

Response to Haida/Rescan Comments on NaiKun Offshore Wind Energy Project Environmental Assessment Application

FINAL REPORT (*Reformatted*)

Version B.1
(Project #1021-001)

September 29, 2009

Prepared For:

Council of the Haida Nation
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Prepared By:



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1.0 INTRODUCTION

The Council of Haida Nation (**CHN**) retained Rescan Environmental Services Ltd. (**Rescan**) to undertake a 3rd Party review of the proposed marine windfarm plan as put forth by NaiKun Wind Development Inc. (**Naikun**). This document provides Rescan comments/questions and subsequent responses to the comments, as provided by NaiKun Wind Development Inc. (**Naikun**). The base document for this process was the *Application for an Environmental Assessment Certificate for the NaiKun Offshore Wind Energy Project; Volumes 1 and 2*. When we initiated this Project in March 2009 we were dealing with Version 1 of the Application (dated March, 2009). In May Rescan was provided with Version 2 of the Application (dated May, 2009).

Comments and responses are structured in an iterative format as per the subsequent chapters of this document, with NaiKun specialist consultants (led by Hemmera) responding to comments in their respective areas of expertise.

The process involved the following steps:

1. Rescan specialists reviewed sections of the Application for an Environmental Assessment Certificate, as identified as “high priority” by the CHN. These comments are presented in the accompanying tables as “**Rescan Comments/Recommendation**”. The comments were reviewed and edited by the CHN as needed.
2. Rescan comments were provided to Naikun (represented by Hemmera and their respective specialists and sub-consultants); their responses are presented in the accompanying sections under the heading of “**Naikun Response**”.
3. A final round of discussion between the paired specialists ensued (i.e., in a series of conference calls) and the results/comments (prepared by Rescan) are then presented as: “**Rescan’s Final Comments / Recommendation**”.
4. In some disciplines, a closing review was conducted by the CHN and additional comments/edits provided and added to the final comments (**Rescan’s Final Comments / Recommendation**) included in #3 above.

Note that in some cases the 3rd round of discussion was not required, thus only the first 2 steps are presented.

Also note that Rescan was asked to compare the Terms of Reference for the project with the Table of Concordance, as provided in the original version of the Application. Comments noted under "Compliance with Terms of Reference" by Rescan were addressed during the screening period and forwarded to the EAO for inclusion in the initial Application/Screening review in April, 2009.

Further, this final document was submitted to the EAO on 10 July, 2009 to ensure it was considered in the final project assessment.

If further information is required in respect to this document, please contact the Rescan Project Manager: Dave Archibald at email: darchibald@rescan.com

2.0 MARINE WIND AND WAVE ENVIRONMENT

Relevant Section of Application	Section 5: Marine Wind and Wave Environment
Rescan Specialist	Dan Jarratt, P. Eng
NaiKun Specialist	RPS Energy
Company	Hemmera

2.1 COMPLIANCE WITH ToR

Rescan Comment:

Requirements of the TOR have been addressed in the Environmental Assessment

NaiKun Response (included in Annotated Concordance Table):

No additional comment.

2.2 RESPONSE TO DETAILED COMMENTS – METEOROLOGY (*WIND*)

Comment #: 1

Topic/Discipline: Marine Wind and Wave Environment

Issue or Concern: monitoring the change in wind speed as a result of the wind farm physical infrastructure should be undertaken.

Application Page: 5-15 (Table 5-2)

Rescan Comments/Recommendations: The mitigation/monitoring plan "M1" at the bottom of the table indicates that wave height will be monitored; in the chapter it also indicated that wind speed and direction will also be monitored downwind of the wind farm at the same frequency. Accordingly, the Mitigation Details should indicate that both will be done. Also there is no legend (or footnotes) for the table to allow the reader to understand the numbers that are used for the "Residual Environmental Effects Characterization."

NaiKun Response: The observation is correct; both wind and wave height will be monitored. This correction will be made to the mitigation details.

