YEREYMENTAU WIND POWER PLANT, Yereymentau, Kazakhztan

Non - Technical Summary

Final Report

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TABLE OF CONTENT

1 INTRODUCTION

Samruk Green Energy LLP ("SGE") is in process of developing Yereymentau Wind Farm Project (the "Project") south-east of Yereymentau Town, approximately 130 km east of Astana, in Akmola Region, Kazakhstan. The Project will have a capacity of 50 MW.

This Non-Technical Summary ("NTS") presents the main findings of the assessment of the environmental and social impacts performed for the Project, providing an overview of the potential impacts associated with the construction, operation and decommissioning of the Project, and the measures identified to avoid or mitigate potential impacts to acceptable levels.

A pre Environmental Impact Assessment ("pre-EIA" or "pred-OVOS") was completed for the proposed Project in 2011 as part of the national permitting procedure supplemented by additional assessment work performed by an independent consultant and summarised into an Addendum to the pre-EIA, including an Environmental and Social Management Plan ("ESMP").

This NTS is based on the assessment performed as part of above mentioned studies and is part of the Environmental and Social Assessment ("ESIA") disclosure package of the Project.

In addition to this NTS, the ESIA disclosure package also includes the Project pre-EIA (pred-OVOS), the Addendum to the pre-EIA including additional environmental assessment information, an Environmental and Social Action Plan ("ESAP") and a Stakeholder Engagement Plan SEP.

The ESIA disclosure package is made publicly available in hard copy at the Yereymentau Town Hall, and at SGE headquarters at the following address:

Samruk Green Energy, Kabanbai Batyr Ave., 15A, Astana, Republic of Kazakhstan, 010000.

The ESIA disclosure package is also available on SGE website (http://www.samruk-green.kz/) and EBRD website (*www.ebrd.com)*.

There is a mechanism in place to receive and address grievances, questions, comments and suggestions from stakeholders. Any questions, comments or concerns regarding the Yereymentau Wind Farm can be submitted as follows:

by regular mail to:
Samruk-Green Energy" LLP
Mr. Aidan Kasymbekov
010000 Republic of Kazakhstan Astana,
Kabanbai Batyr Ave., 15A, Block B

by e-mail at: info@samruk-green.kz
or *by contacting* the Project Manager at:
Aidan Kasymbekov
Phone : +7 (7172) 682366, 682562, 682371, 682373, 680547.

2 SUMMARY OF THE PROJECT

2.1 SITE SELECTION CRITERIA

The location proposed for the Project (approximately 2 km south-east from Yereymentau Town centre) was considered a feasible location for the Project based on the following criteria:

- availability of public roads for site access;
- railway availability to facilitate equipment shipment to the site;
- availability of 35 kV, 110 kV, and 220 kV overhead power lines which facilitate project connection to the grid; and
- availability of numerous internal roads (dirt tracks) within the site.

The site location is an open steppe landscape, with scattered water bodies, and the closest dwelling to the site located at a distance of approximately 600 m.

2.2 PROJECT DESCRIPTION

The proposed Project is a wind farm at Yereymentau with an installed capacity of approximately 50 MW. The Project will consist of maximum 20 wind turbines, hardstand pads adjacent to each turbine, internal roads, internal electrical grid, an electrical substation including a control building and the grid connection.

The wind farm is planned to be developed south-east of Yereymentau on a site with a total area of 1,242 ha.

The site encompasses hill tops, gently rolling slopes, minor creeks generally flowing towards north. The upper parts and the hills slopes are typical steppe grasslands while the lower parts and the valleys contain patches of forest and hydrophilic vegetation. The wider surrounding area is open steppe with scattered water bodies.

State authorities' approval has been obtained for a layout of 20 wind turbines of 2.5 MW capacity each (turbines type Fuhrlaender FL 2500) based on a Feasibility Study prepared in 2012.

Given the technical progress since preparation of the Feasibility Study, alternative wind turbines may be eventually used for the Project to increase its efficiency.

According to a technical due diligence performed for the Project, the possible configurations may comprise installation of 15, 17 or 20 wind turbines. The exact number of turbines and capacity will depend on the selected manufacturer and turbine type. Rotor diameter varies correspondingly between 103 and 112 m, and the hub height between 80 and 85 m.

