protection features and full security arrangements. It will also be located a calculated safe distance from any occupied buildings, occupied areas and access routes.

The limestone will be transported from the quarry to the crusher in trucks.

The quarry site is expected to employ 26 people on a full time basis and the proposed hours of operation are likely to be one 8 hour shift, six days a week for a total of 328 days per year. Quarrying activities will shut down throughout the winter months due to the harsh winter climate.

2.2 THE LONG BELT CONVEYOR

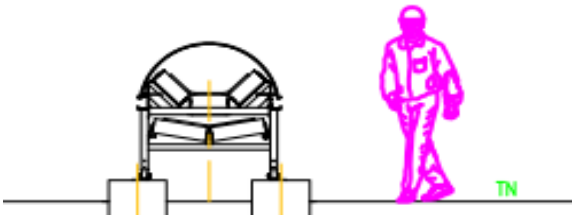

Figure 3: Cross section of a typical long belt

Limestone will be transported from the quarry crusher to the cement plant by a long belt conveyor. The conveyor will be 0.84km in length. It will be covered to prevent dust emissions and located primarily at ground level although it will be raised in certain sections to cross natural undulations in topography and this will also allow animals to pass under the conveyor. Crossing points over the conveyor will be provided.

2.3 THE CEMENT PLANT

The process selected for the operational project site is a dry multi-stage preheater kiln process rather than the old wet kiln production process. This has two overall benefits, firstly there are significant reductions in water demand for the process as water is not required to form a pre-kiln raw meal slurry, and secondly, dry pre-heater kilns result in high energy efficiency.

The cement plant site operations will include raw material storage, cement production areas, packaging area, storage warehouses, delivery and dispatch areas, office and service centre buildings, repair shop and garage, power and steam supply facilities, and water treatment facilities. Raw materials and cement products will be delivered to, or dispatched from site, via train and truck.

Figure 4: Image of a typical cement plant

The development will have a capacity of 1,500 tonnes per day of clinker production. In comparison to the majority of other cement plants, this will be a relatively small plant on completion of phase 1. In Europe, the average cement plant has a capacity of approximately 3,000 tonnes per day.

A cement plant has a number of production stages, but essentially involves raw materials extraction and crushing at the quarry, transport to the cement plant using a conveyor, and raw materials preparation. The materials are then brought up to temperature in a part of the plant called a preheater. The material (called 'raw meal') is then processed in a rotating kiln, at temperatures of around 1500 degrees centigrade, where it is chemically changed and combined. The 'calcined' material called 'clinker', the main constituent of cement, is then cooled and stored. In a second process, further additives are added (dependent on the specific cement type) and further grinded together into a cement, a fine powder. The cement is then either packed in bags or bulk packed for onwards transport. Cement has a wide variety of uses, including as a primary ingredient in concrete.

The cement plant installation will include a coal fired furnace / boiler system which will provide supplementary steam to the waste heat recovery plant, to provide peak loading supplementary power. This will provide peak power of 6MW electrical supply to the facility and will operate on a periodic basis.

The plant will be either a fluidised bed system or a pulversided coal system (dependent on final designs) furnace and boiler system. There will be 'low sulphur' (less than 1.2% sulphur) coal utilised in the plant. The unit will be fitted with automated combustion air control systems to ensure that combustion gas emissions (nitrogen oxides and carbon monoxide) are minimised to levels associated with the use of best available techniques (BAT). Further, a bag filter system will be utilised to ensure that particulate emissions are reduced to 20mg per cubic meter, again the level associated with the use of BAT. Periodic compliance monitoring will be undertaken, at least annually, and a burst bag detection system will be installed to ensure that BAT particulate emissions levels are constantly achieved.

As this is a small boiler unit, operated in line with BAT and only used periodically for standby peak power supply, it is not anticipated that significant impact will be cause through emissions. Indeed, the facility would not require a pollution control permit in a European regulatory context due to the insignificant emissions produced by this type of plant. The plant is currently in the early stages of design. However, a full impact assessment will be conducted using air dispersion modelling to ensure the expected insignificance of the impact to atmosphere. This modelling will also be used to design an optimised stack release height which will achieve fully effective dispersion and result in an insignificant process emissions contribution.

Waste will be produced by the boiler plant in the form of combustion bottom ash and fly ash captured by the bag filter unit. This will be segregated, stored in a sealed silo and proper disposal arrangements will be implemented. Also, the feasibility of using this ash as alternative raw material additive in the cement will be assessed, a common practice in the cement sector. This will have the advantage of reducing the quantity of waste disposed and also reduce carbon dioxide emissions per tonne of cement produced.

Senj Sant Cement Plant will be developed in two phases; Phase 1 will comprise a single production line with a capacity of 1,500 tonnes of clinker per day. Phase 2 of the project will consist of an additional production line, with preheater, kiln and materials processing equipment. The timing of phase 2 has not yet been decided.

Up to 650 foreign workers will be used to construct the cement plant. They will live in a self-contained accommodation compound and integration between the camp and village with be managed in line with International Finance Corporation / European Bank of Reconstruction and Development document *Workers and Accommodation: Processes and Standards* (August 2009) to include both office facilities and worker accommodation. During the operation of the plant, approximately 320 people will be employed and a permanent workcamp will be developed on the site with the same overall features as the construction workcamp. The arrangements for worker accommodation and employment opportunities related to the project are presented further in Section 6 of this document.

2.4 ASSOCIATED INFRASTRUCTURE

Figure 5 below shows the overall infrastructure requirements directly associated with the project, including the quarry site boundary, the cement plant and the localised routes of the electrical transmission line and the water pipeline. The road which is being developed by the regional authorities is shown in figure 7.

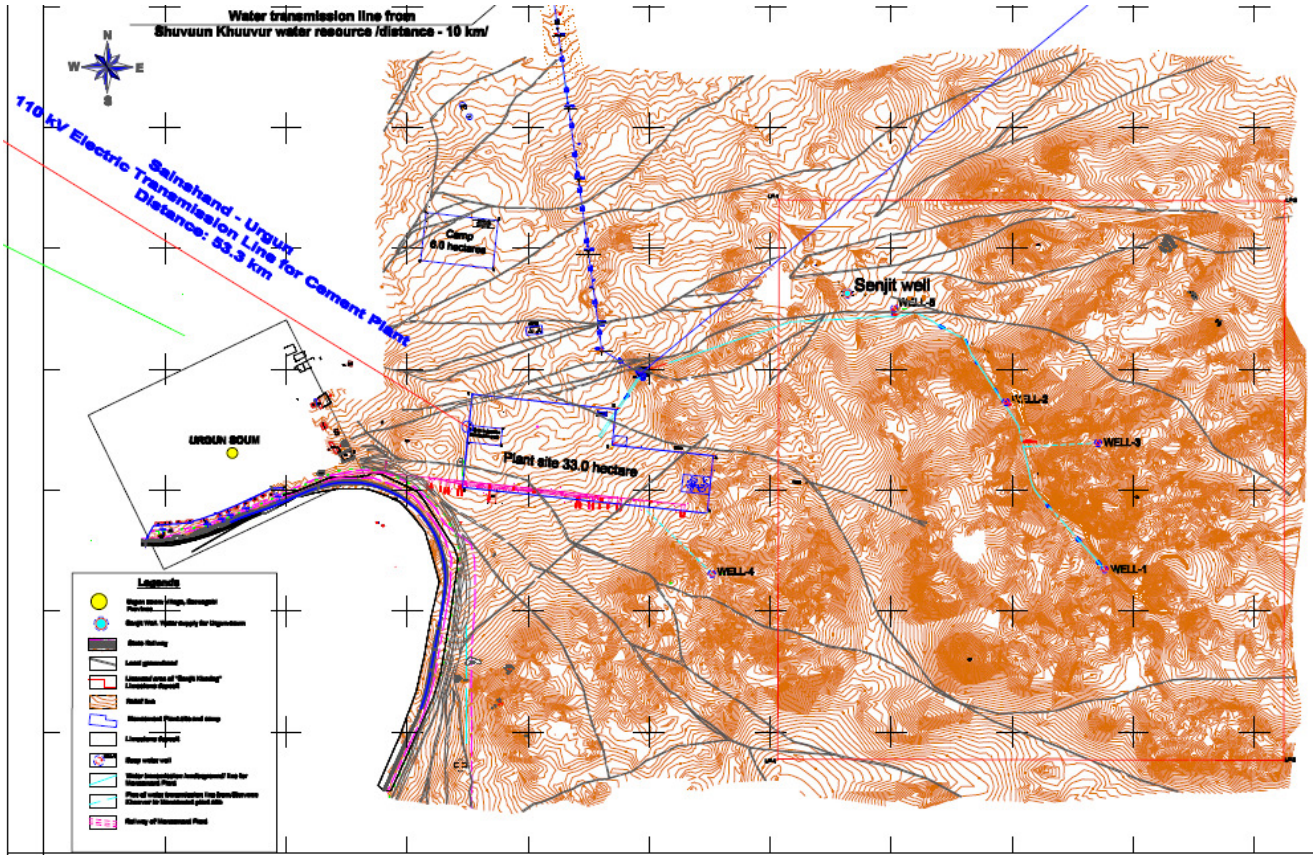

Figure 5: General site layout and infrastructure.