3.0 MARINE PHYSICAL

Relevant Section of Application Sections 5 & 6: Project Design
Rescan Specialist Dr. Paul Greisman
NaiKun Specialist Heiner Josenhans
Company

3.1 COMPLIANCE WITH TOR

Rescan Comment:

1. 3.6.1 Physical Hypotheses p28 and p29 of TOR document:

Hypothesis #1 through # 6 Changes to the wave climate and changes to sediment transport regimes during construction, operation and decommissioning. Of these hypotheses, it is the effects during operation (hypotheses #2 and #5) that would have the most significant effects (due at least to duration) on wave climate and sediment transport. These hypotheses must be tested with site specific modelling supported by wave, current and preferably sediment transport measurements for calibration if wind inputs are used. The question of the degree of modification of the local wind regime which will be affected by the turbines, needs also to be addressed and, if significant, the model wind fields should be refined.

I have not examined the biological hypotheses.

Rescan Comment:

Data Review and Collection (5.3 p48) has not been rigorously undertaken as far as I can tell. I could not find references to the extensive work done by DFO and MEDS (Marine Environmental Data Service) on wave data collection, wind driven and tidal circulation. In particular I did not find an explanation of the sediment dynamics which formed and maintain Rose Spit, that is nourishment of the beaches by littoral transport of sediment. There will be some effect on the littoral transport due to installation of the turbine towers, the question to be addressed is the magnitude of the effect.

NaiKun Response (included in Annotated Concordance Table):

NaiKun retained RPS Energy who have worldwide expertise offshore windfarms projects to review all available literature, and metocean data and information available on Dogfish Banks seafloor. As well as experts in the regional geology were retained (i.e. Heiner Josenhans). This review has been documented and there are citations to these reviews in the Application (Volume 3).

The sediment dynamics at Rose-Spit are very well documented (including Barrie and Conway 1996. Geological Society of London Special Publication, Evolution of Nearshore and Coastal Macrotidal Sand Transport Queen Charlotte Islands Canada; v.117,p. 233-427) and this literature was reviewed and reflected in Volume 3 and the effects assessments in Volume 1, section 6. It is evident that the sediment dynamics at Rose Spit and the Windfarm Area are very different. Rose Spit is located North of 54 degrees 10 minutes latitude whereas the windfarm northern limit is 54 degrees latitude; a separation of at least 20km between the windfarm structures and Rose Spit. These are different geomorphic areas when it comes to coastal interaction and sediment supply. The Windfarm is on the bank top and is offshore in an area dominated by longshore transport and does not interact with the coastline. Rose Spit and its adjacent offshore submarine extension is at the confluence of Hecate Strait and Dixon Entrance and is

intimately related to the longshore coastal processes, specifically coastal erosion. This spit is at the northern end of Dogfish Bank where water depth increases from less than 10-15m to great than >100m.

A discussion of the sediment dynamics is provided in Volume 3, sections 3.4 and 3.5.

NaiKun have acknowledged that there will be a local effect of the foundations and towers on local wind, waves and sediment transports near the towers. However, this effect on sediment transport is not expected to extend from one turbine tower to another nor from the wind farm to the shoreline of Graham Island.

The assessment in section 5 identifies that there will be local effects on wind and wave around turbine foundations but that these effects are not expected to extend from one turbine foundation to another, nor from the wind farm to the shoreline. This assessment is based on experience at other offshore wind farms, and the well documented geomorphic processes of Dogfish Banks.

The degree to which the shoreline of Graham Island will be affected is addressed in the assessment. This assessment is based on a strong literature specific to Dogfish Banks that indicates that sediment on which the shoreline features of Graham Island depend is a product of longshore transport and not transport of sediment from the wind farm area to the shoreline. Evidence collected (and reported in the Application) by NaiKun is consistent with this view.