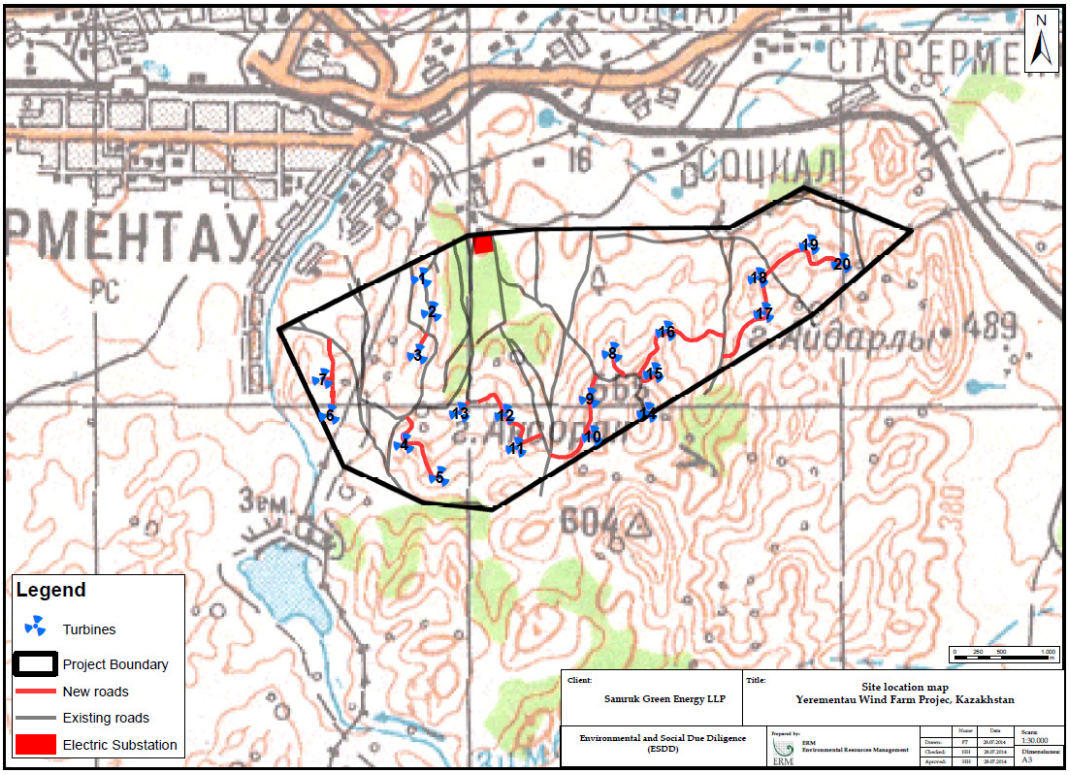

Figure 1 *Site layout map (approved Project configuration shown)*

Crane pads with dimensions of 40 x 35 m (with and without reinforced concrete slabs) will be provided adjacent to each turbine.

It is envisaged to use at the extent possible existing roads within the site. Existing road structure consists of natural pathways/dirt tracks which will have to be enhanced for Project purposes. New road sections will also be needed to ensure access to all turbine locations. The enhanced roads will have a width of 5 m and will be provided with adjacent tranches for storm water drainage.

The internal electrical grid will consist of underground cables. An electrical substation including electrical equipment and a control building with social facilities will be provided at the northern site boundary.

SGE will be the sole owner of the wind farm and after the warranty period will manage, operate and maintain the wind farm.

Start of construction work is expected for April 2016 and would be finalized in 2017.

2.3 CO_2 AVOIDANCE

As a positive effect, the wind farm will result in in significant reduction of greenhouse gas carbon dioxide (CO_2) emissions, by replacing CO_2 emitting power generation facilities. Considering an expected generation of net between 137 and 179 GWh electricity per annum (depending on turbine type), the average CO_2 avoidance will be between 205,500 and 242,000 tonnes per year.

2.4 OTHER WIND FARM PROJECTS IN THE AREA

Two other wind farm projects are located in the area around Yereymentau:

- A 30 – 50 MW wind farm planned at a site located at a distance starting approximately 3.5 km north-west of the Project (the project is in planning stage, construction has not been initiated)
- A 45 MW capacity wind farm project, located approximately 2.5 km west from the Project. The project is developed by SGE's daughter company, First Wind Power Station LLP (ТОО "Первая ветровая электрическая станция)" and is currently under construction.