Electrical Supply

A 53.3km (110kV) overhead electricity power line will be constructed from Sainshand to the cement plant site and the proposed route is shown in Figure 6. The route predominately follows the line of the existing overhead power lines that connect Urgun to main electricity grid in Sainshand. No permanent structures were identified along the proposed route of the overhead power lines. The existing trans-Mongolian railway line (shown on Figure 5) also follows a similar, partially parallel route, to the transmissions lines at a distance varying from 10m-2500m.

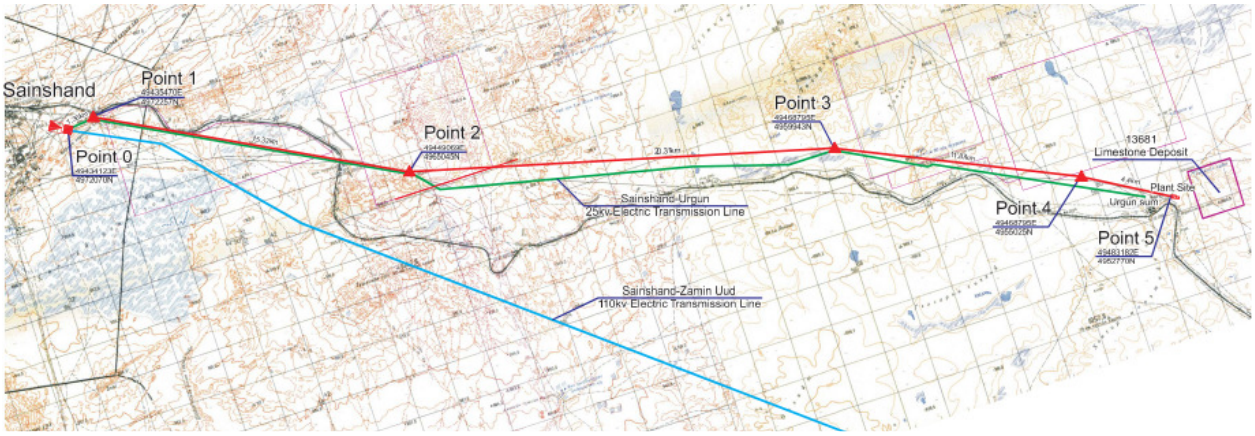

Figure 6: Proposed route of 110kV power lines

Key

Northernmost line – new 110kV transmission line

Middle line – existing 35kV Sainshand to Urgun transmission line

Southernmost line – existing 110kV Sainshand to Zamin Uud transmission line

Water Supply

Currently, two potential groundwater sources are being considered to supply all drinkable and non-drinkable water for project operations. These include the Shuvuun Khuuvur aquifer located approximately 10km to the north of the cement plant and the limestone aquifer located beneath the quarry. This limestone aquifer also currently supplies Urgun. A 10km underground water pipeline will be constructed from the Shuvuun Khuuvur aquifer to the cement plant site, which is not expected to represent a barrier to herders or wildlife. Separate drinkable and non-drinkable water supplies will be provided. Section 8.3 (Water Resources) of this Non-Technical Summary discusses the potential for these two groundwater sources to provide all the project water demand, and also discusses some alternative sources under investigation. Section 8.6 (Ecology and Biodiversity) discusses the potential impacts of the pipeline route on flora and fauna.

A waste water treatment works will be built and will include sewage water treatment and chemical clean water treatment. This will manage waste associated with the Urgun settlement and the construction and operational phases of cement plant. The exact size and location of the treatment plant will be determined at the detailed design stage and will be selected jointly in consultation with Lafarge and their sub-contractors. However, the treatment plant will be located within the plant site; therefore, additional land acquisition will not be required. All discharges from the production facility and all workcamps will be treated to an appropriate standard in line with the use of Best Available Techniques requirements. Waste water will be utilised where feasibility for non drinking purposes such as for dust suppression.

Infrastructure

A total of 5km of roads will be built linking the quarry, crusher, cement plant and other facilities in the plant area. A railway extension is being constructed to connect the cement plant site to the existing railway line.
A state road is being constructed and will end to the north of Urgun. A road will be constructed between the cement plant and the new state road. This road will not go through the middle of Urgun, but is likely to go to the north of the village.

3 WHY IS THIS DEVELOPMENT REQUIRED?

The development is required in order meet future demands of the construction industry within Mongolia. There is currently one other cement manufacturing facility in the country and Mongolia relies heavily on imports of cement from China and Russia. The Mongolian cement industry is incapable of meeting the rising demand for cement resulting from the major construction boom that it is experiencing. The Senj Sant cement plant would alleviate this supply issue, facilitate the countries' development plans and reduce Mongolia's dependence on imports.

4 WHERE IS THE PROJECT LOCATED?

The land associated with the Senj Sant LLC cement project is currently state owned. Senj Sant LLC has leased the licensed quarry area for 30 years and the plant site is leased for 15 years, with an option to renew. The cement plant site is approximately 33 hectares in size and the licensed quarry area is 484 hectare in size. The project area is approximately 750m to the east of Urgun at its nearest point, and approximately 55km to the east of Sainshand, the nearest major town. The site is located within a rocky desert area on the edge of the Gobi desert; approximately 991m above sea level and the topography generally slopes from east to west.

The location of the site is shown on Figure 8.

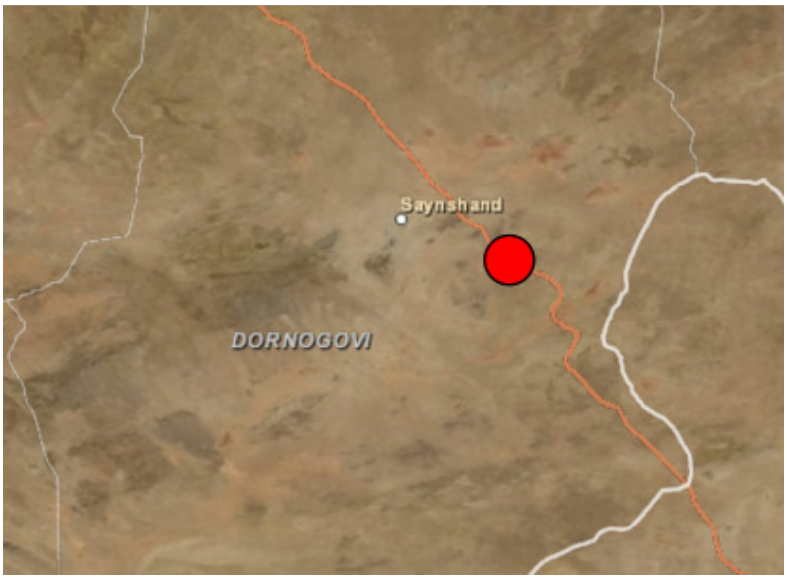

Figure 8: Cement Project Location Plan

Urgun is a small village with a permanent population of approximately 600 people. An additional 1,400 people that form part of this community are nomadic herders living within the wider Urgun area. The Urgun Soum area equates to approximately 870,000 hectares of land and comprises small mountains and hills to the east and south of the study area and the Gobi-steppe environment to the north and west for approximately 40-50km.

No paved roads are present within the village, although a state road is due to be constructed by the end of 2012, linking the village with the A3 (Sainshand to Zamyn-Uud) road located approximately 18km away to the west of the village.

Due to the nature of the desert environment, permanent surface water features within the vicinity of the Project area are limited to the Shuvuun Khuuvur spring, located to the south of the former Shuvuun Khuuvur well. This spring discharge is relatively small being approximately 50m-60m in length and is not suitable for potable supply due to mineral content, although the spring is used by two families for watering livestock.

Small localised temporary surface water bodies are also present within the lowest parts of the main valley features located between the quarry site and the Shuvuun Khuuvur aquifer. These water bodies are not permanent features; they are only present following periods of rainfall and are not present for notable lengths of time due to the permeable soils and high evaporation rates. However, these features are used by local herders when they are present.

There is a small rise in the topography along the western boundary of the cement plant site resulting in an existing natural bund/screen between the site and Urgun. This will be extended and landscaped to create further screening between the site and Urgun.

No protected sites have been identified on the site or within the surrounding Urgun village area.

5 WHY IS THIS A GOOD LOCATION?

In order to produce cement, limestone is required and there is a good source of this raw material at this location.

In addition, the site is also located near to the direct rail connection linking the key markets for cement; Ulaanbaatar and Sainshand.

