

KfW IPEX Bank GmbH and SEB
Silute Onshore Wind Farm

Environmental Technical Note

October 2014



Report Summary

SgurrEnergy has been appointed by KfW IPEX Bank GmbH as lender's technical adviser for the Silute onshore wind farm located in Lithuania (the Project).




The technical note includes our review of the environmental aspects of the Project with particular regard to the requirements set out within the EU EIA Directive and IFC Performance Standards.



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Amendment Record

Revision Number	Date	Summary of Amendments	Purpose of Revision
A1	5 Sept 2014	Initial draft	Draft issued to Client.
A2	17 Sept 2014	Revised report	Draft, for review.
A3	19 Sept 2014	Minor changes following review.	For approval.
B1	24 Sept 2014	Minor changes clarifying difference between EIA and revised layout.	For Client
B2	6 October 2014	Revised report based on information provided by Nelja.	For Client.
B3	14 October 2014	Revised report following project team meeting in Frankfurt	For Client.

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NOTICE

This document entitled "*Environmental Technical Note*", document number 14/7489/001/GLA/R/001 B3 has been prepared solely for KfW IPEX Bank GmbH and SEB in connection with Silute Onshore Wind Farm. This document in whole or in part may not be used by any person for any purpose other than that specified, without the express written permission of SgurrEnergy.

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1 Environmental and Social Review

The technical note includes SgurrEnergy's review of the environmental aspects of the Project, with particular regard to the requirements set out within the EU EIA Directive and IFC Performance Standards.

1.1 Review Framework

The project has been reviewed against the following requirements:

- Republic of Lithuania Law on Environmental Impact Assessment of the Proposed Economic Activity, 15 August 1996, No. I-1495 (as last amended on 30 June 2008 by No. X-1654).
- Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (as amended) (The 'EIA Directive').
- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.
- Directive 79/409/EEC on the conservation of wild birds (as amended).
- IFC Performance Standards.
- IFC EHS General Guidelines and sector specific guidelines for wind energy.

1.2 Documents Reviewed

SgurrEnergy reviewed the following documents which have been translated into English:

- Report on Environmental Impact Assessment (Chapters 2 – 9).
- Building Permit.
- Bird Study.
- Document 7089-00-TDP-M.Ž-03 providing details of drainage specifications.
- Noise study.
- Design Document - Traffic Infrastructure: Local Roads (Ref. VF-13-62-SPP).
- Ministry of Agriculture Reclamation Certificate.
- Shadow Flicker Study.
- UAB "Šilute vejo Projektai" Detalesiaisiais planais numatyti vejo jėgainių statybos sklypai bei koordinatės (UAB "Šilute Wind Project": Detailed plans of the wind power plant construction plots and coordinates) provided to SgurrEnergy on 18 August 2014.
- OneGE Construction EHS Plan.



- Nelja Energia AS Environmental Management Manual.

2 IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

2.1 Review of Project Environmental Impact Assessment

In accordance with Article 7(6)(2) of Law No. I-1495 (as amended by No. X-1654) together with the EU EIA Directive the developer should consider the likely effect of the project on:

- Flora and fauna.
- Soil and water.
- Air quality and climate.
- Landscape and visual impacts.
- Cultural heritage.
- Public health (health and safety).
- The inter-relationship between all of these factors, i.e. cumulative impacts.

Furthermore, when considering whether the potential impact on the above aspects is likely to be significant, the developer should be cognisant of the environmental sensitivity of the location which is likely to be affected by the proposed activity.

In this regard, the following areas would generally be viewed as being more sensitive to development:

- Protected areas, particularly sites designated at the EU level (Natura 2000).
- Densely populated areas.
- Wetlands.
- Forest areas.
- Areas where the permissible level of pollution has been exceeded.
- Areas with historical, cultural or archaeological significance.

Note that SgurrEnergy has excluded any consideration of air quality and climate as it is generally accepted that wind developments do not result in a significant impact on air quality.

Public health aspects have been bifurcated into the nuisance impacts associated with noise and shadow flicker and the control of general health and safety during construction and operation.



SgurrEnergy has considered each of these aspects during our review; these are detailed in the sections below.

2.1.1 Site Overview

The Project is planned to be constructed on land currently used for agriculture; pastures, hay meadows and farmland dominate the area.

The background noise environment currently experienced is dominated by trees, birds, human activity and wind. A constant level of 40dB has been chosen as being representative of the background noise levels on the site.

A number of watercourses are identified in close proximity to the Project. These watercourses are:

- Leitė River: around 126m from the nearest WTG (no. 28).
- Veižas River: around 737m from the nearest WTG (no. 53).
- Šyša River: around 183m from the nearest WTG (no. 23).

Two Natura 2000 protected areas are located in relatively close proximity to the Project. The boundary of these areas are identified as:

- Nemunas delta: 480m to the west.
- Pleinė marsh: 2.4km to the southeast.

A number of cultural heritage features have been identified in the vicinity of the site. The sites identified consist of three historically valuable Evangelical Lutheran old cemeteries located between 150m and 940m from the closest WTG. There are no registered cultural heritage features identified within the boundary of the Project itself.

SgurrEnergy has been provided with a more recent plan showing a revised layout which provides details of the distances to the nearest residential properties. These distances have been used for the purpose of our assessment and are provided in the table below. As a result, the distances noted in the EIA have been excluded from our assessment.

Figure 2-1: Figure 2-2: Distances between Homesteads and Closest WTG

Residential Property	Distance to nearest WTG (m)
DF1	878
DA1	870
DA2	897
DA3	925



Residential Property	Distance to nearest WTG (m)
DA4	644
DA5	790
DA6	621
DA7	897
DA8	827
DA9	824
DB1	595
DB2	521
DB3	635
DB4	911
DB5	960
DB7	837
DB8	734
DB9	470
DB10	642
DB11	976
DB12	927
DC1	776
DC2	861
DC3	817
DD1	511
DD2	673



Residential Property	Distance to nearest WTG (m)
DD3	800
DD5	887
DD6	947
DD7	977
DE1	746
DE2	515
DE3	666
DE4	649
DE7	675
DE8	906
DE9	756
DE10	876
DE12	736
DE13	760
DE14	816
DE15	1058

The Project is scheduled to be connected to the 330 kV overhead electric line running from Klaipėda to Sovetsk which passes adjacent to the site. A new 30/330kV transformer substation will be constructed to export electric power from the Project to the grid.



2.1.2 Flora and Fauna

2.1.2.1 Protected Areas

The Project site is adjacent to the Nemunas Delta Ramsar and Natura 2000 site. The closest WTG will be 480m from the boundary of the site which is designated due to its year round significant ornithological value; including breeding, migrating (spring and autumn) and winter bird interest. It should be noted however that the core area of the site is somewhat further from the nearest WTG than the boundary.