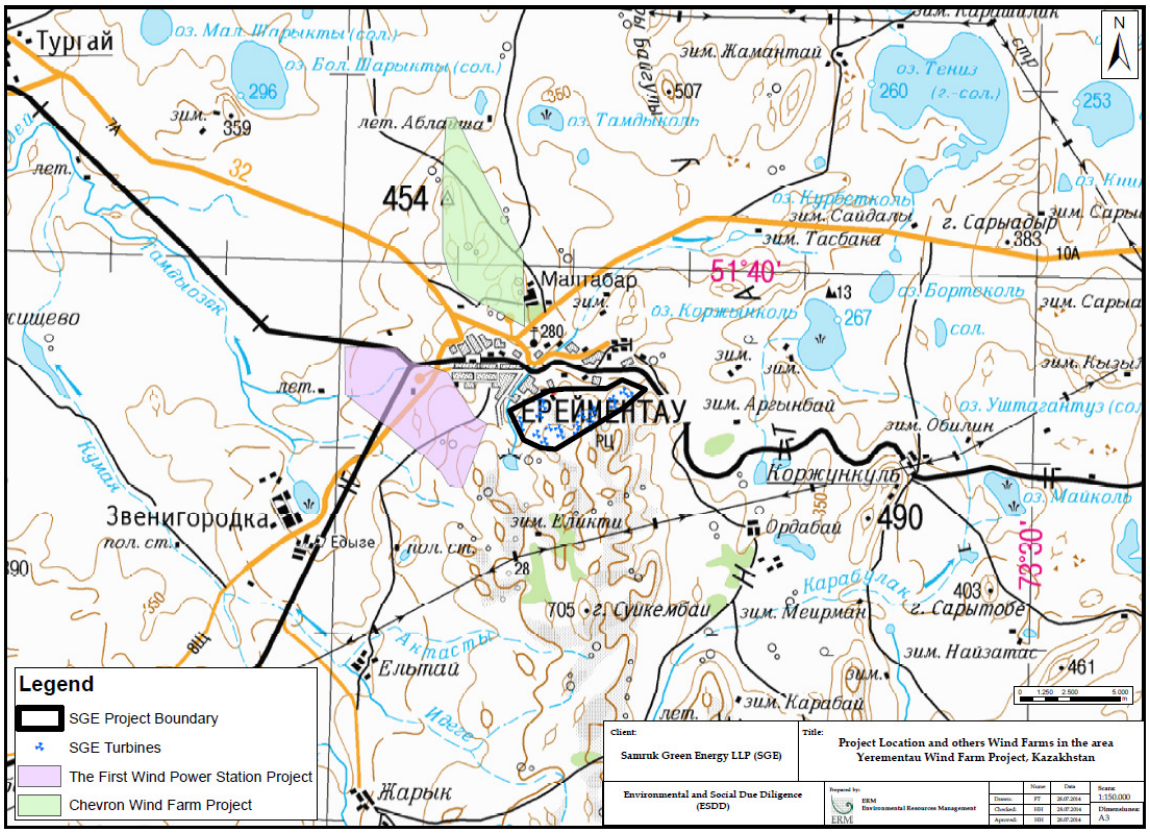

Figure 2 SGE Project and the neighbouring wind farm projects

3 SUMMARY OF IMPACTS AND MIITIGATION MEASURES

3.1 SOIL AND GROUNDWATER

Construction impacts on soil and groundwater will be associated with removal and handling of topsoil, soil compaction, potential spills of fuel and lubricants.

To mitigate impacts the Project will make use at the extent possible of the existing roads in order to minimize land take. Also, best practice soil handling techniques are to be implemented including the following:

- limiting topsoil stripping to the footprint of the turbines, platform and new access roads sections;
- disturbance on slopes and near water will be minimised, anti-erosion measures implemented and cleared land re-vegetated using native species only;
- topsoil will be segregated and separately stored and used for restatement of the disturbed areas at the site at the end of construction stage;
- after construction is finalised the stored soil and topsoil will be used as backfill and for landscaping at the construction site and unoccupied areas will be restored to their initial conditions; and
- surplus soil will be transported and stored at locations indicated by local municipality for further reuse.

Measures to avoid spillages of fuel and lubricants will include

- restriction of equipment and vehicles maintenance refuelling at designated impermeable hard-standing areas with implementation of spills containment and control measures;
- during the night transportation vehicles and construction equipment will be parked on paved surfaces provided with storm water runoff control, at extent possible;
- any oil or fuel spills will be immediately cleaned up, and contaminated area will be remediated and restored; and
- implementation of procedures for emergency/spill response, and for the storage and handling of fuels, construction materials and wastes.

No significant impacts to soil and groundwater are anticipated during the operation phase of the wind farm.

3.2 *SURFACE WATER*

Only small creeks are located in the lowlands on the Project site. Excavation activities will be restricted during periods of intense rainfall to reduce the risk of sediment, oil or chemicals spilled into the natural drainage system. Full reinstatement of creeks disturbed during construction will be implemented.

During operation, the wind farm will have no water demands and no discharges will be made. The hard-standing areas (including new access roads, crane pads and turbines bases), although small in size as compared to the total wind farm site area, will minimally increase impermeable areas, resulting in a small increase in runoff rates. No significant impacts are anticipated either on the run-off rates or on the drainage patterns during the operation of the wind farm.

3.3 *AIR QUALITY*

During the construction period of the wind farm, air emissions will consist of dust generated from construction activities (e.g. land moving) and combustion related emissions from vehicles and construction equipment. These impacts can be mitigated by employing good construction practices including use of well-maintained construction equipment and employing dust abatement measures.

As part of this Project, there will be relatively small areas of ground breaking or land disturbance. Dust control measures will be employed during construction (watering of roads during dry periods, limit construction traffic speed, use of covers on truck loads etc.) and overall no significant adverse impacts are predicted from dust generation.