Two potential sites were considered within Urgun, namely the current proposed site and a site to the west of the settlement. In the vicinity of the proposed site, the existing railway line turns to the south, which technically provides a good location for a railway spur line to serve the plant. In addition, the prevailing wind in the region is from the north-west. The plant will therefore be located downwind of the village, minimising potential noise and air quality impacts.

The proposed location to the east of Urgun is therefore considered to be the best location for the plant to reduce the level of potential impacts.

6 WHAT IS THE BENEFIT OF THE PROJECT TO THE LOCAL PEOPLE AND THE ECONOMY?

Up to 1,000 jobs will be generated during the construction phase of the project. Due the skilled nature of the construction process, the majority of the workforce will comprise migrant workers. However, some construction phase jobs will be created that are anticipated to be filled by the population from across the region. Where possible, supplies will also be sourced regionally which is likely to benefit the local economy, including livestock raised by local herders.

The construction workforce will be housed in a purpose built work camp accommodation. This will be of high quality, contain clean and comfortable dormitory accommodation with heating, lighting and adequate ventilation and include separate male/female accommodation facilities. Cooking facilities and catering will also be available and full washing and sanitation facilities also present. Arrangements will be in place for waste and wastewater management and security will be provided. There will be careful management of the workers entering and leaving the camp and a code of conduct will be implemented to define the rules for any interaction with the local community.

During the operation of the plant, approximately 320 people will be employed. Parts of the cement plant will be operational 24 hours a day. It is anticipated that a significant number of staff will be employed from across the Dornogobi aimag (province) and specifically from the local provincial centre, Sainshand. It is expected that skilled roles can be recruited from across the region, and specifically from colleges in Sainshand. These job opportunities will include a wide variety of roles such as electricians, engineers, carpenters, heavy machinery operators, railway workers and medical staff. There will also be semi-skilled roles which can be recruited more extensively from Urgun settlement and Senj Sant LLC would send these workers for full training. Purpose built accommodation will be provided for all workers, approximately 500m to the north of the cement plant site. This accommodation will include the features of the construction phase work camp detailed above.

Where possible, materials required during the operation of the Site, including food and materials for the employees, will be sourced from across the Soum. This will enhance the economic conditions of the area through increased spending.

7 POTENTIAL SOCIO-ECONOMIC IMPACTS OF THE PROJECT

7.1 SOCIAL INVESTMENT

Senj Sant LLC have already begun a programme of social investment into the Urgun Settlement and there is an active programme going forwards. Previous achievements of this programme have included funding the installation of a high speed internet connection to the village; the provision of fuels, equipment and temporary accommodation to assist the village to combat and infectious livestock disease in 2010; clearing and proper disposal of accumulated waste in the village area; funding of the building of a new administrative office building for the Soum; and a current project to build a new railway station building.

As part of the project, a railway spur will be constructed from the cement plant to the existing trans-Mongolian railway line. The route of this railway spur will avoid any need for any resettlement. The figure below shows the routing of the railway connection spur:

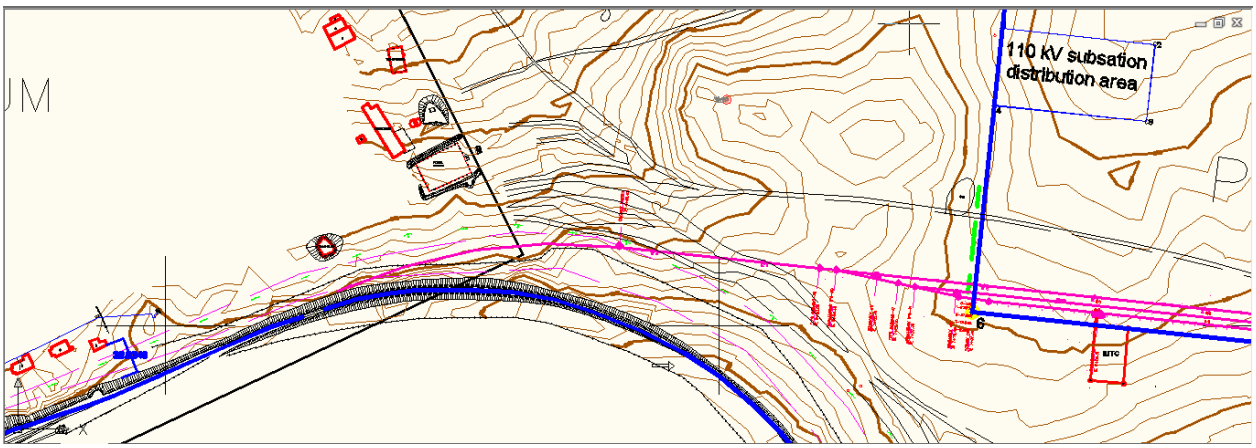

Figure 9: Intended routing of the railway spur.

7.2 IMPACTS TO WATER

One of the most important potential social impacts of the project relates to the supply of water resources for the project. The key potential social impact areas relevant to water resources include:

- *The use of temporary surface water pools and shallow herder wells in the centre of the valley*. These surface water features are utilised by local herders immediately following periods of rainfall (they are frozen in winter). The 10km long water pipeline to the Northern Aquifer will pass through/close to the location of temporary surface water features and shallow herder wells. There is potential for a very short term impact on these during construction of the pipeline, due to ground disturbance creating an alternative water pathway. Detailed mitigation techniques are committed and detailed in Section 8.3 which will ensure that this is only a minor and temporary impact. If herders' water supplies are temporarily impacted during construction, an alternative temporary source will be provided.
- *The village water supply*. The Senjit Khudag is the main waiter supply for the village, and non potable water is currently tankered from the well to the village. A new well will be created within the village by Senj Sant LLC and they have already undertaken investigations to assess groundwater resources for this alternative well. Detailed design of this new supply system is still to be undertaken, although Senj Sant LLC will ensure that this well is properly developed and water quality is adequate. Once the new well is constructed, it is unlikely that the existing well will continued to be used, although it will remain to be available. If use of the existing well is reduced, there is potential for a change in livelihood for the tanker driver who currently transports water to the village. In this case, the provisions identified within the Land Acquisition Framework and Stakeholder Engagement Plan will be enacted and specific assistance will be offered to this family as required.
- *Use of the Shuvuun Khuvuur Spring*: This spring is relatively small and not suitable for potable use but is available for use by livestock during the months of March to October. During the winter months, is frozen and therefore not available for use. There are 2 herding families in the region which utilise the Shuvuun Khuvuur Spring. Family number 1 has three members who maintain 150 livestock and generally live circa 4 km from the spring. Family number 2 has two members who keep 200 livestock and generally live 4.5 km from the spring. Each of these families move around the local area on a seasonal basis. Senj Sant LLC have consulted the two families, who report that alternative water is available, including two specific alternative wells in the region.

At this stage, the impacts to the spring are uncertain. However, there is a detailed sequence of mitigation measures which will be implemented to ensure that a sustainable water resource for the project is achieved without significant impact on uses of the water resources, specifically herder groups. These are detailed in Section 8.3 and potentially include measures such as artificial maintenance of the spring resource, or utilisation of an alternative aquifer if required.

If impacts do occur, the Land Acquisition Framework developed for the project will be followed to ensure that full arrangements are in place to address any social issues that arise. This framework sets out the commitments of Senj Sant LLC to formally understand all uses of the land area prior to acquisition or use of the land, to evaluate impacts, and provide any compensatory arrangements where land use of access impacts occur. All affected stakeholders, including herder groups, will be consulted in detail on their use of the water resources in the area such as springs and

wells, and the on the proposed mitigation measures. All actions will be agreed and documented as detailed in the Land Acquisition Framework.

Further issues associated with impacts to water are included in Section 8.3.

7.3 WORKFORCE MANAGEMENT

During the construction phase, the introduction of migration workers to the area could potentially impact on the local community. This could include placing an increased demand on local services and facilities and also the potential cultural and religious impacts resulting from a large ethnic group in the area. In order to minimise this issue, the migrant workforce will be accommodated in a self-contained camp and interaction between the camp and the village will be strictly managed in line with the International Finance Corporation / European Bank for Reconstruction and Development document '*Workers and Accommodation: Processes and Standards'* (August 2009). The camp will provide catering facilities or a canteen, adequate first aid and general medical facilities and the provision of entertainment/recreation facilities, minimising the need to workers to leave the camp.

All migrant workers will be provided with guarantees of being sent home to their native countries once the construction works have been completed.

When operational, plant operatives new to the area will be housed in a workers village in close proximity to the existing Urgun settlement, increasing the population of the Soum District.

Figure 10: Nomadic Herder Ger

The health and welfare of the workforce will be managed in accordance with the Lafarge global safety standards and will be applied at both the design and construction stage.

Lafarge is a global cement company and believes that on-going advances in building materials must integrate the respect for people, their different needs and their environment. This is reflected in a strategy which combines industrial know-how with performance, value creation, respect for employees and local cultures, environmental protection, and conservation of natural resources and energy.