The Natura site is of international importance for wintering wildfowl and waders and supports up to 200,000 individual birds between March and April; including up to 70% of the global population of Greater White-fronted Goose, 45% of the global population of Northern Pintail, 11% of the European population of Ruff, and 50-60% of the Western European population of wintering Whooper Swans.

A number of the ornithological receptors, for which the site is important, are known to be negatively affected by WTGs through collision and/or displacement impacts (including Cranes, wildfowl, waders and large raptors).

The Pleine Marsh Reserve is located 2.4km from the nearest WTG. This reserve is designated as a Natura 2000 site (Special Area of Conservation (SAC)) due to its important habitats.

Section 5 of EU guidance on wind energy development (http://ec.europa.eu/environment/nature/natura2000/management/docs/Wind_farms.pdf) sets out the relevant considerations for Natura 2000 sites which could be affected by wind energy projects. The relevant considerations based on this EU guidance are as follows:

- An initial determination must be made by the Lithuanian Authorities as to whether an appropriate assessment (AA) is required as set out under Article 6 of the Habitats Directive. If it can be established that there will be no significant effect upon the Natura 2000 site then no AA is required.
- Screening for AA is required for Projects inside or outside a Natura 2000 site if they are likely to have a significant effect on a Natura 2000 site.



There is no requirement under the EU Habitats Directive to undertake a separate assessment and it is perfectly acceptable for Member States to incorporate this under the general EIA process, as is the case in Lithuania. The Client's legal advisor has advised that an AA has been addressed by dialogue between the Sponsor and the relevant Lithuanian authorities. Impacts on Natura 2000 sites have been included in the EIA. The relevant government departments were provided the opportunity to comment following submission of the EIA however no objections were received by the Sponsor. For this reason we are content that the Sponsor has fulfilled its obligations in terms of Appropriate Assessment.

2.1.2.2 General Ecology Comments

Ornithological field work has been completed and reported in the EIA, as well as a separate bird study report. However, it is not clear what other field studies have been completed for other ecological receptors including herpetofauna (reptiles and amphibians), mammals and bats. The latter being discounted in the EIA as not being present within the study area despite the presence of forests which could potentially support bats. There have been no on-site surveys to confirm the sensitivity of the site for bats. Impacts of the proposals on non-avian receptors may be under-assessed due to lack of relevant data derived from field study.

2.1.2.3 Ornithology

The EIA and associated bird reports are quite detailed in terms of potential ornithological value of parts of the Project site. Information is presented regarding the avifauna of the Project and wider area which shows areas of the Project site and the adjacent Nemunas Delta SAC support a high number of Annex I and Lithuanian Red List species.

During preparation of the EIA report the available data has been used as a background for further investigation; this includes state environmental monitoring data, other scientific studies and data compiled during the International 'Wings over Wetlands' project (2007-2009). During this project the entire Nemunas Delta Natura 2000 area and adjacent territories were examined for important bird accumulation areas and migration routes during spring and autumn migrations. The 'Wings over Wetlands' project confirmed that the migrating birds mostly gather in large numbers in the western part of the Natura 2000 area (which is furthest away from the Project). These accumulation areas are well known and observed regularly. The closest significant areas are 4.5 – 5.5 kilometers from nearest WTG however most of the core area is further west from the Project. Furthermore, 14 of the 24 turbines are located at a distance of 15-20 km away from the eastern boundary of the Natura 2000 site.

In addition to the available data, information on the migrating birds has been collected during monitoring:



- Spring 2009 4 transect observations, 4 vantage point observations (March – April 2009)
- Autumn 2010 5 transect observations (September – October 2010) and 11 vantage point observations
- Spring 2011 8 transects (March –May 2011) and 10 vantage point observations

The monitoring included:

- Transects – visiting the whole park and adjacent territories to identify significant accumulations of birds and identification of suitable vantage points.
- Vantage point observations recording time, species, direction and height of flights (4 hours after sunrise and 2 hour before dusk each time)

Predator bird monitoring was carried out in 2009.

The potential impacts on wintering and staging birds have been assessed based on available data and existing land use (heavily modified agricultural land).

Based on the monitoring data, a number of turbines closest to the migration routes have been removed from the project in order to eliminate possible negative impact.

Department of protected areas and Regional environmental departments have been involved into the EIA and gave their approval for its results.

Although the building permit has been granted for a 40 WTG development, based on the results of the surveys the decision has been taken by the Sponsor to reduce the Project from 40 to 24 WTGs which further minimizes the potential environmental impact of the Project.

Based on the level of data SgurrEnergy has been provided with, it is known that:

- The site is close to the East Atlantic Flyway and is close to a Natura 2000 and Ramsar site.
- Some Annex I and Annex II species are present within the Project area.
- At risk species and those of conservation concern (including those listed on Natura 2000 citation) were recorded within the survey area. At risk species are large, slow flying, soaring bird species such as storks, cranes, herons and allies (similar species) and raptors or species which occur in or in the vicinity of the Project in large concentrations (wildfowl (ducks, swans and geese)).
- The EIA together with the additional survey reports concludes no negative impact on the Natura 2000 site. This view would appear to be consistent with the operational impacts reported at the Ciuteliai wind park located further north.



2.1.2.4 Terrestrial ecology

A desk study was completed to produce a list of possible faunal species present on the site. With the exception of an unknown assemblage of bats it is not thought, by the authors of the EIA, that other species of conservation concern occur on the site. However we would still recommend that the land is managed to discourage use by mammal species or ground nesting birds.

2.1.2.5 Recommendations

It is understood that the Sponsor does not intend to undertake any further pre-construction ornithological surveys. As a consequence of this, our recommendations are as follows:

- **Terrestrial ecology:** It is recognised that the site is currently utilised for agriculture and as a result the sensitivity is likely to be low. However we would recommend that the land is managed to discourage use by mammal species or ground nesting birds. We would recommend that the land on which the tracks and WTG bases will be located is turned over prior to the start of the bird breeding season to render the land unsuitable for such species.
- **Bats:** We would recommend a three stage approach to bat mitigation. Firstly we would recommend on-site monitoring during the construction phase using an Anabat detector or similar to determine the level of use and the species present on site. If the level of bat activity on site is determined to be significant, or if no on-site surveys have been undertaken, then the first mitigation approach should be to maintain an area of clearfell of at least 50m between blade tip and the nearest area of forestry. Should the above mitigation not be sufficient, a WTG cut-in wind speed of 5.5m/s should be implemented between April and August inclusive commencing 20 minutes before dusk and continuing until 2 hours after dusk and then again from 2 hours before dawn to 20 minutes after dawn.
- **Birds:** for financial model input purposes, 2.5% curtailment across all WTGs in all day-light hours over the course of a year (2.5% allows, for example, WTGs adjacent to the Natura 2000 site to be subject to more curtailment whilst other WTGs (further away from Natura 2000) may not be subject to as much curtailment). The 2.5% figure is based on our experience and could go up or down based on operational monitoring results.
- **Conduct detailed bird and bat monitoring during the operations phase** (for at least the first year of operation but ideally for longer) including carcass searches as set out in the Operational Monitoring Protocol at Appendix A.