As combustion emissions from construction traffic will be distributed across the travel route, and are not large in nature, these impacts are not anticipated to impact the air quality in the area.

No relevant negative ambient air impacts are associated with the operation phase of the project. Operational traffic emission impacts are those associated with the limited number of vehicles accessing the site for maintenance or security purposes.

On the contrary, the Project will have an overall positive impact on air quality as the energy produced by the wind farm will replace energy generation from conventional fossil fuel combustion.

3.4 *BIODIVERSITY AND NATURE CONSERVATION*

The understanding of the baseline conditions and subsequent impact assessment is based on the pre-EIA (pred-OVOS) report 2011, the conclusions report for the Project produced by the Kazakhstan Institute of Zoology in 2010, the EIA and field studies for the neighbouring First Wind Power Station (a daughter company of SGE), discussions

with ornithologists undertaking surveys at another wind farm 3.5km north west of the proposed Project, together with consultation with other stakeholders and available desk study data. In addition regional and national data was extracted from the Strategic Environmental Review for the Kazakhstan Renewable Energy Financing Facility (KazREFF) report.

Protected and Designated Areas

The Yereymentau wind farm is within an Important Bird and Biodiversity Area (IBA), the IBA KZ084, *Ereymentau Mountains,* which is predominately an upland site with bare rock, dry steppe and woodland, the latter usually alder dominated associated with natural drainage areas, or lowland coppice dominated by birch.

The IBA network identifies priority sites for conservation, and although many IBAs overlap with nationally or internationally protected areas, the IBA designation itself does not confer any protection on a site. Of 121 IBAs identified in Kazakhstan, 38 are wholly or partly under some form of protection by national law, with 83 sites unprotected [(1)]. The key bird species for which the Ereymentau Mountains IBA has been created are: Saker Falcon (*Falco cherrug*) (IUCN Endangered (EN), Red Book of Kazakhstan) [(2)] , Red-footed Falcon (*Falco vespertinus*) , Lesser Kestrel (*Falco naumanni*), Steppe Eagle (*Aquila nipalensis*) (Red Book of Kazakhstan), Eastern Imperial Eagle (*Aquila heliacal*) (IUCN Vulnerable (VU), Red Book of Kazakhstan), and Pallid Harrier (*Circus macrourus*).

Also the Project lies six kilometres north of the Buiratau National Park, which is designated primarily for steppe and forest ecosystems and has high botanical and fauna biodiversity. This includes 227 species of bird including 13 breeding species that are listed in the Red Book of Kazakhstan.

Overview of Site

The project is situated at the north end of a ridge that runs southwards, and is predominately an area of gentle rolling dry steppe intersected by natural seasonal creeks, some supporting forest and marsh vegetation. The steppe areas are used for livestock grazing and the majority is criss-crossed by livestock paths and access tracks. Data from other sites and literature review indicates high botanical diversity and the likely presence of rare and endemic plant species on hill slopes.

Desk study data indicates up to 41 mammal species could be present although field surveys only found up to twelve species on the First Wind site, including Siberian Roe Deer (*Capreolus pygargus)* and Corsac Fox (*Vulpes corsac)*. No Argali (*Ovis ammon)* (Red

(1) Sklyarenko, S.L., Welch, G.R. and Brombacher, M. eds. (2008) Important Bird Areas in Kazakhstan: Priority Sites for Conservation. ACBK. Almaty.

(2) This NTS reports species only reports the IUCN Red List status of Threatened Species (Vulnerable and above) and species listed in the Red Book of Kazakhstan. The EIA Addendum Report provides IUCN Red List status for all species mentioned.

Book of Kazakhstan) were recorded during the field visits although desk study data indicates they are recorded in the Yereymentau area in some years, moving north from the resident population supported by the Buiratau National Park. Bobak Marmot (*Marmota bobak)* was recorded as abundant. There are records of five species of bat having been recorded in the wider area, although only Parti-coloured Bat (*Vespirtilio murinus)* was recorded in the area.

No reptiles or amphibians were reported although desk study data mentioned two amphibian and four reptile species, including the Meadow Viper (*Vipera ursinii)* (IUCN VU).

Desk study data also indicates the Yereymentau area could support eight Kazakhstan red list insects; however, only two were found during the First Wind Power Station surveys. These were *Onconotus servillei* (a bush cricket) (IUCN VU) and Apollo Butterfly (*Parnassius Apollo)* (IUCN VU), the latter, although IUCN VU is common in Kazakhstan.

The Institute of Zoology concluded in their 2010 report that the Project area does not lie on a recognised migration route. The main bird migration corridors through central eastern Kazakhstan run to the west of the site through the Tengiz-Korgalzhyn depression (approximately 250 km southwest of the Project site) and to the east of the site along Irtysh River (approximately 250 km northeast of the Project site).