Consideration has been given to using wind and wave data that NaiKun would collect as part of the operational monitoring of the wind farm at turbines and the offshore converter station for the purpose of assessing long term trends in physical processes on Dogfish Banks, with particular reference to the effects of climate change on this important coastal feature. This consideration would be consistent with the commitment by NaiKun to adaptive management and collaboration with other stakeholders in the area. Indeed the significant data base that will accumulate for winds and waves would afford a unique opportunity for researchers, stakeholders and NaiKun to advance the basis for multi-stakeholder management of the area. This consideration has not been advanced at this time because consultation on the aspect with stakeholders has not occurred and commitments cannot be made without such consultation.

NaiKun would welcome input that would further their understanding of the effect of the project on the littoral transport due to installation of the turbine towers.

Rescan Comments:

Suggested modelling:

A sediment transport model based on available wind, current and wave data, calibrated with observed sediment transport, deposition and shoreline erosion and accretion rates should be developed;

Next hydrodynamic modelling should predict the changes to the wind, wave and current fields due to the presence of the wind turbines;

Also, the sediment transport model should be used to predict changes to sediment transport, deposition and shoreline erosion and accretion rates. The focus should be on both the shoreline and the immediate area of the wind farm. It would be desirable to include the likely effects during a 50 or 100 year return period storm. Estimated confidence intervals of the predictions should be presented;

For credibility, the model should be able to explain the observed accretion at Rose Spit and predict the magnitude of the change that is expected.

Note that this is still an outstanding issue as of 30 September, 2009. Naikun, however, has committed to convening a meeting of specialists and will accept their recommendations.

3.2 RESPONSE TO DETAILED APPLICATION REVIEW COMMENTS – MARINE PHYSICS

Comment #:

Topic/Discipline: General

Issue or Concern: INCOMPLETE LITERATURE SEARCH

Application Page:

Rescan Comments/Recommendations:

NaiKun Response: The Application does not identify all materials, references and sources used. NaiKun will review all information used in the many studies carried out and compile a bibliography of all references and sources. Any sources not used will be assessed and identified.

Comment #: 1

Topic/Discipline: Winds

Issue or Concern: Effect on wind

Page: Sectn 5

Rescan Comments/Recommendations: Decrease to leeward, how much?

NaiKun Response: It is expected winds will decrease slightly to leeward of turbines. However, the distance to leeward is not expected to extend the beyond the distance between turbines, or to the coastline.

Comment #: 2

Topic/Discipline: Waves

Issue or Concern: Effect on wave climate

Page: Sectn 5

Rescan Comments/Recommendations: Sea and swell will be reduced to leeward, how much?

NaiKun Response: The leeward effect on waves is expected to be small in magnitude and to extend a short distance; less than the distance between the turbines, or to the coastline.

Comment #: 3

Topic/Discipline: Sediment Transport

Issue or Concern: Change in bottom sediment characteristics

Page: Sectn 6

Rescan Comments/Recommendations: How much will the sediment particle size distribution change to leeward?

NaiKun Response: This depends on sediment grain size, which varies across the study area. The dominant sediments are sands and overall this is not expected to change. There will be site specific studies for each turbine location. Each site will be mapped for sediment types and properties, and the likelihood of scour and wake effects, prior to installation.

Comment #: 4

Topic/Discipline: Sediment Transport

Issue or Concern: Deposition in lee of wind farm

Page: Sectn 6

Rescan Comments/Recommendations: With less transport energy how much sedimentation will occur in the lee of the wind farm?

NaiKun Response: Deposition has not been observed in this area in the lee of large boulders (such as comet marks). Leeward deposition is expected to be very site specific, and dependent upon grain size.

Comment #: 5

Topic/Discipline: Sediment Transport

Issue or Concern: Erosion of Rose Spit

Page: Sectn 6

Rescan Comments/Recommendations: Will the decrease of sediments transported to the northeast in the lee of the wind farm cause the outer reaches of rose Spit to erode (beach "starvation")? How much?

NaiKun Response: Rose spit is largely nourished by coastal erosion (cf Barrie and Conway; Walker). Longshore drift is towards the north, and sediments of Rose Spit are primarily fed by sediments from land and coastal erosion further south; not from offshore.