- Conduct operational monitoring and, on the basis of its results, design a tailored mitigation plan if there is found to be any adverse impact on birds and/or bats. The mitigation would focus on the targeted shutdown of specific turbine(s) during specific times of the day/year.

2.1.3 Soil and water

The superficial deposits in the wind farm area generally consist of glaciofluvial sediments. The general low lying nature of the surrounding area coupled with the intensive agriculture result in superficial geology which is not deemed to be particularly sensitive to wind farm development.

It has been reported that there is a large amount of surface water featured in the planned project site with a dense network of water channels. The distance from the planned area to Nemunas delta Rusnė River is around 4.8km. The distance to the Curonian Lagoon is around 16km to 18km.

As noted above, the closest larger surface waters are between 126m and 763m from the nearest WTG.. Given the distances between the watercourses and the Project site, a suitable buffer is available to minimise run-off from the project site to nearby watercourses. However appropriate pollution prevention measures should still be in place to minimise the risk of pollution, in particular to smaller ditches and drainage channels which discharge into the main watercourses. Further comment has been provided in Section 3.2.

2.1.4 Landscape and visual impacts

The Project is located in a landscape character type of sandy plain characterised by open spaces with full overview, with some areas of semi-open spaces, but which may be overviewed for the most part. The spatial structure of the landscape is expressed only by the vertical dominants. As a result, the addition of a wind farm into that landscape type has the potential to alter its character; however, the EIA does not appear to formally assess the impact of changes to landscape character.

The assessment has focused on the impacts on the landscape character but has omitted any consideration of the visual impacts on individual receptors and settlements. However, the reduced scheme goes some way to addressing previous concerns regarding the impacts on landscape character and residential amenity.

Given that the visual impacts have not been quantified, SgurrEnergy recommend that the Sponsor place an emphasis on ensuring that the local population benefit from the Project as far as possible. Further comment is provided in Section 2.1.9.

2.1.5 Cultural heritage

Possible effect on immovable cultural values caused by implementation of wind power plants are:



- Their direct destruction or damage as a result of construction works.
- Indirect effects on the setting of cultural heritage features as a result of the change to the landscape due to WTGs.

A number of sites of cultural heritage are located in the vicinity of the site. The sites closest to the WTGs are:

- Historically important graveyard of Evangelic Lutherans (24336) (940m and on the opposite side of the Sysa River from WTG 22).
- Graveyard of Evangelic Lutherans (24327) (150m from WTG 11).
- Graveyard of Evangelic Lutherans (24314) (450m from WTG 5).
- Site assumed to be graveyard of Evangelic Lutherans (24317) (365m from WTG 4).

In addition to the sites listed above, Section 4.5 of the EIA lists a number of additional sites of cultural heritage interest in the locality of the Project; these are:

In Juknaičiai eldership:

- a) Sacred hill of Juknaičiai (M149).

In Žemaičių Naumiestis eldership:

- b) Žemaičių Naumiestis mound called the Green Hill (A1721).
- c) Mound of Juodžiai and Šeputaičiai together with the settlement (A513KP).
- d) Venckai mound with settlement (A515KP).
- e) Užsustis graveyard, called Ruskalva (A514P).
- f) Graveyard of Žemaičių Naumiestis.

It is not clear from the EIA how far sites (b) to (f) are from the closest WTG. However based on the revised layout it is unlikely that those areas will be impacted by the new layout.

2.1.5.1 Measures to reduce effect on cultural heritage

According to the official paper No (12.12) SSKI-64 issued by Klaipėda territorial division of Department of Cultural Heritage under the Ministry of Culture there are no sites of cultural heritage value registered within the boundaries of the Project. The Registry of Immovable Objects of Cultural Heritage confirms that there are no known objects of cultural heritage within the boundaries of plots planned for construction.

It is noted in the EIA Report that the Project will be situated in a territory which has been transformed anthropogenically and used for agricultural activity, which does not contain registered archaeological values. As a result, SgurrEnergy agrees that the direct impacts are not likely to be significant.



However, there is still the potential to reveal unregistered archaeological features and objects – chance finds – during construction works. This has been recognised in the EIA therefore there is a commitment that excavation works will require archaeological supervision. SgurrEnergy recommends that this commitment is reiterated in an action plan.

2.1.6 Health and Safety

Occupational and community health and safety aspects are discussed in Sections 3.1 and 3.3 respectively.

2.1.7 Noise and Shadow Flicker

2.1.7.1 Operational Noise

The revised noise assessment undertaken in support of the Project was in accordance with the 2011 Lithuanian Noise Guidelines referenced in the ESIA in that, should operational noise complaints be received, these will be addressed during operations. In the event of such a complaint we would request that the World Health Organisation's noise guidelines¹ be used by the Sponsor as guidance. SgurrEnergy has provided this document to the Client.

The IFC Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Environmental sets out operational noise limits of 55dB(A) and 45dB(A) for daytime and night time respectively.

Furthermore WHO Night Noise Guidelines² for Europe recommend a night time noise limit of 40dB.

Under the 2011 Lithuanian noise guidelines (HN 33: 2011) referenced in the ESIA and additional study, the condition to be met for noise is 45dB at the nearest noise sensitive receptors. The Sponsor demonstrates that this level specified in the 2011 Lithuanian guidance is met.

Curtailment of the WTGs due to noise is therefore not required for the updated WTG layout and candidate WTG in accordance with the 2007 Lithuanian guidelines.

It is noted in the ESIA Noise chapter 5.3 that noise monitoring is required. The proposed monitoring plan and methodology should be provided for review.

¹ http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf

² http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf



SgurrEnergy was provided with revised noise modelling results which shows that with the new layout, noise levels would not exceed 45dB(A) as required under HN33 2011 and IFC EHS Guidelines. We note that the project will not meet the more stringent WHO limits for Europe however there is no legal requirement to meet those limits.

2.1.7.2 Shadow Flicker

SgurrEnergy has reviewed the separate shadow flicker report provided by the Sponsor. WindPro (version 2.6.1.252) software was used to model the potential instances of shadow flicker in homesteads and a number of hours of a shadow flicker effect per year and per day. It is recognised that the software will calculate a worst case scenario. However, SgurrEnergy would generally correct the astronomical worst case with a realistic number of sunshine hours per year to gain a more realistic prediction of shadow flicker effects.

It is recognised in the EIA that curtailment would be required to reduce the predicted shadow flicker to an appropriate level; in this case a maximum of 30 hours per year or 30 minutes per day has been used. This is an acceptable standard to use.