Transect surveys at the site of the wind farm planned to the north of Yereymentau recorded 72 species in the spring of 2012, and 21 species in autumn. The most significant species identified were a pair of Eastern Imperial Eagle regularly recorded within the wind farm boundary and thought to be nesting locally. In addition a Pallid Harrier was also thought to be nesting close to the wind farm. Other species of note included a young Golden Eagle (*Aquila chrysaetos),* (Red Book of Kazakhstan) . The most numerous migratory waterfowl recorded from the site were White-fronted Geese (*Anser albifrons),* with a flock crossing the project area at collision risk height on one occasion.

Impact Assessment

Potential impacts arise from direct habitat loss and destruction of flora and fauna during construction, with impacts more likely for less mobile species such as plants and invertebrates. Overall given the small size of the wind farm, its proximity to the main town of Yereymentau with pre-existing disturbance, and the large area of habitat encompassed by the IBA direct loss of habitat is expected to be of minor significance. Loss of rare plants and invertebrates is possible in case they occur on sites affected by construction. Flora and habitats may also be at risk from dust associated with the development or accidental releases of waste.

Eastern Imperial Eagle and Pallid Harrier both nest close to the site of the wind farm planned to the north of Yereymentau, so some potential for disturbance or

displacement during construction is possible. However the IBA supports relatively large breeding populations of both species and the temporary displacement of these nesting territories would not affect the overall population. Due to the small footprint of the site construction and habitat loss, some minor effect on marmot may occur, but is likely to be short term and reversible.

The Project site is used infrequently by Argali and because of existing pressures (proximity to Yereymentau, grazing pressure) is of low suitability. The core area for Argali within the Buiratau National Park will not be affected.

The analysis of impacts using likely pathway of effects indicated that operational impacts were likely to be minor except for potentially increased disturbance through improved access to the area. The main operational risks were associated with collision and displacement associated with turbine operation. This acts primarily on birds and bats.

The site does not lie on any major bird migration routes, and does not support high densities of resident IUCN Threatened or Red Book of Kazakhstan species. Consequently collision impacts with operational turbines, particularly taking into account collision avoidance behaviour1 are unlikely to be a significant issue. Although bats do not form part of the reasons the IBA was designated they are known to be vulnerable to turbine collisions, and literature sources do make reference to bat migration in the Yereymentau area by a limited number of species.

Mitigation

Wherever possible land-take will be minimised, and the existing design uses existing tracks as far as possible. Land will be restored wherever possible to its original state. Good construction practice will be adopted to control dust (e.g. covering of loads on trucks, watering of roads) and waste.

Additional mitigation will be undertaken to:

- undertake check surveys for sensitive flora, fauna and sensitive habitats in relation to the final development layout;
- a survey program to verify predicted bird (IBA breeding species, migratory species) and bat use of the proposed wind farm;
- verification of collision risk prediction; and
- use the results to inform and update the measures adopted in the ESMP through adaptive management.

[1] SNH September 2010. Avoidance Rate Information & Guidance Note

3.5 *LANDSCAPE AND VISUAL IMPACTS*

The Project area is at the northern end of a broad ridge. The site encompasses hill tops at modest elevations (<550m) with gently rolling slopes, intersected by minor streamlines (creeks) generally flowing northwards. Their upstream reaches extend to the hilly peaks and present seasonal flows and limited catchment areas. Surface flows are observed as tree belts in the valley courses, ponds and springs. The upper parts and the hills slopes are typical steppe grasslands while the lower parts and the valleys contain patches of forest and hydrophilic vegetation. The site is located approximately 2 km south-east from the town centre of Yereymentau, with the closest residence to a wind turbine within a distance of approximately 600 m.

The introduction of 15 to 20 wind turbines, overall at maximum height of 140 m to tip and maximum 85 m to hub will contribute to the landscape and visual impacts. These will add man-made elements of considerable scale to the landscape establishing a new landmark feature and a point of reference in views from a wider area.

The project implies a clearly evident and frequent/continuous change in landscape characteristics affecting a larger area. However, the sensitivity of the landscape is not deemed high, as it would be the case for a protected landscape and/ or a landscape widely acknowledged for its quality and value as well as a landscape with distinctive character. For that reason the impact of the Project on the landscape is deemed moderate.

The following measures are proposed to mitigate landscape and visual impacts.

- Removal of vegetation to be minimized;
- Signage to be provided only for health and safety (H&S) purposes on the turbine doors;
- No advertising or brand names will be permitted on the turbines;
- Turbines will be painted in a colour, typically matching the sky (light grey or pale blue) to minimise visual impacts, if not stipulated differently by the Kazakh Aeronautical Authority; and
- Enhancing vegetation or tree planting.

The visual impact on the landscape by wind farms cannot be entirely mitigated. Planting of trees and other vegetation can only mitigate the visual impact to a certain degree and will come into effect only after years. Cumulative impacts resulting from the other wind farms are described below.