These safety standards will be implemented through the development of task specific risk assessments. Any work being conducted by any worker, including contractors will be subject to risk assessment, and for contractors a specific method statement will be required to be prepared and will be signed off as compliant with the defined safety and environmental standards before the contractors will be permitted to start any work. There will be a dedicated inspection and performance monitoring team on the site where contractors activities will be checked against the agreed approaches defined in the method statements. This approach would be continued when the plant becomes operational and the facility will be managed under a formal health, safety and environmental management system, aligned with international standards.

7.4 EMPLOYMENT

The main positive impact of the Site will be the generation of long term employment opportunities when the site has been built and is operating, as discussed in Section 6. Where possible and dependent on skills availability, these jobs will be filled by residents from across the Soum, including the settlements of Sainshand and Urgun. This will have positive impacts on the local communities through provision of jobs to some local people, which in turn is likely to result in a modest increase in spending on locally sourced goods and services that could enhance the wider regional economy.

8 WHAT WILL BE THE KEY ENVIRONMENTAL IMPACTS OF THE PROJECT AND HOW WILL THEY BE MITIGATED?

8.1 AIR QUALITY

The potential impact of the proposed cement plant and quarry on local air quality has been assessed for both the construction and operation phases.

Potential impacts during the construction phase are considered to be minor and will primarily relate to the generation of dust from construction activities and emissions from construction vehicles.

Although the impacts are anticipated to be minor, all vehicles and equipment will be kept in good condition and regularly maintained to minimise emissions. In addition, dust will be controlled by spraying water on stockpiles and exposed surfaces where necessary. By adopting these mitigation measures, impacts on air quality during construction will be very minor.

The operation of the cement plant will give rise to emissions from a number of sources, including the kiln and cement mill chimney, and visible dusts from raw material and product handling. The typical wind direction is from the north and northwest and the cement plant has been located 'downwind' of Urgun. The quarry site is located far enough away from Urgun that the potential impact of emissions to air from the quarry and associated activities will be negligible.

In order to mitigate the potential impact of the process on air quality, all aspects of the cement plant have been designed to include Best Available Techniques, including the use of bag filters and a strict maintenance procedure which will be used to ensure their continued efficiency. This is discussed in further detail in Section 9 of this document and includes the phased introduction of further pollution control equipment to further reduce combustion gas emissions (in particular nitrogen oxides) at phase 2 of the project. More advanced emissions abatement systems will be introduced at phase 2 of the project to reduce the nitrogen oxide emissions due to the higher overall mass releases when the 2nd line of the cement plant is in operation. The impact assessment has demonstrated that this is not required at phase 1 of the project, due to minimum impact and the need for additional handling and use of ammonia for gas treatment. This will ensure that plant emissions meet Mongolian and international limits for nitrogen oxide, particulates and other pollutants. The overall effects of the emissions from the cement plant site are considered to be minor.

Continuous Emissions Monitoring

The cement plant installation will have a system which continuously monitors emissions within the main process emission points, including the main preheater emissions stack (which includes the emissions from the kiln), the clinker cooler and the cement mill. These systems will monitor the significant sources of emissions from the process, including combustion gases and dust. The monitoring systems will be linked to main cement plant controls so that processes are automatically adjusted to ensure that emissions levels remain within the stated levels and to ensure that no significant impact on air quality results from the process. Other pollutants will be tested on a scheduled annual basis.

8.2 NOISE AND VIBRATION

The potential impact of noise and vibration from the cement plant, quarry, conveyor and railway link to the trans-Mongolian railway has been assessed for both the construction and the operational phases.

At the moment, the site is predominantly undeveloped grazing land and whilst a single residential property is located by the water well to the north west of the quarry, the majority of the nearest sensitive receptors (residential properties) are located in the village of Urgun. Noise monitoring has been undertaken at five positions across the site and in the local surrounding area to confirm the existing noise levels in the area and help determine the potential for noise related impacts. The monitoring found that existing noise levels during the day and night were generally low and fairly typical for a remote area, (generally falling below 30dB with intermittent peaks, primarily caused by motorbikes and

barking dogs). Other intermittent sources included the operation of a nearby boiler, and the occasional passing vehicles and trains.

Residential properties within Urgun will be far enough away from the majority of noise sources to ensure that they are not significantly affected by the construction activities. However, some properties in the western area of the village are fairly close to the road and railway extensions and may experience some temporary disturbance. In order to mitigate this, best practice site management measures will be implemented. These will include maintaining site vehicles and equipment, and limiting the hours of operation for the nosiest pieces of equipment or operations. In addition, the soil from construction activities will be used to create a noise barrier between the cement plant and Urgun.

Once operational, it is unlikely that impacts, including those of blasting activities, will exceed the World Health Organisation (WHO) Guideline level of 45dB at the village due to the distance separation of the quarry noise sources from potentially noise sensitive premises and the intervening topography and ground cover. Nevertheless, the cement production plant will be enclosed within buildings where possible and plant noise levels will be reduced at source. Noise effects from blasting activities will be monitored to ensure that blast design and mitigation measures are efficient. The monitoring results will be reviewed and blast design and mitigation measures can be adapted if required. The potential noise impacts associated with the operational phase of the development are therefore likely to be limited to noise generated by the road traffic on the new road extension. Whilst some properties on the northern edge of Urgun may be relatively close to the proposed road extension, the construction of the railway extension will significantly reduce the amount vehicles that will need to travel on this road. In addition, whilst the residential dwelling at the Senjit Khudag well is relatively close to the proposed conveyor belt, this will only be operational during the day time and Senj Sant LLC are committed to ensuring routine maintenance of all equipment and plant including the railway track and engines, conveyor belt, road vehicles and cement plant.

8.3 WATER RESOURCES

Water is currently transported by tanker vehicle to Urgun residents from the Senjit Khudag well which is installed in the southern limestone aquifer (i.e. water bearing rock) approximately 2.5km to the east of the village. This is within the licensed quarry area. Water use in the village is currently estimated at 40-50m^3/day for both drinkable and non-drinkable uses (with more water being required in winter months to heat the dwellings in the village), of this approximately 48m^3 is used per week for drinkable uses. Herders currently predominantly utilise shallow wells, springs and temporary surface water pools when present, for domestic and livestock water supply.

The calculated water demand for the project construction phase has been estimated by Lafarge as approximately 170m^3/day including non-drinkable (116m^3/day) and drinkable (54m^3/day) requirements. During operation of the first cement line (phase 1) the water demand has been estimated by Lafarge as approximately 647m^3/day including non-drinkable (i.e. process and cooling requirements) (560.4m^3/day) and drinkable (i.e. workers accommodation and site operation requirements) (86.4m^3/day) sources. During the operation of the second cement line (phase 2) the total water demand has been estimated as approximately 720m^3/day including non-drinkable (588.5m^3/day) and drinkable (131.8m^3/day) sources. The final water balance for the project will be fully confirmed at the detailed design stage so there is, therefore, some potential for changes in the water demand. Currently the design team is confident that overall water demand will decrease due to technology improvements.

It is currently intended that water for project operations will be obtained from two potential groundwater sources. These include abstracting the majority of the non-drinkable water demand (450m^3/day) from the Shuvuun Khuuvur northern aquifer (comprising unconfined sandstone/sands and gravels) located approximately 10km to the north of the cement plant, and abstracting the drinkable water demand (131.8m^3/day) and the remaining non-drinkable demand (138.5m^3/day) from the southern limestone aquifer (total of 270m^3/day) located beneath the quarry. It is also currently intended that all water demand during construction (both drinkable and non-drinkable) will be abstracted from the southern limestone aquifer located beneath the quarry (170m^3/day).

Figure 11 presents the location of water features within 15km of the cement plant site. Water resources with the potential to be affected by the project, as discussed in Section 7, include the following:

- Shuvuun Khuvuur spring and herder wells located on the northern aquifer which have value to local herders (although this feature is not suitable as potable drinking water it is used for watering livestock) and ecology;
- Temporary surface water pools and shallow herder wells in the centre of the valley. The surface water features are utilised by local herders when they are present (following periods of rainfall) and the wells are utilised when they are not;

- The village water supply. It is intended that a new well will be created within the village; and
- The southern aquifer and associated aquifer yield required to meet project water demands.

The existing village supply well has not been defined as a receptor as it is not currently intended to be utilised by the project.

While there is likely to be sufficient volume of water in the northern aquifer to supply the project's non-drinkable water demand, abstractions are likely to impact the Shuvuun Khuuvur spring within the lifetime of the project. Reduction in spring discharge may have resulting implications on the local population and ecology; this is further discussed in the relevant Ecology (Section 8.6) and Social sections (Section 7). There is also the potential for herder wells on the northern aquifer, and other wells and springs in geology adjacent to this aquifer, to be affected.