Long term time series studies on coastal erosion have been carried out by the Pacific Geosciences Centre (Barrie and Conway, Walker). They indicate Rose Spit is being fed by sediments transported by longshore currents which are eroded from the shores of NE Graham Island. The supply of offshore sediments is thought to be negligible in terms of feeding Rose Spit. Observations by NaiKun further support this work.

Extrapolation from other areas indicates that the wind farm will have little or no effect on wave energy along Rose Spit and Naikoon Provincial Park.

Studies comparing Codling Bank to Dogfish Banks (see Volume 3) indicate that the wind farm will have no impact on the shoreline of Graham Island.

Despite the above expectations, there will be operational wind and wave monitoring in the wind farm.

Climate change is affecting water levels with associated increased sea level. This is expected to accelerate coastal erosion. Rose Spit will likely receive more sediment, not less, as a result of rising sea levels.

Comment #: 6

Topic/Discipline: Current Regime

Issue or Concern: Recent (after 1980) studies not included

Page: Sectn 6

Rescan Comments/Recommendations: A great deal more work has been done; e.g., Tidal rectification

NaiKun Response: We acknowledge that many references have not been included in the Application, and that some data sources may not have been used.

NaiKun will review all information used in the many studies carried out and compile a bibliography of all references and sources. Any sources not used will be assessed and identified.

Comment #: 7

Topic/Discipline: Wave Regime

Issue or Concern: Recent (after 1980) studies not included

Page: Sectn 6

Rescan Comments/Recommendations: A great deal more work has been done; e.g., Wave buoys

NaiKun Response: As above.

Comment #: 8

Topic/Discipline: Tidal Currents

Issue or Concern: Lack of investigation

Page: Sectn 6

Rescan Comments/Recommendations: Tidal currents, tidally rectified currents, wind driven currents and features such as the "overfall" off Rose Spit have been described quantitatively in open literature. The studies are not mentioned.

NaiKun Response: As above.

It is noted that NaiKun have contributed to knowledge of tides in the area, through the work of Terra as part of the geophysical surveys. Studies compared predicted and observed tides for Prince Rupert and **Queen Charlotte City to produce corrections for the detailed bathymetric surveys.**

Comment #: 9

Topic/Discipline: Current Model

Issue or Concern: Not undertaken

Page: Sectn 6

Rescan Comments/Recommendations: Codling Bank is not pertinent

NaiKun Response: RPS have extensive experience studying offshore wind farms around the world. Their work compared conditions in Codling Bank to those of Dogfish Banks and found a reasonable basis for comparison. RPS also carried out current and wave modeling for Dogfish Banks. Information describing RPS capability in this work is being assembled for reference. The studies authored for NaiKun have been forwarded to Rescan for review.

Comment #: 10

Topic/Discipline: Wave Model

Issue or Concern: Not undertaken

Page: Sectn 6

Rescan Comments/Recommendations: Codling Bank is not pertinent

NaiKun Response: See #9. Wave models have been generated and onsite wave monitoring continues. Some of this information is reported in the Application. The bibliography assembled in #6 above will be used to assess any data gaps from existing sources.

Comment #: 11

Topic/Discipline: Sediment Transport Model

Issue or Concern: Not undertaken

Page: Sectn 6

Rescan Comments/Recommendations: Codling Bank is not pertinent

NaiKun Response: Sediment transport will be assessed at each turbine site in the wind farm. In addition, sediment monitoring is ongoing. For example, depth of disturbance rods are installed at two sites and monitored 4 times a year to quantify sediment mobility.

Comment #: 12

Topic/Discipline: Navigation

Issue or Concern: Clearance of blades above sea

Page: Sectn 6

Rescan Comments/Recommendations: 5 m above max wave will endanger vessels in storm

NaiKun Response: NaiKun are confident in the assessment they have completed, and will be subject to Transport Canada regulations.

Comment #: 13

Topic/Discipline: Scour

Issue or Concern: Scour area

Page: Sectn 6

Rescan Comments/Recommendations: Scoured areas may be unsuitable crab habitat

NaiKun Response: Crab habitat could be affected by scour and associated deposition. However, design options and mitigation are identified to minimize this effect.