3.6 *CULTURAL HERITAGE*

Potential impacts on cultural heritage are related to the construction phase only.

There are no registered cultural heritage objects within the Project site. In Yereymentau District 25 archaeological objects are registered. These include ancient graves, burial mounds, ancient settlements, old fences and a menhir (standing monolith stone/religious object). None of these registered archaeological objects is situated on the site of this Project.

On the neighbouring 45 MW wind farm project site archaeological investigations were performed in May 2013. These investigations identified a kurgan (tumulus) located approximately 4 km west of the westernmost Project turbine location and the remains of a settlement (approximately 4.7 km west of the westernmost Project turbine).

Given the findings of the local government and the neighbouring wind farm, presence of similar cultural heritage objects at the SGE Project site as well cannot be excluded.

To avoid potential impacts on unknown cultural heritage an archaeological field survey should be performed prior to construction works initiation.

According to international best practice, an archaeological field survey is to be performed in the detailed design stage of the Project to confirm that no cultural heritage will occur at the site and in case of any finding, to enable undertaking the actions required by law.

A Chance Finds Procedure is to be developed prior to commencement of earthworks and implemented during the relevant stages of construction. If necessary, a licensed archaeologist may be employed for field supervision of earthworks execution at relevant site locations of potential cultural heritage interest.

3.7 SOCIOECONOMIC IMPACTS

Socioeconomic impacts caused by the project may be associated with the land take required for the Project and associated impacts on livelihoods and local economic activities.

The Project will be developed exclusively on state-owned land. Land acquisition from individuals will not occur and therefore no resettlement or physical displacement of people will be associated with the Project. The Project land is currently used by local residents for open range grazing based on yearly agreements with the localmunicipality.

Given the wide areas available for grazing, the limited land take by the Project (0.72% of the total wind farm area) is not relevant (limited to turbines, new road sections and substation footprint). Grazing will be possible on the Project site undisturbed again after construction. Given the reduced land take, the Project is not considered to pose relevant impacts on land availability. Temporary disturbance of access to grazing land

may however occur due to construction activities extended over a period of approximately one year.

To address this, measures to allow safe access to grazing areas will be identified and implemented in communication with local authorities and the residents.

Pressure on local social infrastructure from the Project during construction stage is not expected given relatively reduced number of construction staff compared to the population of Yereymentau town (25-50 workers vs. 10,000 inhabitants).

The Project will result in certain employment opportunities to local population. These will however most likely be limited to unskilled workforce during construction stage and to security services positions during construction and operation.

A Stakeholder Engagement Plan (SEP) has been defined and will be implemented throughout entire lifecycle of the Project. The SEP is aimed at ensuring a consistent, bidirectional communication between the Project and stakeholders to allow addressing any issues and opportunities in effective manner.

3.8 COMMUNITY HEALTH, SAFETY AND SECURITY

3.8.1 Environmental Noise

Construction activities may result in noise impacts due to equipment operation and vehicle traffic.

Wind turbines also produce noise during operation. Mechanical noise may be generated by equipment in the nacelle and aerodynamic noise emanates from the movement of air around the turbine blades and tower.

The construction activities will take place during day time and construction noise will be temporary. Annoyance due to construction noise may be possible mostly in certain areas in the south-eastern part of Yereymentau, which are located closer to the Project.

Construction trucks traffic is expected to reach a number of approximately ten movements per hour in peak situation conditions. For the construction of a single wind turbine or a group of turbines, the routes will change several times during the entire construction phase which limits the duration of the impact at a given receptor. In these conditions it is expected that the applicable national regulation standards for noise in residential areas will be met.

Significant adverse noise impacts from Project construction are not expected.

In order to assess Project noise impacts during operation, modelling using software specialised for wind projects noise modelling has been employed. The modelling has been performed considering the worst case scenario.

The results of the modelling indicate that during day time, noise levels in residential areas of Yereymentau town will not reach the national standard threshold levels. This indicates that no significant effects from Project operation are expected.

The worst case scenario modelling indicates that during night time the regulatory threshold level will be slightly exceeded at approximate 10 dwellings located in the south-eastern part of Yereymentau. Although actual noise levels at these receptors is expected to be bellow estimated values, the modelling results indicate that noise monitoring is to be performed in this area. In case monitoring performed would indicate noise level above regulatory threshold levels at residential receptors, mitigation measures are to be employed.

Such measures may include the following:

- dimming of rotor speed of closer turbines;
- plantation of trees and shrubs in front of affected buildings; and
- installation of soundproof windows at the affected residential buildings.

3.8.2 Shadow Flicker

Any moving object that comes between a viewer and a light source can cause a flicker effect. Wind turbines, like other tall structures will cast a shadow on the neighbouring area when the sun is visible.

A modelling of shadow flicker was performed to calculate potential impacts on dwellings of Yereymentau using specialised software. The results of shadow flicker modelling provided the area where shadow flicker can be expected and the maximum number of hours this nuisance may last.