As noted previously, the layout has changed significantly and as a result we would expect the shadow flicker impact to have reduced accordingly. The Sponsor has confirmed that a revised assessment will be undertaken to confirm whether the incidences of shadow flicker would be below the agreed standard or whether mitigation would be required. We would recommend that the shadow flicker zone for consideration is an area 130° either side of north at a distance of up to 10 times the rotor diameter.

2.1.8 Cumulative impacts

Under the requirements of the EIA Directive and given the proximity of the Project to nearby Natura 2000 sites it is important that all projects are developed within the 'carrying capacity' of the local environment. In this case, the maximum allowable impact on the qualifying features of the Natura 2000 sites should not be exceeded.

In order to comply with the requirements of the EU EIA Directive SgurrEnergy recommends that sites which are operational, consented and not built, or subject to a valid planning application at the time of application be identified.

There are a number of other wind farm projects in Lithuania although none within 25km of the Silute site. For this reason we do not believe that there is likely to be the potential for cumulative impacts in relation to noise, shadow flicker or landscape and visual impacts. Cumulative impacts would be primarily related to the impacts on bird and bat species associated with the nearby designated sites.

Following the construction of the Ciuteliai wind park (17 WTGs) carcass search monitoring is being undertaken for the first three years of operation. During the 2013 monitoring eight bird carcasses (all species) have been found with a further four carcasses reported in 2012. Note that SgurrEnergy has been provided with a list of



species killed. Based on the reported data on collision rates and composition of species we are of the opinion that no species of conservation concern have been impacted and the site has not impacted on the qualifying features of the Natura 2000 area.

Furthermore five carcasses of *Pipistrellus nathusi* have been found during the same survey period – note that this species is widespread in Central and Eastern Europe and has an IUCN conservation status of Least Concern. After relevant adjustments (seasonal, predators, amount of turbines etc) it was established that both bird and bat collision rates are below the rates predicted by the relevant scientific studies. Therefore, based on the information provided by Nelja, there would not appear to be a significant contribution of impacts from other wind farm developments in the area and, as a result, there is not likely to be a significant cumulative impact.

2.1.9 Community Benefits

SgurrEnergy has been informed by the Sponsor by e-mail of 1 October 2014 that the Sponsor has in place a voluntary scheme, where it donates €0.32 from every MWh produced. These funds are transferred to a separate account in the municipality and can be used for social and environmental projects of nearby communities. The decisions are taken by a board where municipality, local communities and donor are represented. A signed agreement has been in place from the end of 2011.

Furthermore the Sponsor has been involved in a number of activities supporting the elderly and children from socially vulnerable families outside of this agreement.

SgurrEnergy undertook a separate energy yield study on behalf of the Sponsor which calculated an energy yield for the project of 237.1GWh/annum. This would equate to an annual payment of €75,872 per annum or €1,264.53 per installed MW.

We would recommend continued engagement with the municipality and local communities to ensure that the community benefit programme meets the expectations of all parties concerned.

We recommend that this information is incorporated into a Stakeholder Engagement Plan as described in Section 2.2 below.

2.2 Environmental and Social Management

IFC PS 1 has a specific requirement to develop a site-specific Environmental and Social Management Plan (ESMP). Our suggested approach to environmental and social management is to develop an environmental and social management system (ESMS) which is documented in an ESMP. We would suggest the following approach:

- Identify an effective corporate management structure and include details of roles and responsibilities.
- Identify the environmental and social baseline conditions.
- Identify legal and other requirements.



- Create an environmental and social policy, and set targets and objectives.
- Identify initial training needs.
- Prepare an ESMP which includes the above points.
- Implement the ESMS.
- Review the ESMS.

SgurrEnergy has been provided with the group level Environmental Management Manual (EMM) which will also apply to the Sponsor. Furthermore, SgurrEnergy has been advised that as GE will be the main contractor responsible for over 80% of works on site as well as maintenance of WTGs for further 15 years of operation (SPV does not have any personnel and basically is never on site), the GE EHS manual would be the most relevant document for the purposes of environmental management on site.

In our opinion this is an acceptable approach to environmental management during construction and operation.

However SgurrEnergy would recommend that the group EMM is adapted to be specific for the project and in particular it would be useful if the EMM provided details of the hierarchy of environmental management plans together with roles and responsibilities of personnel that will apply to the project. If no personnel have yet been appointed then job titles would be sufficient at this stage.

We would suggest that, wherever practical, a revised EMM makes reference to the relevant GE environmental management plans and procedures to be followed rather than developing anything new if it is not necessary.

We would request that the project specific mitigation measures proposed in the EIA are transposed into the revised EMM for the project.

We would recommend that the EMM is updated prior to the commencement of construction works on site. To maintain consistency of terminology with IFC PSs we would recommend the revised EMM is referred to as a Project ESMP.

Furthermore, in order to comply with the IFC's requirements regarding stakeholder engagement and disclosure of information we would recommend that the Sponsor develop and implement an approved Stakeholder Engagement Plan (SEP), including regular (at a minimum annual) feedback to local stakeholders on the implementation of agreed environmental and social mitigation measures related to impacts that could affect them. Records of any grievances raised should be kept and associated responses provided.



We would recommend that a qualified Environmental manager is appointed to report directly to site manager who would have responsibility for implementing the Project ESMP. The Environmental Manager should have independent reporting lines to corporate management. This role may be delegated to owner's engineer or main contractor, with oversight by the Sponsor.

3 Review against Performance Standards 2 – 8

3.1 PS2: Labour and Working Conditions

The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN). In summary the objectives of PS 2 are to:

- Promote the fair treatment, non-discrimination, and equal opportunity of workers.
- Establish, maintain, and improve the worker-management relationship.
- Promote compliance with national employment and labour laws.
- Protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- Promote safe and healthy working conditions, and the health of workers.
- Avoid the use of forced labour

The first step in demonstrating compliance with PS2 is to adopt and implement human resources policies and procedures, appropriate to the size of workforce that set out the approach to managing workers consistent with the requirements of the PS and national law. Workers should be provided with documented information (a "Staff Handbook") that is clear and understandable, regarding their rights under national labour and employment law and any applicable collective agreements, including their rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.

SgurrEnergy recommends that a staff handbook is developed for the Sponsor and agreed prior to works commencing on site. We note that there is currently one person employed by the Sponsor but we would expect more to be appointed prior to construction. If suitable Nelja group documentation is available then we would recommend that this be used by the Sponsor.

A suitable occupational health and safety plan(s) should be developed and implemented prior to the commencement of construction. The plan should provide the mechanism for implementing appropriate health and safety measures on site during the construction and operational phases. We would recommend that GE's EHS documentation be used



as the guiding document during construction.

A workers grievance mechanism should also be in place prior to the commencement of construction. The grievance mechanism should provide the opportunity for workers (and their organizations, where they exist) to raise workplace concerns. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for anonymous complaints to be raised and addressed.