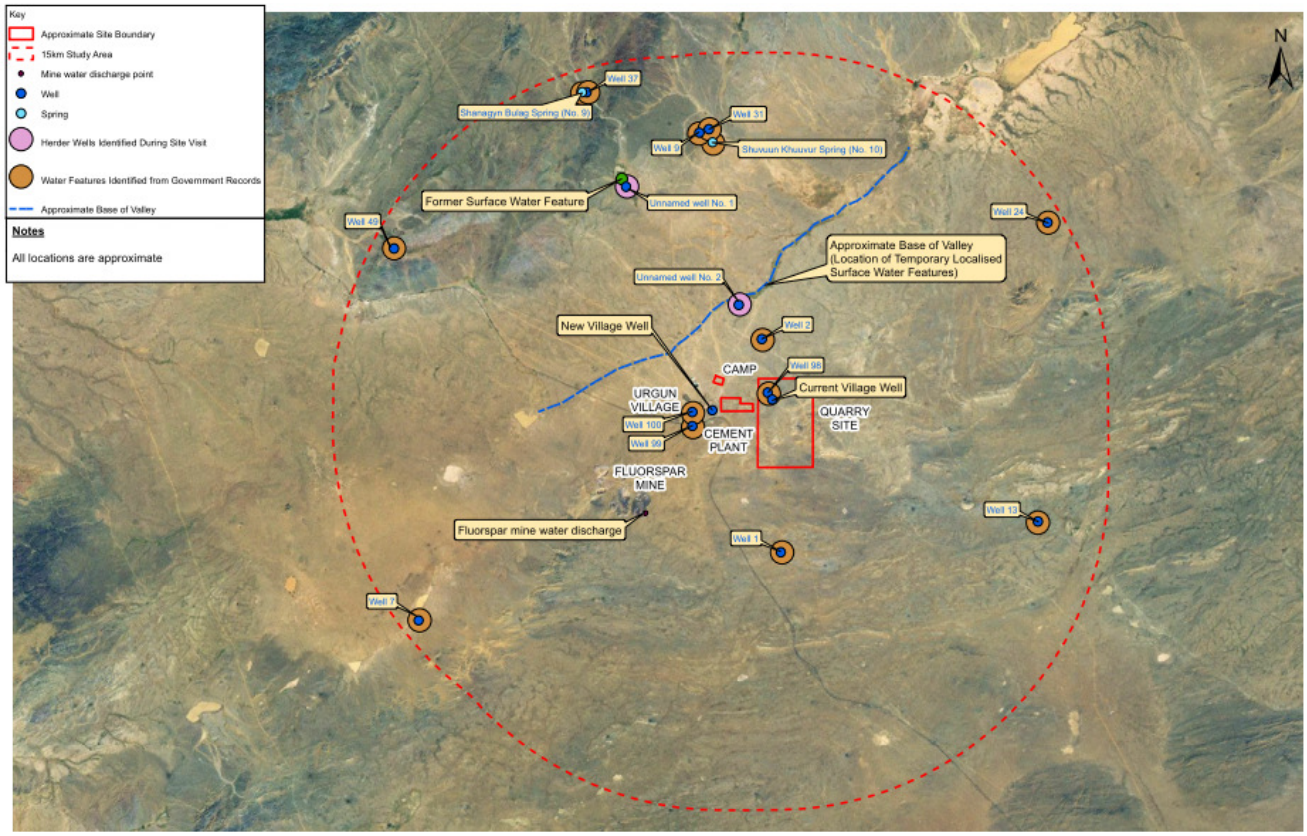

Figure 11: Map showing water resources

Proposed abstractions from the southern limestone aquifer beneath the quarry site may impact the groundwater levels and therefore the aquifer yield (i.e. possible abstraction rates). Consequently, abstractions from the southern aquifer may not be able to meet the proposed project water demand in the medium to long term during the operational phase and thus additional complimentary water sources may be required to meet the project water demand.

In order to ensure that impacts of the project are adequately managed to enable a sustainable water supply for the cement plant, residents of the region, and that water receptors are protected during construction and operation of the project, Senj Sant LLC will adopt a series of mitigation measures, summarised below. These mitigation measures are relevant to both the northern and southern aquifers:

- Further detailed assessment (including pumping tests) and groundwater modelling will be undertaken for both the northern and southern aquifers (including modelling of the spring) in order to refine predictions on future groundwater levels and impacts at identified receptors. This will assist in defining appropriate long term abstraction rates at each aquifer that will provide an optimal relationship between yield and future groundwater levels. The further investigations will be over a timescale of 12 to 18 months and will commence in 2012;
- Further monitoring wells will be installed within both aquifers, and rock coring will be undertaken during drilling. Thorough monitoring of groundwater conditions will be observed during drilling and ongoing regular groundwater monitoring will be undertaken following installation of the monitoring wells;

- Further assessment will include monitoring groundwater levels (including in both aquifers and within the village supply well) and spring elevations and flow rates. This will verify aquifer boundary conditions; further investigating the extent of the aquifers, determining aquifer storage values. A aquifer recharge assessment will be undertaken, as will a comprehensive water features study;
- In particular, during the pumping tests monitoring wells will be installed in association with each pumping test well, groundwater levels will be monitored in surrounding existing wells (e.g. herder wells and the village supply well) and the spring flow rates will be quantitatively measured (e.g. with a v-notch weir).
- Water usage and wastewater will be minimised through water recycling, use of efficient technology, undertaking staff training programmes, treating wastewater in an on-site facility so that it is suitable for reuse wherever possible (e.g. for dust suppression);
- An assessment of the risks of climate change on groundwater resources will be undertaken to identify future risks to water resources relating to the project; and
- In order to ensure that future users of the aquifers are identified (for example, if there were to be future development in the area), and to ensure that the project water demand will be met throughout the project lifetime (taking into account potential climate change), existing and future water demand will be monitored on an on-going basis.

Mitigation measures specific to the southern aquifer include the following:

- The use of the project abstraction wells at the limestone aquifer beneath the quarry site will include continuous and routine monitoring. Where necessary, abstraction rates will be flexible and adaptable to optimise the yield/future groundwater level relationship at all times; and, further abstraction wells will be installed in the southern aquifer if required; and
- Dewatering (the removal of water) is likely to be required to prevent groundwater flooding within the quarry. The abstraction of groundwater during dewatering will contribute to overall daily groundwater abstraction.

Two alternative groundwater reserves have been identified for further investigation with the potential for supplying additional / alternative water supply. These reserves are known as 'Guveet Ukhaa' (located approximately 20km-28 km north of the project area) and 'Shar Tal' (located approximately 35km-38 km northeast of the project area) aquifers. These aquifers are known to contain notable volumes of groundwater. Groundwater investigations are currently being undertaken in these areas to investigate the potential for the groundwater reserves to supply the project. On-going investigations will be undertaken over a period of 24 months commencing in 2012.

To mitigate impacts to the water receptors in the northern aquifer and to the herders and ecology that use them, one of the following options will be undertaken, which are presented in order of preference. Each option will be investigated thoroughly before deciding in favour of another option:

- 1) Abstract groundwater from the northern aquifer at the proposed rates, understanding that the spring (and potentially other wells and springs) is likely to be impacted, and undertake the following if/when required: implement ecological mitigation measures to mitigate loss of the existing surface water feature created by the spring (see the Ecology section for ecological mitigation measures); provide a replacement water supply to local herders (see Section 7 for mitigation measures for the local population); and investigate the potential for engineering increased aquifer recharge and/or engineering spring discharge;
- 2) Do not abstract groundwater from the northern aquifer, continue the groundwater investigations at the Guveet Ukhaa and Shar Tal alternative aquifers and utilise these as alternative/additional groundwater reserves if suitable (and subject to additional environmental assessment if required). The groundwater investigations at the alternative aquifers will include geological investigations and pumping tests (to determine aquifer yields), and will include a water features study to identify any current users of the aquifers (ecological or human); or
- 3) Do not abstract groundwater from the northern aquifer and undertake detailed investigations and additional environmental impact assessment of potential alternative aquifer(s) outside of the current study area or potential alternative deeper aquifer(s) on-site or in close proximity.

Decisions on the preferred option will be dependent on the results of the further investigations at the northern and southern aquifers, and at the alternative aquifers.

The new village well is being constructed in a different (granite) aquifer to the current village well (currently within the limestone aquifer and may not be used when the new village well is in operation, though will still be available). Although there is limited potential for the new village well to be impacted by the proposed project groundwater abstractions (within the limestone), the new well will be within a lower permeability rock and water quality analysis has not currently been undertaken. Therefore, further testing will be undertaken to ensure the new village well can support the village water demand. Senj Sant LLC will play an active role in ensuring that the following mitigation measures are adopted to ensure that a permanent village water supply of appropriate quantity and quality is provided:

- Aquifer pumping tests will be undertaken at the new village well by appropriate and experienced contractors within 2012 to determine the aquifer properties and to make a full robust assessment on the potential yield of the granite aquifer. At least three monitoring wells will be installed at appropriate monitoring distances as part of the pumping test, and all available existing wells within the area of influence will also be monitored during the tests (e.g. herder wells and the old village well). The water quality (for both mineral content and contaminant content) will also be analysed at a laboratory prior to being made available for consumption and the water quality will be regularly monitored over the lifetime of the project to ensure that it remains suitable for drinking;
- If the aquifer is not suitable to achieve the village water supply, an alternative/complimentary water source will be investigated and provided within or in proximity of the village. Alternative sources that have currently been identified for potential investigation include those discussed above; and
- If the water quality is not suitable for human consumption a treatment/purification system will be provided.