The results indicate that in some areas of Yereymentau town shadow flicker can occur due to the Project. However the duration of the effect in these areas is expected to last for less than 30 hours per year, which can be regarded as not significant in line with international guidelines.

Considering these circumstances the effect of shadow flicker due to the Project can be considered as not significant.

3.8.3 *Ice Throw*

Wind farms operating in cold climates may suffer from icing in certain weather conditions and ice accretion can result in 'throwing' of ice from the wind turbines, which may affect public safety.

This is only deemed a problem where there is the possibility of people being near the turbines. The residential houses or other buildings from Yereymentau are located at a distance where ice throw from Project turbines is not relevant.

The land use of the wind farm area is for grazing only. Given that in winter conditions land use for grazing is not possible, there will virtually be no public traffic within project area and therefore community risks associated to ice throw will be negligible.

Precautionary measures applicable to reduce the risk of throw may include providing the turbines with ice sensors and automatic shutdown of turbine in case of ice detection, curtail of wind turbine operations during periods of ice accretion and placing warning signs at certain points at the wind farm site to alert the public of risk.

3.8.4 *Electromagnetic Interference*

Wind turbines could potentially cause electromagnetic interference with aviation radar and telecommunication systems (e.g. microwave, television, and radio).

There are no airports in the project area, therefore risks associated with aviation radar interference are not considered relevant.

Interference to television signals in the wind farm area can be caused by either the reflection or obstruction of the signal by the turbine blades. With glass reinforced plastic blades, modern wind turbine generators will however cause minimal television interference.

Given reduced EMF fields associated with the Project, other potential effects (e.g. on bats, cattle) are not expected.

3.8.5 *Public Access*

The project area is used for open range grazing (mostly cattle) by individual owners and potential access safety issues due to construction works may occur during construction stage. Measures to allow safe access to grazing areas will be identified and implemented in communication with local authorities and residents.

Mitigation employed will comprise clear procedures to be implemented by contractors, including Construction and Traffic Management Planning (within construction site and on public roads) and fit for purpose Emergency Response Planning.

Appropriate public communication to allow timely notice of affected residents before major construction operations or traffic in areas open to public, appropriately trained security service to prevent unauthorized access to project locations, use of hazard notices/signs/barriers to prevent access to dangerous areas are measures also to be employed.

These aspects are addressed in the Project ESMP and considered in the Stakeholder Engagement Plan ("SEP") to be implemented by SGE.

3.9 CUMULATIVE IMPACTS

The Project was assessed in combination with the other two wind farm developments planned in Yereymentau area (cf. Chapter 2.4). Cumulative impacts may arise for biodiversity, noise, shadow and flicker and landscape.

3.9.1 Cumulative Impacts on Biodiversity

As all the three proposed wind farms lie outside the Buiratau National Park no impacts are predicted on this protected area.

Two of the proposed wind farms (the Project and partially the First Wind Power Station project) are located within the IBA Ereymentau Mountains. However cumulatively the total footprint of these wind farms is very small and overall impacts are likely to be low, particularly in relation to habitat, flora and invertebrates.

In relation to the IBA there is some indication that the project located to the North of Yereymentau town may potentially have an impact on a pair of Eastern Imperial Eagle and it is uncertain to what extent this pair or others use all or some of the wind farm areas including the Project. It is estimated that the IBA holds 30-35 pairs of Eastern Imperial Eagle, therefore the loss or displacement of one pair is potentially significant. There is uncertainty about usage of the wind farm airspace in relation to migration routes and the proximity of breeding key IBA species. Given the size of the IBA these risks are likely to be small, however further survey effort is needed in order to confirm this and fully understand cumulative impacts.

There is little information on bat use at any of the proposed wind farms although turbines in open steppe habitat are unlikely to have the same effect as those in mountain ridges, particularly those that are well vegetated. Further survey work would be required if effects on bats are to be fully understood both in isolation and cumulatively.

Good quality data and understanding of the effects of the Project in isolation will improve understanding of cumulative impacts and would allow definition of any mitigation.

3.9.2 *Cumulative Noise Impacts*

Cumulative impacts for noise are possible due to simultaneous operation of the Project and of the First Wind Power Station project. Given the larger distance to the third wind farm planned north of Yereymentau Town, no cumulative noise impacts are expected as result of simultaneous operation of the Project and of this wind farm.

The modelling performed for the worst case scenario indicates only minor cumulative influence on part of the 10 dwellings for which slight exceedance of the regulatory threshold level during night time has been calculated for the Project operating in isolation. As explained earlier, actual noise levels at these receptors is expected to be bellow estimated values but this is to be confirmed through monitoring. Mitigation measures are to be employed in case monitoring results would indicate noise level above regulatory threshold levels at residential receptors.