3.2 PS3: Pollution Prevention and Abatement

The Sponsor has a responsibility to avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release during construction and operation of the Project. SgurrEnergy would expect those aspects to have been identified in the EIA Report and developed further in the ESMS/ESMP. For a development of this type we would expect the main sources of pollution to be due to inappropriate waste management practises, spillages of fuel and oil together with sediment run-off from areas of excavated ground during periods of heavy rainfall.

SgurrEnergy note that Section 8.32 of the GE Construction EMP provides specific requirements in terms of waste management. These are:

- GE and Contractor personnel shall ensure that the site has suitable facilities to manage waste in compliance with local regulations and the requirements of the Environmental Plan included in this EHS Plan. This will require them to:
 - Ensure adequate waste collection receptacles (bins/dumpsters) are available around the site, and that they are regularly emptied to prevent the uncontrolled accumulation of waste materials.
 - Ensure hazardous wastes are segregated and hazardous waste is managed.
 - Ensure all waste is disposed of using licensed waste management companies.
 - Where facilities are locally available for recycling, require segregation into waste streams that can be recycled.
 - Where this is possible, provide separate waste containers (bins/dumpsters) for each waste stream.
 - Ensure all waste containers are labelled in languages persons on site can understand, so materials will be placed in the correct container.



- Ensure waste management areas have an impervious floor, or other means of containment to prevent any release to the environment.

Section 7 of the GE Construction EMP identifies the following scenarios as high hazards on a typical site:

- Major water releases.
- Major ground spills.
- Historical pollution.

The general measures for addressing each of those scenarios are included in the GE EMP.

It is the opinion of SgurrEnergy that the GE EMP contains the relevant information that we would expect for a project of this scale. However SgurrEnergy recommends that the EMM is updated as described in Section 3.2 above to make specific reference to GE's management procedures and, prior to the commencement of construction we would recommend that site-specific measures are incorporated into the Project ESMP, for example details/plans of areas identified for waste and fuel storage.

We would recommend that a qualified on-site Occupational Health and Safety manager is appointed to report directly to site manager, with independent reporting lines to corporate management. This role may be delegated to owner's engineer or main contractor, with oversight by the Sponsor.

3.3 PS4: Community Health, Safety and Security

There is limited consideration in the EIA of the Project's impacts on community health, safety and security. The focus is primarily on identifying the main socio-economic indicators in the locality and it is noted in Chapter 4.6.10 of the EIA that the main measure to reduce the negative effect on public health would be to use WTGs that meet EU standards for safety and to implement a shutdown procedure to reduce shadow flicker.

In accordance with best practice as set out in IFC PS 4, it is recognized that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.

It is our opinion that the general provisions contained in the GE Construction EMP will provide adequate protection for local communities during project construction and operation. However this EMP should be reviewed and revised as appropriate to include any site-specific requirements.



3.4 PS5: Land Acquisition and Involuntary Resettlement

Based on the information provided for review, we do not believe that any landowners were moved under a compulsory purchase order, or similar procedure, to make way for the Project. This has been verbally confirmed by the Sponsor at the meeting on 9 October in the KfW-IPEX office in Frankfurt. However we would recommend that a register is maintained of all landowners together with a summary of compensation agree. Note that we would not expect this document to be made available to anyone outside the Sponsor and Lenders.

3.5 PS6: Biodiversity Conservation and Sustainable Natural Resource Management

All aspects related to this PS have been discussed in Section 2.1.2 above.

3.6 PS7: Indigenous Peoples

Given that there are no identified indigenous peoples identified in Lithuania that we are aware of this PS is not applicable to the Project.

3.7 PS8: Cultural Heritage

All aspects related to this PS have been discussed in Section 2.1.5 above.

4 Summary of Compliance with IFC E&S Performance Standards

Error! Reference source not found. provides a summary of the Project's current compliance against PS 1 broken down in accordance with significant environmental aspects while Table 5 2 provides a summary of compliance against the remaining PSs.

This table is intended to serve as a gap analysis between what has been undertaken in terms of meeting Lithuanian law and what additional work would be required to meet the IFC Performance Standards.

To comply with the IFC Performance Standards we would recommend that the actions identified below are incorporated into an Action Plan.



Table 4-1: Project Action Plan to Maintain Compliance with IFC Performance Standards

Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
PS1: Social and Environmental Assessment and Management Systems:				
1.1	Provide a supplementary assessment document following any significant changes to the Project design.	Sponsor's own resources	As required	Submission of supplementary information
1.2	Implement all mitigation measures specified within the EIA and additional supporting documentation.	Sponsor's own resources	During construction and operation	Bi-annual report to Lenders
1.3	Develop and implement a site specific environmental and social management plan (ESMP) during pre-construction, construction and operations phases. It is acceptable to develop the plans currently available and make reference to other plans and procedures where applicable. The ESMP should also be reviewed and revised as appropriate based on the timescales specified therein.	Sponsor's own resources	Prior to commencement of construction phase.	Bi-annual reports confirming project compliance with the ESMP and underlying management plans.
1.4	Verify, monitor and ensure implementation of contractors environmental	Sponsor's own	During	Bi-annual report



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
	and social obligations in accordance with Nelja's (and/or Sponsor's) HSE policy	resources	construction works.	to Lenders
1.5	Appoint and maintain a qualified on-site Occupational Health and Safety manager to report directly to site manager, with independent reporting lines to corporate management. During construction, this may be delegated to owner's engineer or main contractor, with oversight by the Sponsor.	Sponsor, but may be delegated to main contractor.	Prior to commencement of construction	Designated person throughout construction and operation
1.6	Appoint and maintain qualified Environmental manager to report directly to site manager, with independent reporting lines to corporate management. During construction, this may be delegated to owner's engineer or main contractor, with oversight by the Sponsor.	Sponsor, but may be delegated to main contractor.	Prior to commencement of construction	Designated person throughout construction and operation
1.7	Facilitate and permit the Creditor's Engineer to undertake periodic external monitoring of key EHS issues as outlined in this ESAP and the EIA documentation.	Sponsor's own resources	Monitor: at least quarterly during construction and annually during the first three years of	Creditor's Engineer EHS monitoring reports



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
			operations, until cessation is agreed with the Lenders	
1.8	<p>Develop and implement an approved Stakeholder Engagement Plan (SEP), including regular (at a minimum annual) feedback to local stakeholders on the implementation of agreed environmental and social mitigation measures related to impacts that could affect them. Keep records of any grievances raised and associated responses provided.</p> <p>Update the Stakeholder list periodically during project implementation.</p>	Sponsor's own resources	Throughout construction and operation	<p>Submission for review and approval by the Lenders.</p> <p>Annual Monitoring Report to Lenders to include stakeholder engagement and resolution of grievances</p>
1.9	Implement a grievance mechanism which includes public consultation and disclosure of the processes and procedures together with feedback of the grievances raised and how they were addressed.	Sponsor's own resources	Prior to construction	Public information, and inclusion in bi-