A 10km pipeline is proposed to transport water from the northern aquifer to the cement plant site. This will pass through/close to the location of temporary surface water features and shallow herder wells. There is potential for the pipeline trench to present a preferential pathway for surface water features to drain into and/or shallow groundwater flows to be disrupted. Mitigation measures that Senj Sant LLC will adopt include investigation of groundwater levels along the pipeline route; excavations during the dry season along the pipeline route; temporary trench dewatering during construction; remedial engineering to retain surface water features during construction; and backfilling trenches with similar material to that excavated to prevent creation of artificial permeable pathways. If herders' water supplies are impacted during construction, an alternative temporary source will be provided.

During quarrying, it is likely that there will be groundwater flooding at the base of the quarry. As well as disrupting project activities, there is potential for sediments to get trapped in water in the base of quarry and reduce the water quality. The further investigations described above will provide additional information on the groundwater elevations and the nature of the confined limestone aquifer. Abstraction wells will be installed to dewater (remove water) to prevent groundwater flooding within the quarry. Updated assessments will be undertaken to predict the cumulative effects of abstractions for water supply and dewatering. The abstractions (water supply and for dewatering) within the limestone aquifer are unlikely to affect the village water supply within the granite aquifer. However, regular groundwater monitoring will be undertaken within the village supply well to identify any effects on groundwater levels in this location.

When the decision is finalised on the water resources to be utilised to supply the project water demand, the steps in the land acquisition framework for the project will be followed in detail to identify all specific stakeholders and their specific interests. These stakeholders, specifically herder groups, will be consulted on their use of the water resources in the area such as springs and wells, and the proposed mitigation measures. The mitigation measures will ensure that no difficulties will be encountered in relation to the stakeholders' access and use of water supplies. All actions will be agreed and documented as detailed in the Land Acquisition Framework.

8.4 LANDSCAPE & VISUAL IMPACT

The potential landscape and visual impact of the development has been assessed and this has considered both the construction and operational phases. The cement plant will be visible from Urgun during both the construction (cranes and construction plant) and operational phases (the operating plant). In order to reduce the impact of these changes in views to residents of the village, a series of mitigation measures will be put in place.

Figure 12: Photomontage of proposed cement plant

This includes ensuring that construction is undertaken in as short a timescale as possible, use of hoardings on the cement plant site boundary, good site management minimising land take for building works and storages areas and limiting the use of artificial lighting on the cement plant site. In addition, it is proposed to extend the existing bund located between the site and the village to provide extra screening. It is intended that that the bund and land in its immediate vicinity will also be planted with desert-tolerant trees to further screen the operation of the site from residents of the village.

8.5 ARTIFICIAL LIGHTING

The external lit environment on and in the immediate vicinity of the cement plant and quarry site was assessed as part of the baseline lighting survey, which confirmed that these areas were generally unlit and very dark. Low levels of light were recorded within Urgun.

During construction, temporary artificial lighting will be installed around the contractor's compound and working areas. In order to minimise the temporary effects of artificial lighting on Urgun, specific mitigating measures will be implemented. Overall, this will include ensuring that temporary lighting is well placed and orientated, in accordance with best practice standards.

To minimise the effects of lighting during construction the following measures will be implemented:

- Specified working hours, use of lighting, location of temporary floodlights to be agreed in advance with Urgun Soum council representatives;
- Temporary lighting fixtures to be installed and designed to ensure that artificial light is restricted to the defined area intended to be illuminated;
- Lighting to be switched off when not required unless specifically needed for construction activities or for security and / or health and safety requirements;
- Light fittings to be mounted at a 70 degree angle and directed into the centre of the cement plant site (and quarry site where necessary);
- Poorly sited lights on the boundary of the cement plant site (and quarry site where necessary) are to be avoided; and
- Use of modern lights with appropriate angles and shields to avoid upward light spill.

The measures outlined above will ensure that the effects of light spill, glare and sky glow are effectively mitigated during the construction phase. Overall, it is considered that the impacts of artificial will be limited during construction.

During operations, the lighting will be installed to provide a safe and secure work environment. The Proposed Development will therefore introduce new artificial light sources on the cement plant site. The effects of new artificial lighting will be mitigated by a detailed lighting design, which will take into account the surrounding sensitivities (including neighbouring residential properties) and will be based on the use of low light pollution installations.

To minimise the effects of lighting during the operational phase, the detailed lighting strategy will incorporate measures to ensure:

- Light fixtures to be designed and installed so that artificial light is confined to the defined area intended to be illuminated;
- Light fittings are mounted at a 70 degree angle and directed into the centre of the cement plant site (and quarry site where applicable);
- Lighting to be directed into the cement plant site (and quarry site where applicable);
- Use of modern lights with appropriate angles and shields to avoid upward light spill;
- Lighting to be switched off when not in use unless needed for security and / or health and safety reasons; and
- Implementation of a regular maintenance programme.

Furthermore, the sensitive orientation of new buildings will be considered to provide additional screening for Urgun where feasible.

The adoption of controlled lighting and implementation of an appropriate lighting design in accordance with best international practice will ensure that the potential effects on surrounding sensitive receptors from artificial lighting are minimised.

8.6 ECOLOGY & BIODIVERSITY

The survey area for the ecology and biodiversity assessment included the following areas:

- cement plant site and associated roads;
- the quarry site and associated roads;
- the construction and operational workers accommodation;
- the railway extension;
- the transmission lines to Sainshand corridor; and
- the 10km water pipeline corridor.

The site was surveyed on 14th and 15th May 2012 to identify and map habitat types and notable floral and faunal species, assess potential species diversity and identify features or species of particular value for nature conservation. Following this initial site visit, a survey team of experienced ecologists surveyed the site between the 19th and 23rd of July 2012. The surveys recorded all floral and faunal species present within the site, paying particular attention to those rare and declining species listed within the 'Red Book of Mongolia' (2005), which lists flora and fauna species according to risk of extinction.

During the surveys, several internationally recognised methodologies were followed in order to establish an inventory of mammals, birds and reptiles within the site.

There are several plant species listed as 'rare' in the Mongolian Red Book present in the Dornogobi area. Generally these plants are sparsely distributed and occur in low numbers in the Dornogobi region. None of these species were recorded within the survey area during the May 2012 field survey, (though it should be noted that vegetation was generally short and in many instances species identification was difficult, due to a previously very hot summer and cold winter which delayed the growing season). During the July 2012 survey, a total of five different plant species listed within the Red Book of Mongolia were recorded within the site.

Figure 13: Red Book Species Five-toed pygmy jerboa

A total of eleven rare and notable mammal species are present in the Dornogobi region and whilst none of these species were recorded in the survey area during the May 2012 field survey, it is considered possible that Gobi Jerboa, Goitered or Black-tailed Gazelle, Red Fox, Asiatic Wild Ass, Thick-tailed pygmy Jerboa, Satunin's or five-toed pygmy Jerboa and Mongolian Gazelle may be present within the project area. During the July 2012 surveys a total of nine mammal species listed as rare in the Red Book of Mongolia were recorded within the site, the most notable of which are long-eared hedgehog and five-toed pygmy jerboa (Figure 13).

A total of ten rare and notable bird species are present within the Dornogobi region and it is possible that Lesser kestrel, Houbara bustard and Ground jay could be present within the survey area. A number of bird species were observed during the May 2012 field survey and the only rare bird sighted was a bustard species. A total of twenty bird species listed in the Mongolian Red Book were observed within the survey area during the more detailed July 2012 field survey, the most notable of which are Saker falcon, lesser kestrel, (both of which were recorded nesting along the line of the proposed new power line), and common crane.

During the July 2012 field study, a total of two Red Book of Mongolia reptile species were recorded in the site; these being toad-headed agama and Mongolian racerunner; both of which are relatively common species in Mongolia.

There are two species of invertebrate classified as 'rare' in the Red Book of Mongolia (2005) that could be present in the Dornogobi region. Although based upon known distribution, habitat requirements, the location and the habitats present within the survey area, it is considered that the only rare invertebrate species that could be present in the survey area is likely to be the Scarab beetle.

The project will result in both short and long-term loss of land consisting generally of a mixture of sand and pebble covered hard surface with little vegetation cover and generally low floral species diversity. These habitats are widespread in the Dornogobi region.