3.9.3 *Cumulative Impacts Shadow Flicker*

The shadow flicker modelling results for the worst case scenario indicate no cumulative impacts as result of simultaneous operation of the Project and of the First Wind Power Station project located to the west.

Given the larger distance to the third wind farm planned north of Yereymentau Town, no cumulative shadow flicker impacts will occur in relation with this project.

3.9.4 *Cumulative Impacts on Landscape*

The cumulative impact of wind farm development on landscape and visual amenity is a product of:

- distance between individual wind farms (or turbines);
- distance over which they are visible;
- overall character of the landscape and its sensitivity to wind farms;
- siting and design of the wind farms themselves; and
- the way in which the landscape is experienced.

In future, if the planned wind farm projects are realized, Yereymentau Town will be bordered by three wind farm clusters as indicated in Chapter 2.4. Only east of Yereymentau landscape will not be changed.

The effect of having wind farms sited in three geographic directions may be to make the observer feel surrounded by development. Combined visibility occurs where the observer is able to see two or more developments from one viewpoint and this may be the case for this Project from certain viewpoints.

The sensitivity of the landscape is not deemed high, as it would be the case for a landscape which is protected and/ or widely acknowledged for its quality and value as well as for a landscape with distinctive character. However, considering that in future three wind farm clusters will be located in three geographic directions from Yereymentau, the cumulative impact is deemed major due to the magnitude of change.

However, the visual impact on the landscape by wind farms cannot be entirely mitigated. Planting of trees and other vegetation (the steppe climate limits this to the lowlands) can only mitigate the visual impact to a certain degree and will come into effect only after years. Enhancing a combined programme covering the three wind farms for vegetation and tree planting is however recommended.

3.10 IMPACTS DURING DECOMMISSIONING

The projected operational lifetime of a typical wind farm is 25 years. After this period there are two options: repowering the site and replacing existing wind turbines or decommissioning the site, removing the wind turbines and other major structures and reinstating the site.

Prior to decommissioning, a decommissioning method statement, detailing how the site will be restored is usually prepared and approved by the relevant authorities.

At present wind turbines are removed by crane and reused elsewhere if possible. In the case of the foundation works, upper sections are removed and the voids backfilled with appropriate materials to support the land use at that time. Underground cables and deep concrete foundations are usually left in place as removal is likely to cause more disruption than leaving them in-situ. However, if techniques allowing removal of underground cables with limited disruption and impacts will be available at the time of decommissioning these will be appraised and considered. Surface vegetation or soil make-up is also to be restored. As with the turbines the electrical control building and internal equipment is removed and reused or recycled where possible.

Impacts caused by decommissioning activities are in principle comparable with impacts during the construction phase.

4 *ENVIRONMENTAL AND SOCIAL MANAGEMENT*

The assessment performed identified the potential environmental and social impacts associated with the Project and also defined potential mitigation measures to be implemented in order to maintain these impacts within acceptable limits. To facilitate implementation of these mitigation measures, the following tools will be used during project implementation:

- the Environmental and Social Action Plan (ESAP) which represents a roadmap for implementation of key environmental and social actions required for the Project;
- the Environmental and Social Management Plan (ESMP) which is a management tool transposing mitigation identified into actionable measures for implementation by contractors and by the developer during the various stages of the Project; and
- the Stakeholder Engagement Plan (SEP) which defines the means for communication between the Project and its stakeholders including the process for consideration of public feedback during Project lifecycle.

The key elements considered in the ESAP include:

- requirements for ensuring sufficient capabilities to address environmental, occupational health and safety, and social aspects including appropriate procedures and appropriate management of contractors;
- implementation of an occupational health and safety plan guiding all activities on project site during all stages of the Project;
- pollution prevention and abatement measures including implementation of appropriate wastes management plan, dust abatement during construction, erosion control;
- requirements for appropriate community health and safety procedures and enforcement of their implementation by developer and contractors;
- provisions for noise monitoring to identify mitigation needs if applicable;
- provisions for best practice biodiversity surveys during all Project stages to inform considered mitigation and allow update of the ESMP accordingly;
- provisions for prior cultural heritage survey and implementation of chance finds procedure during construction; and
- provisions for SEP implementation and periodic update during project lifetime.

The ESMP provides the actions to be taken for implementing the environmental and social mitigation measures identified in the course of assessment performed. The ESMP is envisaged as a management instrument and some of the considered actions may require additional detailing in the form of procedures for operational implementation

as part of the Project management system. The ESMP also indicates responsibilities for implementation, training needs as well as recommended implementation auditing and control measures.

The SEP identifies key Project stakeholders and provides a framework for meaningful information disclosure and response to stakeholders' feedback. It defines public consultation and information disclosure process to be implemented, resources needed; it provides a mechanism for the public to convey questions, comments and grievances and also defines how the Project will address these.

The SEP refers to all Project stages and will be periodically updated as needed, in response to changes and stakeholders' feedback.