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
				annual Monitoring Report to Creditors on the operation of grievance procedures
1.10	Communication of time schedule of the Project and the location of construction traffic through different media.	Sponsor's own resources	Prior to construction	Information channels (news, websites, local announcements, information offices)
PS2: Labour and Working Conditions				
2.1	Develop and implement a suitable occupational health and safety plan(s) which should be implemented prior to the commencement of construction. It is acceptable to refer to either Nelja or GE plan(s) with the incorporation of any relevant site-specific requirements.	Sponsor although it would be acceptable to implement to	Contractor plan: No more than five working days after it is	Submission of contractor OHS plan(s) and approval by Sponsor OHS manager



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
	<p>Requirements to include (but not be limited to):</p> <ul style="list-style-type: none"> • Job- and task-specific hazard analysis and controls for Sponsor's activities • PPE provided, use of PPE required, and enforced • Safety training for all personnel in their language • Review and approval of contractors OHS plans, to meet same standards as Sponsor's ESMP • Oversight of contractor OHS implementation, including mandatory reporting • The OHS Plan should be reviewed and revised as appropriate 	<p>same terms and conditions (T&C) as contained within Nelja's own T&Cs.</p>	<p>produced by the Contractor as per its contract.</p>	<p>Annual Monitoring Report to Creditors to include OHS issues, including accident statistics and training (by JWPC and contractor workforces)</p>
2.2	<p>Develop a "Staff Handbook" for the Sponsor's staff that is clear and understandable, regarding their rights under national labour and employment law and any applicable collective agreements, including their rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.</p>	<p>Sponsor although it would be acceptable to implement to same terms and conditions (T&C) as contained within Nelja's</p>	<p>Prior to construction</p>	<p>Submission for review and approval by the Lenders of HR Policy and Procedures</p>



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
		own T&Cs.		
2.3	Prepare and implement a workers grievance mechanism prior to the commencement of construction. This should include the Sponsor and all contactors.	Sponsor's own resources.	Prior to construction.	Submission for review and approval by the Lenders. Bi-annual Report to Lenders to include information on worker grievances.
2.4	If applicable, build and maintain construction camps that are appropriate for their locations and that meet the requirements of IFC PS 2	Sponsor, but may be delegated to main contractor.	At all times construction camps are occupied	Compliance audits. Annual Monitoring Report to Lenders to include an update on this topic
PS3: Pollution Prevention and Abatement				



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
3.1	<p>Develop and implement site-specific pollution prevention measures and incorporated into the ESMP discussed above.</p> <p>It is recommended that those aspects be in place prior to the commencement of construction.</p> <p>Although measures have been included in the GE EMP (and that plan should be referred to) we would recommend that site-specific measures are in place as appropriate.</p>	Sponsor's own resources, although may be delegated to main contractor.	Prior to commencement of construction	Submission for review and approval by the Lenders of ESMP and reporting as part of bi-annual report to Lenders
PS4: Community Health, Safety and Security				
4.1	<p>Develop a Community H&S management plan, including where applicable:</p> <ul style="list-style-type: none"> • Infrastructure and equipment safety; • Hazardous materials safety; • Exposure to disease; • Security measures. <p>. Although measures have been included in the GE EMP (and that plan should be referred to) we would recommend that site-specific measures are in place as appropriate.</p>	Sponsor's own resources, although may be delegated to main contractor.	Prior to construction	Community H&S Plan. Bi-annual report to Lenders to include an update on this topic
	Develop and implement procedures to protect public health and safety, to	Sponsor's own	Prior to the commencement	Submission of traffic plan to the



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
	include (but not be limited to): <ul style="list-style-type: none"> • Traffic management plan for all drivers and equipment operators (speed limits, training, etc.) • Public notice of blasting operations near areas open to the public • Security to prevent unauthorized access to project sites, with appropriate training for guards. • Notice to local authorities and nearby residents during construction of transmission line and then during operations • Hazard signs/ notices in the languages of the area on power pylons/poles 	resources, although may be delegated to main contractor.	t of major construction works Throughout construction and maintenance operations	Lenders with first EHS report Bi-annual report to Lenders to include traffic management, security, other activities, including any incidents
4.3	Undertake noise monitoring during operation to confirm that noise levels meet limits specified under HN:2011	Sponsor's own resources	Within 6 months of operation.	Report to Lenders
4.4	Revise shadow flicker calculations based on current layout. Implement mitigation if necessary. Consider impact of shadow flicker curtailment on energy yield.	Sponsor's own resources	By end of December 2014.	Shadow flicker report to Lenders. Operational impacts and mitigation



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
				reported in bi-annual report to Lenders.
4.5	Develop and implement community grievance mechanism.	Sponsor's own resources	Prior to construction	Bi-annual report to Lenders
PS5: Land Acquisition and Involuntary Resettlement				
5.1	Maintain a register on agreement reached with each relevant landowner whose land has been used for the Project.	Sponsor's own resources	constant	Bi-annual report to Lenders
PS6: Biodiversity Conservation and Sustainable Natural Resource Management				
6.1	Implement Operations Phase Bird Monitoring Protocol. This should include: <ul style="list-style-type: none"> • Summer bird surveys (i.e. 12 hours per VP per month). • Spring / Autumn Migration & Staging surveys (Spring migration and staging from end of February to mid-May. Autumn migration and staging from mid-August to the end of October). • Winter bird surveys (12 hours per VP per month in November, December, January and February) • Breeding birds (transects completed once in mid-March, twice in 	Sponsor's own resources.	Immediately on commencement of the operational phase.	Bi-annual report to Lenders



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
	April and May and once in mid-June) <ul style="list-style-type: none"> Carcass searching for birds and bats 			
6.2	If equipment is available, undertake bat surveys during construction phase. Surveys should be 2 nights per month (including dusk/dawn) during April – August. Results of survey may reduce requirement for further mitigation.	Sponsor's own resources	Apr-Aug 2015	Separate bat monitoring report to Lenders.
6.3	In the absence of survey data, or should surveys reveal site is medium risk or above with respect to bats, implement bat mitigation measure of maintaining area of at least 50m clearfell between WTG blade tip and woodland/forestry edge.	Sponsor's own resources	Clearfell during construction then maintenance throughout operation	Bi-annual report to Lender
6.4	Should clearfell mitigation not be sufficient, implement a cut-in speed of 5.5m/s during the periods specified in Section 2.1.2.5.	Sponsor's own resources	During operation	Bi-annual report to Lenders
6.5	Manage the site to discourage ground nesting birds or mammals from using project area by turning over the ground prior to the start of bird breeding season.	Sponsor's own resources, although requirement may be	Early spring 2015	Bi-annual report to Lenders



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
		delegated to GE or to landowner.		
6.6	Monitor bird and bat mortality on site and along transmission line corridor. In case of excessive mortality, develop and implement bird/bat protection plan.	Sponsor's own resources	During operation	Bi-annual report to Lenders
PS7: Indigenous Peoples				
Not applicable				
PS8: Cultural Heritage				
8.1	Archaeological supervision during the initial clearance and topsoil stripping phase of construction works i.e. archaeological watching brief.	Sponsor's own resources although task may be delegated to GE with Sponsor maintaining	During initial construction activity.	First report to Lenders following completion of construction works.