Permanent and semi-permanent habitat loss will be avoided where possible or mitigated through the adoption of sensitive design, minimising habitat loss and ensuring, insofar as is practical, that habitat loss and degradation is restricted to habitats of lower ecological value which are less sensitive to change. Specialist advice will be sought to develop a strategy of individual translocations of the five rare plant species recorded within the site. Where translocation isn't considered the most effective mitigation method, a process of storage of top soil during the construction phase will be implemented to preserve the seed bank of the site to allow future restoration of the vegetative structure of the site.

The construction of a conveyor has the potential to represent a barrier to fauna of both commonly occurring and more notable species. Habitat fragmentation arising during the construction will be further emphasised during the operational life of the works with increased noise, visual disturbance and artificial lighting. The effects of fragmentation will be reduced by removing any security fencing at locations where the conveyor crosses existing small valleys / ravines to allow passage of animals beneath the conveyor. Restricting the operational times of conveyor and quarry site to daylight hours will further assist, permitting the movement of nocturnal species and those active at twilight; these species typically being more sensitive to disturbance.

In addition, whilst the overhead power line has the potential to represent a barrier to bird movement in the area, the route of the new power line runs parallel to that of the existing 35kV power line for large sections of its length. Further, the new power line will be of a similar height and as such it is considered that birds in the local area will have become partly habituated to the location of the power lines and avoid them, demonstrated by the fact that both Saker falcon and lesser kestrel were recorded nesting on the poles supporting the existing power line during the July 2012 surveys.

The proposed overhead 110kV power line will be designed and constructed to avoid electrocution or birds. In addition, future monitoring surveys will be undertaken and further mitigation measures will be implemented, where necessary. Along the route of the new overhead power line bird flight diverters will be provided to warn the birds of danger and signal that flight height or direction should be changed, preventing collision of the birds with the power lines.

Immediately prior to the construction phase mammal burrows within the construction footprint (i.e. areas where soil will be disturbed) will be mapped on base maps, and their location will be highlighted 'on the ground' using high visibility tape or paint. Construction activities will be managed to avoid or minimise the impact on identified mammals burrow within the area wherever possible and in particular for infrastructure outside the main cement plant site.

The water demand associated with the development of the site may impact a small spring associated with the northern aquifer approximately 10km north, known as Shuvuun Khuuvur Spring. During both the May and July 2012 survey visits, a small number of Red Book rare bird species were recorded using this water feature including little-ringed

plover and ruddy shelduck. No significant numbers of species of mammals were recorded using this feature, although they are known to be present within the wider area and may therefore use this feature. The loss of this feature may therefore lead to an impact on a number of rarer species. The potential to create an alternative surface water feature will be investigated to offset the loss of the existing spring. This would be located in an area away from the site to prevent the long-term disturbance of species using the new water feature.

Monitoring surveys will be undertaken to evaluate the presence of rare and notable species in the vicinity of the project operations (i.e. cement plant, quarry site, overhead power lines, abstracted wells) and impacted water features (i.e. Shuvuun Khuuvur spring) to cover breeding and migration periods, to ensure that the mitigation measures developed are appropriate. The biodiversity value of the spring feature will also be characterised. If the results of the monitoring surveys are significantly different to the baseline recorded in July 2012, additional mitigation measures will be developed.

A detailed restoration plan will be developed in line with the World Business Council guidelines for the Cement Sustainability Initiative, and will be subject to agreement and approval with Urgun Soum officials. A progressive restoration programme will be adopted enabling the early phases of the quarry to be restored prior to completion of extraction activities elsewhere on the site. A detailed ecological restoration programme will also be developed which will provide an opportunity to monitor, manage, preserve and enhance biodiversity within the local area.

The use of artificial lighting along and around the conveyor will be eliminated to further reduce impacts on species, while lighting within the quarry and cement plant will be designed to minimise light spill into the wider landscape.

8.7 GEOLOGY AND CONTAMINATION

The plant and quarry are to be constructed on undeveloped areas and therefore there is unlikely to be any existing sources of contamination on the site.

During the operation of the cement plant and quarry best practice mitigation measures in line with international guidelines, such as the World Business Council Cement Sustainability Initiative guidelines, will be implemented ensure that any potential impacts relating to the storage and use of hazardous materials on the site are reduced and / or eliminated during both the construction and operational phases. These will include having set construction traffic routes and site access points to minimise the risk of accidents, having appropriate storage areas with concrete surface for hazardous materials and substances, ensuring site staff have environmental awareness training and, having emergency plans in place to ensure that accidents they are dealt with as quickly and as effectively as possible.

Potential impacts including slope stability issues and blasting associated with open cast mining operations will be addressed by preparing and carrying out regular monitoring of the quarry slopes and stockpiles. In addition, blasting procedures will be developed for all personnel involved with explosives (e.g. handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives).

8.8 WASTE MANAGEMENT

The site preparation, earthworks and construction works will result in waste arisings and the need to arrange for final disposal of a proportion to landfill. Wherever possible, excavation and construction waste will be reused on-site or reused/recycled off-site.

Any hazardous waste will be appropriately disposed of in accordance with local and EU requirements. In order to minimise the volume of waste generated, the site operation will adhere to the Waste Hierarchy system, ensuring that contractors adopt good site practice and assign responsibility from the outset to help to minimise waste generation.

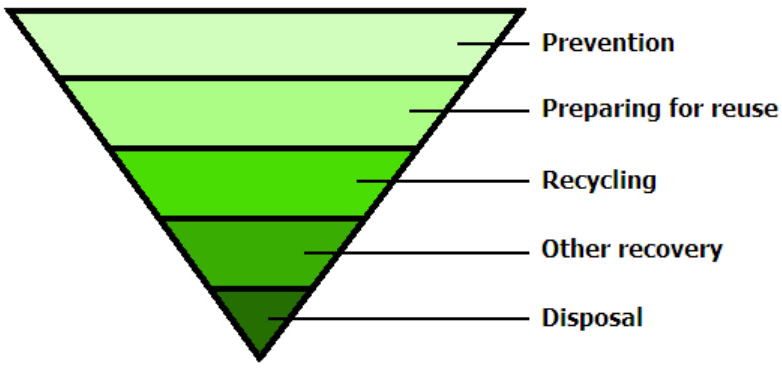

Figure 14: The waste hierarchy

The operation of the cement plant and quarrying operations will generate a range of waste materials that will require management and specific management plans will be developed for both sites in accordance World Business Council

guidelines. The Site will have a waste audit undertaken, set targets and actions for reducing, reusing and recycling their waste streams. The employees of the Site will have access to facilities to enable the separation of recyclable materials, where possible.

8.9 ARCHAEOLOGY

An archaeological desk study was carried out based on information available in the public domain. Available evidence indicates that the Site has been used across multiple historical periods. However, the likely range of archaeological assets which might be present is unclear.

Cultural features are known within the landscape which are of local importance and respected as long term indicators of activity. These features will be retained and appropriate measures implemented to ensure that access is maintained throughout the construction and operational phases of the development.

Figure 15: Cultural Monument

There is considered to be moderate potential for buried archaeological remains from the Prehistoric period onwards to be present on-site. In line with Mongolian legislation Senj Sant LLC will consult with the Institute of Archaeology of the Mongolian Academy of Science to undertake a detailed phased assessment of the potential for archaeological assets in the vicinity of the site. If necessary, the information obtained will inform the development of an appropriate mitigation strategy. An archaeology management plan will be prepared to ensure that appropriate procedures and measures are in place to enable the preservation and / or recording of all artefacts should archaeological assets be encountered during the construction and operational phases.

8.10 TRANSPORT

Traffic movements will increase in the area during the construction and operational phases of the development. The significance of these increases has been minimised via key design decisions for the development which include the construction of the conveyor between the quarry and cement plant, the railway link to the trans-Mongolian railway and road extensions being located to the north of Urgun and not going through the middle of the village.

The majority of incoming materials to the cement plant site will be transported either via the conveyor from the quarry or via the proposed railway line connection which will minimise the amount of vehicles utilising proposed state road from Urgun to Sainshand.

The transportation of raw materials to the site and dispatching cement from the site will be split between the proposed rail connection and the use of trucks. It is anticipated that the cement plant would generate approximately 60 two way truck movements per day. It is forecasted that the quarry will generate minimal vehicular movements beyond the actual quarry site itself.

No significant impacts are anticipated with traffic associated with the proposed development.

9 WILL THE PLANT BE DESIGNED TO THE BEST INTERNATIONAL STANDARDS FOR THE MANAGEMENT OF THESE IMPACTS?

The facility will be designed and constructed in line with the Lafarge Global standards, in terms of environmental, health and safety standards. Lafarge have made a commitment to adopting best international practices as part of the signatory to the World Business Council for Sustainable Development's Cement Sustainability Initiative. The plant will be operated using formalised management systems, in line with international best practice standards for environment, health and safety.