Action	Overview of requirements	Responsibility	Timetable	Target and Evaluation Criteria
		overall responsibility.		



4.1 Environmental and Social Conclusions

Although the project meets the requirements of the Lithuanian planning and EIA system it is considered that further work is required in order for the Project to comply with international best practice lending standards.

It is noted that the Sponsor does not intend to carry out further, pre-construction baseline surveys which would bring the assessment up to international best practice lending standards. Consequently, the recommendations made at Sections 2.1.2.5 and 2.1.7.1 have been made as an alternative to reduce project risk. These recommendations include the full implementation of the operational bird and bat monitoring protocol at Appendix A.

Please note that SgurrEnergy are aware that there are be discrepancies between the distances to residential properties reported in the EIA and the most up to date layout. We have based all our assessment on the current 24 WTG layout.

We have been provided with examples EMPs from both Nelja and GE and we recommend that those documents be used as a basis for a site specific management system to address any gaps in relation to general environmental management, labour and working conditions and community health and safety.

Furthermore we recommend that continued consultation is undertaken with local communities to ensure the community benefits programme adequately offsets any impact of the development.



Appendix A: Operations Phase Bird Monitoring Protocol

5 Operational Monitoring Protocol

5.1 Ornithology

The proposed wind farm is on the East Atlantic Migration Flyway and is also adjacent to a Natura 2000/Ramsar/Important Bird Area (IBA) which is designated for its importance for migrating and staging water birds; including geese, ducks and swans. The designated site is also important at other times of the year including during the winter when it supports important numbers of Tufted Duck and White-tailed Eagle.

Operational monitoring should be completed for at least the first full year of operation of the wind farm with the results being used to inform an ongoing operational monitoring plan and to further inform mitigation measures.

The following are required:

- i) Monitoring programme should comply with local and EU legislation together with international best practise as set out in the IFC Performance Standards and take cognisance of the specifics of the site and be approved by relevant authorities
- ii) Mitigation measures, if required, should be based on monitoring data, species affected and nature of effects etc and should be approved by both relevant authorities and Lenders,

Should during the first year of monitoring an adverse impact on birds be found, a mitigation plan should be developed which will, *intel alia*, consider an observer led WTG shut down programme. WTG shut down will be initiated for single (or more) birds that are observed flying in to or towards operational WTGs (*i.e.* within the 500m buffer and dependant on shut down time). WTG shut down will be enacted by the observers communicating to the control room when birds (species of conservation concern irrespective of number and or flocks of over ten individuals of any at risk species) are observed flying toward WTGs. Individual or groups of WTGs or total wind farm shut down will be completed depending on the number of birds observed and flight direction.

Qualified ornithologists will lead the observer led shut down procedure to ensure that all at risk flights during operation of the wind farm will not result in collision of species of conservation concern.

Key points regarding observer led shut down:

- Species of conservation concern are all species listed on the IUCN Red List as Vulnerable, Endangered or Critical, all species included on Annex I of the EU Birds Directive or those included as Red Data Book Species in Lithuania.



- At risk species are large, soaring birds (raptors, storks, cranes) as well as wildfowl (swans, geese and ducks) and wading bird species which may move through the site in large numbers.
- At risk flights are birds recorded flying in the direction of the operational WTGs from ground level up to 200m.

WTG shut down will not be enacted for passerine species, irrespective of their conservation status.

Monitoring shall be completed for all daylight hours during spring and autumn migration/staging between one hour before sunrise until one hour after sunset to account for possible movements of swans and geese to and from roosting and feeding grounds. This protocol shall be reviewed on all flight data. Hours of observation will be reduced during other times of the year; however, this will be subject to continual review based on the results of the monitoring and carcass searching.

5.2 Monitoring Protocol

The exact number of vantage points (VPs) is yet to be determined but the whole of the wind farm and 500m buffer must be observed during these surveys.

The following protocol will be completed for the first year of operation.

5.2.1 Summer

A total of 12 hours VP survey will be completed at each of the selected VPs during June, July and in the first two weeks of August (*i.e.* 12 hours per VP per month).

5.2.1.1 Spring / Autumn Migration & Staging

Spring migration and staging is considered to be from the end of February to mid-May (end date needs to be flexible depending on weather conditions and associated bird movements). Autumn migration and staging is considered to be from mid-August to the end of October (end date needs to be flexible).

Surveyors need to be present on VPs for all daylight hours on all days of the week and this will be extended to include pre-dusk and pre-dawn surveys if staging swans and geese are noted within the vicinity of the site (*i.e.* in the Ramsar site).

All birds seen will be recorded in accordance with the agreed methodology and the data will be subject to a collision risk assessment.



5.2.1.2 Winter

Monitoring will be completed for 12 hours per VP per month in November, December, January and February. These surveys will be completed to determine the level of bird activity over the winter period and the results used to inform the need for and frequency of any observer led WTG shut down during this period. In addition to VP surveys, winter activity surveys will also be completed to record aggregations and distribution of any birds occurring within the wind farm site during the winter.

Vantage Point Survey Methods

VPs will be selected that allow a satisfactory viewshed across the entire wind farm area, including a 500m buffer around WTGs.

All at risk bird species of conservation concern (a target list shall be devised in consultation with in-country ornithologists) thought to be susceptible to the potential presence of a wind farm will be recorded during the VP surveys.

All species observed flying through the wind farm area (including buffer) will be recorded on to a field map together with the following information:

- Species.
- Age and sex (if known).
- Time of registration.
- Direction of flight.
- Flight height (to be recorded in 25 m bands).
- Time spent in the wind farm area (seconds).
- Notes on behaviour.

5.2.1.3 Breeding Bird Surveys

In addition to the VP surveys, breeding bird surveys should be completed in the first year of operation and will be completed along agreed transects which will be selected to be representative of the breeding bird habitats on the site. The breeding bird transects will be completed once in mid-March, twice in April and May and once in mid-June, early in the morning by the ornithologists employed to complete the spring migration monitoring.



5.3 Carcass Searching

5.3.1 Introduction

Carcass searching should be completed for at least the first year of operation and the need for and extent of any additional monitoring will be determined on the results of this survey. This will involve regular searching underneath the operational WTGs and all carcasses (bat and bird) will be recorded.

The primary objective of the carcasses searches is to estimate the annual number of avian and bat fatalities attributable to the Project. The standardised fatality monitoring phase of the study will begin once all the WTGs are constructed and operational. The methods are broken into four primary components:

- 1) Standardized carcass searches.
- 2) An incidental casualty and injured bird reporting system.
- 3) Searcher efficiency trials.
- 4) Carcass removal trials.