In addition, a review of the proposed cement plant design has been completed to ensure that it meets currently accepted international best practice and Best Available Techniques. Some of the key features of the cement facility that meet the main Best Available Techniques for the design of cement facilities, as defined by European Union and International Finance Corporation Standards are outlined below:

- The cement facility process that is being used is overall the accepted lowest impact production method available;
- It has been demonstrated that the process used will not result in a significant impact in relation to emissions of oxides of nitrogen. Low nitrogen oxide burners will be employed for all the main combustion sources. At the second phase of the project, there will be additional pollution control equipment installed, including installation of a well proven technique called 'selective non catalytic reduction', which involves injection of ammonia solution into the main combustion gas generating processes, in order to decrease oxides of nitrogen. This technique is not considered to be necessary at phase 1 of the project due to low mass of emissions overall and the need for the additional transport and handling of ammonia when this is not required.

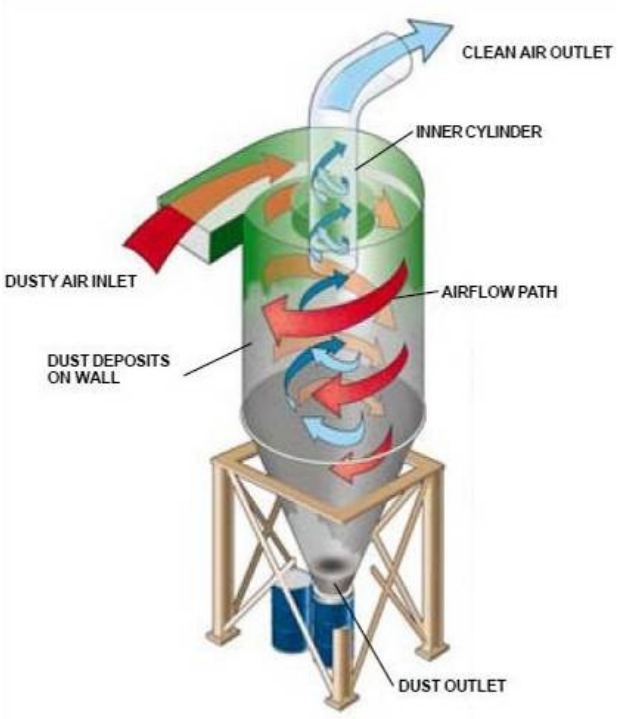

Figure 16: Typical cyclone operation usd to collect particulate matter

- The cement plant will achieve emission levels for sulphur oxide (SOx) which are associated with the best available levels according to international guidance. Low sulphur coal will be used in the coal fired supplementary boiler;
- The conveyors and crusher systems will be covered to prevent fugitive dust emissions;
- Bag filters, which are considered to be the best available technique, will be utilised for a variety of stages within process to control the particulate emissions and the associated bound metal pollutants. A dust emission level of 20mg per cubic metre will be achieved which is aligned with best global standards for these plants;
- The process will operate under negative pressure and therefore should not emit fugitive emissions;
- Cyclones and a bag filter unit are to be utilised during the process to collect particulate matter from clinker cooler exhaust;
- A waste heat recovery system will use the water heat produced by the kiln to produce electricity and increase the overall energy efficiency of the facility;
- Continuous emissions monitoring systems will be in place for particulates and combustions gases for the main emission sources release points along with flow rate, temperature, oxygen and water vapour; and
- The plants proposed water consumption levels are aligned with BAT.

The findings of this review indicate that the design measures proposed for the Urgun Cement Manufacturing Facility will meet the international relevant Best Available Techniques guidelines for the cement sector.

10 GREENHOUSE GAS ASSESSMENT

The emissions of greenhouse gases have been estimated based on the current design. It is estimated that there will be 414,784 tonnes/annum of total carbon dioxide emissions. This equates to 0.87 tonnes of carbon dioxide per tonne of clinker and 0.66 tonnes of carbon dioxide per tonne of cement. This does not include the small level of coal used on site in the supplementary coal fired boiler for the waste heat recovery plant as information is not currently available on coal use in this system.

This number is slightly higher than international averages for cement production. However, this is due to the relatively small size of the plant (1500 tons per day) compared to the international average. Compared to other similar plants the emissions per tonne of clinker are at Best Available Techniques level. Due to a lack of cementitious blending materials (materials that have the same effect as clinker) in Mongolia, the proportion of clinker in the cement also needs to be higher than the international average.

Further search for cementituous blending materials and the increased energy efficiency of stage 2 should reduce the emissions nearer to international averages.

11 ENVIRONMENTAL & SOCIAL MANAGEMENT, MONITORING AND ACTIONS

Senj Sant LLC will complete a series of environmental and social management and monitoring measures and actions in relation to the construction and later operation of the cement plant development project to ensure that mitigation measures are incorporated in to the project design to minimise the effects of the operations and to maximise opportunities associated with the proposals.

These commitments to mitigate effects of development and manage risk to local people and future employees include:

- To develop and implement an Environmental and Health and Safety Management System;
- To implement the Stakeholder Engagement Plan (SEP), including a Grievance Mechanism;
- To implement the Land Acquisition Framework (see section 12);
- To ensure that interaction between the workers camp and Urgun is strictly managed and a ‘code of conduct’ is developed in line with the International Finance Corporation / European Bank for Reconstruction and Development document ‘Workers and Accommodation: Processes and Standards (2009);
- To establish corporate policy and procedures for management of contractor environmental, occupational health and safety, and social performance during construction, operation and maintenance activities;
- To develop a site level employment policy and consider the development of site level labour and social policies;
- To develop and implement a policy on Personal Protective Equipment;
- To incorporate Best Available Techniques requirements in the detailed design;
- For the waste water treatment system to be designed in line with Best Available Techniques and constructed during the early stages of construction;
- To undertake further detailed assessments of the northern aquifer and the limestone aquifer beneath the quarry site, water bodies and wells to ensure that water supplies are sustainable within the area.
- To ensure on-going monitoring of groundwater levels, an assessment of aquifer recharge rates, and routine monitoring of abstraction rates;
- To ensure that access to cultural monuments is maintained throughout the construction and operational phase of the development;

- Avoiding traffic movements during unsocial hours, where possible and providing route directions to vehicles to take lowest impact route to and from the site available;
- To undertake noise monitoring and mapping and aim to reduce noise levels within the production facilities;
- To ensure that all potentially polluting substances are stored on hardstanding, within contained areas and with spill kits being available;
- Reuse top soil on site, where feasible, for landscaping purposes and ensure that landscaping is completed as part of the construction phase;
- Monitor vibrations from foundations construction and monitor any potential for structural damage to the local buildings;
- Prepare and implement an operational service management policy and plan for future operations on the cement plant and quarry sites, taking into account both non-hazardous and hazardous waste;
- Undertake additional biodiversity monitoring surveys, with particular reference to rare and notable species during appropriate survey seasons. Based on findings of monitoring data, where necessary, develop and implement additional mitigation measures;
- Prepare an archaeology management plan to include immediately contacting the Institute of Archaeology of the Mongolian Academy of Science if archaeological assets are encountered; and
- Ensure detailed lighting design is produced and implemented in line with international best practice guidance.

Commitments to maximise opportunities arising from the development include:

- Construction of a new groundwater well located within the village;
- Construction of additional wells in the wider area for local herders;
- To employ as many local people as possible within the cement plant and quarry site and to provide appropriate training schemes to ensure that local villagers have the relevant skills to realise this commitment;
- To source local products, where possible, such as purchasing livestock from local herders; and
- To prepare and implement a detailed quarry rehabilitation plan including a detailed ecological restoration programme to provide the opportunity to monitor, manage, preserve and enhance biodiversity within the local area.

12 STAKEHOLDER ENGAGEMENT PLAN (SEP)

A Stakeholder Engagement Plan has been developed with the objective of identifying key stakeholders and ensuring that, where relevant, they are informed in a timely manner of the potential impacts of projects. The Stakeholder Engagement Plan also identifies a formal grievance mechanism to be used by stakeholders for dealing with complaints, concerns, queries and comments. It will be reviewed and updated on a regular basis. If activities change or new activities relating to stakeholder engagement commence, the Stakeholder Engagement Plan will be brought up to date. The Stakeholder Engagement Plan will also be reviewed periodically during project implementation and updated as necessary. The Stakeholder Engagement Plan includes the following:

- Public consultations and information disclosure requirements;
- Identification of stakeholders and other affected parties;
- Overview of previous engagement activities;
- Stakeholder engagement programme including methods of engagement and resources; and a
- Grievance mechanism.

Stakeholders could be individuals and organisations that may be directly or indirectly affected by the project either in a positive or negative way, who wish to express their views.

A Land Acquisition Framework has also been developed for use by Senj Sant LLC for the project. This document sets out the principles for full consideration of all interested parties in relation to the acquisition, lease and use of land, and includes a framework for the full assessment of these interests and the integration of required controls, potentially including compensatory measures if needed.

13 FURTHER INFORMATION

Contact information for this project is provided below:

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Copies of the Environmental and Social Impact Assessment will be publicly available at the above addresses and the local Urgun Soum council offices.