The number of avian and bat fatalities attributable to collision with the wind WTGs will be estimated based on the number of avian and bat fatalities found in the casualty search plots whose death appears related to collision with these structures. All carcasses located within areas surveyed, regardless of species, will be recorded and a cause of death determined, if possible, based on inspection of the carcass. Some carcasses may be necropsied to aid in determining cause of death. Total number of avian and bat carcasses will be estimated by adjusting for "removal bias" (e.g. scavenging), searcher efficiency bias, and sampling effort. Carcasses where the cause of death is not apparent will be included in the fatality estimate. Including fatalities when cause of death is unknown will lead to an overestimate of the true number of wind project fatalities.

5.3.1.1 Definitions and Field Methods

All operational wind WTGs will be subject to carcass searching. The plot size will be 130m x 130m, with each plot centred on a WTG and the sides orientated north/south, east/west. The corners of each plot will be marked with stakes protruding 1m from the ground and marked with fluorescent tape / paint. Additional markers (bamboo canes), also marked with fluorescent tape, will be stuck into the ground at intervals during the transecting. Compass and GPS are also to be used to allow surveyors to follow transects as precisely as possible.

The plot will be covered with search transects 10 m apart, with the searcher looking 5 m on either side. Depending on the terrain each plot requires 1.5 to 2.5 hours search time.



5.3.1.2 Scheduling/Timing

Carcass searches will be conducted approximately once every week at each operational WTG from March to November. Monitoring will continue over the winter period however at less intensity (dependent on the results of the field surveys and scavenger removal trials).

The first search will be conducted within 30 days after the date all WTGs become operational (commercially producing electricity) to clear the plots of evidence of old carcasses and document fatalities that may have occurred during the testing and early operational phase. The frequency of carcass searching will be informed by the results of the scavenger removal trials.

5.3.1.3 Standardised Carcass Searches

Personnel trained in proper search techniques will conduct the carcass searches. Initially, transects will be set approximately 10m apart in the area to be searched. A searcher will walk at a rate of approximately 45m to 60m a minute along each transect searching both sides of the transect out to five metres for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial.

The condition of each carcass found will be recorded using the following condition categories:

- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass, which shows signs of being fed upon by a predator or
- Scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.).
- Feather Spot - 10 or more feathers or two or more primaries at one location indicating predation or scavenging.

All carcasses found will be labelled with a unique number, bagged and frozen for future reference. A copy of the data sheet for each carcass will be maintained, bagged and frozen with the carcass at all times. For all casualties found, data recorded will include species, sex and age when possible, date and time collected, GPS location, condition (e.g., intact, scavenged, feather spot), and any comments that may indicate cause of death.

All casualties located will be photographed as found and mapped on a detailed map of the study area showing the location of the wind WTGs and associated facilities such as access roads and meteorological towers.



5.3.1.4 Casual Observations

Casualties or fatalities found by maintenance personnel and others not conducting the formal searches within 150m of a wind WTG, meteorological tower, substation or road will be documented using a reporting form which should be kept in all on-site vehicles.

When non-study personnel discover carcasses or injured animals, a digital photograph will be taken and the site manager informed who will inform the projects ecologist.

Casualties or fatalities found in non-search areas will be treated as incidental discoveries.

Fatalities found within search areas, but not during scheduled searches, will be included in the fatality estimation.

Any injured native birds found will be carefully captured by a trained technician and transported to the designated wildlife rehabilitation centre or veterinary clinic in a timely fashion.

5.3.1.5 Searcher Efficiency and Carcass Removal Trials

Searcher efficiency will be estimated by size of carcass, general habitat type, and season. Estimates of searcher efficiency will be used to adjust the number of carcasses found, correcting for detection bias. Searcher efficiency trials will begin when WTGs are placed into operation.

Searcher efficiency and carcass removal trials will be carried out in similar habitat to the wind farm area however the WTG areas will be avoided to reduce any attraction of vultures and buzzards to the wind farm area. An area approximately 1km outside the wind farm area will be chosen that is similar in altitude, topography and vegetation height to the WTG area. Three plots of the same size as those searched in the wind farm will be marked out in similar manner.

During each trial approximately 15 carcasses of birds of two different size classes will be placed in the search area throughout the search period. Species such as chickens (including dark coloured chicks) and pigeons will be used.

An attempt will be made to use several small brown birds (house sparrows if possible) during the summer and fall seasons to simulate bat carcasses. Bat carcasses will be used if available. All carcasses will be placed at random locations within areas being searched prior to the carcass search on the same day. Carcasses will be dropped from waist height and each trial carcass will be discreetly marked so that it can be identified as a study carcass after it is found. The number and location of the detection carcasses found during the carcass search will be recorded.



Trials will take place in late March, mid-June, late September and January and carcasses will be checked for a period of 20 days to determine removal rates. The carcass locations will be checked every day for the first four days, and then on day seven, day 10, day 14, and day 20. The state of each carcass will be noted (intact/ part scavenged / completely scavenged / missing) and signs and presence of scavengers noted. The proposed schedule may vary depending on weather and coordination with the other survey work. On completion of the scavenger removal trials the frequency of carcass searches may be modified.

6 Bats

6.1 Baseline Surveys

To date no results of bat monitoring have been reported. Further bat surveys should be completed broadly in line with Eurobats guidance.

Driven bat transect surveys will be completed during the first year of operation and this will be supplemented by data from static bat detectors which will need to be incorporated in to 25% of the operational WTGs. This will include microphones being placed in the nacelle of the WTGs during construction so recordings can be made at bat flight height when the WTGs are operational. Transect surveys will be completed from a vehicle driving at approximately 10km/h and bats will be detected using specialist bat detectors with all calls being recorded. Transects will be selected to cover all areas of representative habitat across the site.

6.2 Mitigation

At present a default mitigation measure will be implemented which aims to discourage bats from foraging near to WTGs. Mitigation will incorporate the maintenance of a 50m buffer between the blade tip and nearest area of woodland or forest edge.

Should further mitigation be necessary this will be enforced by increasing the cut-in wind speed of all WTGs to 5.5m/s during the bat active season (April to September) between 20 minutes before dusk to two hours after and two hours before dawn to 20 minutes after. This measure will reduce the possible collision risk to bats as above this wind speed they have reduced flight activity.

6.3 Carcass Searching

Carcass searching (see Ornithological Monitoring) will be completed with any bat carcasses also being recorded. Targeted mitigation will be considered at specific WTGs if the carcass searches indicate a particular high impact WTG or cluster of WTGs. A 'High Impact' WTG is considered to be one at which a high proportion of carcasses are found when compared to the wind farm area as a whole.



Further mitigation and monitoring for subsequent years will be informed using the results of the surveys and carcass searches.