Comment #: 14

Topic/Discipline: Scour

Issue or Concern: Scour protection - locate in sand dune troughs

Page: Sectn 6

Rescan Comments/Recommendations: Sand dunes are mobile

NaiKun Response: Plan is to bury cable below the mobile layer. This will ensure that as dunes move, cables or foundations will not become unburied. For reference the mobile layer comprises sand dunes and sand waves, which thicken toward the east.

Comment #: 15

Topic/Discipline: Turbidity

Issue or Concern: Cable installation by jetting

Page: Sectn 6

Rescan Comments/Recommendations: Quantify the amount and effect of sea bed fluidization on turbidity. Justify if insignificant

NaiKun Response: Turbidity will depend on sediment type and installation method. Some turbidity is expected during construction and during cable laying. Ploughing is the preferred method in clay areas.

Some references, and note there are many more recent oceanographic references for Hecate Strait:

Crawford, W.R. and P.Greisman, 1987. Investigation of permanent eddies in Dixon Entrance, British Columbia. *Continental Shelf Research*, 7(8): 851-870.

Greisman, P., 1986. Surface Circulation Dixon Entrance: Results from Lagrangian and Eulerian Measurements. *Canadian Contractor Report of Hydrography and Ocean Sciences*, No. 23: x + 112p.

Greisman, P., 1985. Data Report: Dixon Entrance LORAN-C Drifter and CTD Study, June 1984. Report for the Canadian Hydrographic Service, Institute of Ocean Sciences, Sidney, B.C. Dobrocky Seatech, Ltd., 121p.

4.0 MARINE AQUATIC ECOLOGY

Relevant Section of Application	Section 7: Marine Aquatic Ecology
Rescan Specialist	Glenn Wagner, PhD
NaiKun Specialist	Brian Emmett and Pam Thuringer
Company	Archipelago Marine Resources

4.1 COMPLIANCE WITH TOR

Rescan Comment:

Requirements of the TOR have been addressed in the Environmental Assessment.

NaiKun Response (included in Annotated Concordance Table):

No additional comment.

4.2 RESPONSE TO DETAILED COMMENTS – MARINE ECOLOGY

Comment #: 1

Topic/Discipline: Fish Resources

Issue or Concern: Environmental Components

Application Page: 7-6

Rescan Comments/ Recommendation: Sablefish adults are considered benthic fish. Pacific sand lance in Project area are benthic as well as pelagic.

NaiKun Response: Sablefish – agreed. Footnote was added to Table 7.1 to clarify “¹Dogfish Banks and Hecate Strait are considered areas for juvenile (rather than adult) sablefish rearing and migration therefore the assessment is based on the juvenile life stage, which is considered to be pelagic.”

Pacific sand lance – agreed. This species was already included in both the benthic and pelagic fish resources columns in Table 7.1 with a footnote explaining why.

Both corrected on page 7-6 Table and footnotes

Comments addressed

Comment #: 2

Topic/Discipline: Scoping

Issue or Concern: Data gaps

Application Page: 7-9, 7-125

Rescan Comments/ Recommendation: Very good that cable routes have been identified as data gaps. The focus on certain marine fish and invertebrate species will change substantially towards the mainland compared to the current focus of the EA. Some information on benthic fish and invertebrate species in these areas and associated concerns is currently lacking in this section of the EA.

NaiKun Response: Information on marine invertebrates and fish are contained in the desktop review for a larger geographic area which includes the cable corridors. ROV imagery review and/or more detailed

review of existing multibeam imagery during the detailed design stage is anticipated to address the identified data gap.

P. 7-125 (Ridley Island Landfall Site). Additional biophysical surveys may be required in the nearshore area (<20m depth) of the cable corridor at Ridley Island once the final approach route has been determined in the detailed design stage.

Rescan's Final Comments / Recommendation: Data gap for benthic fish and invertebrate species still noted on pages 7-9 and 7-130.

Comments addressed, pending new survey.

Comment #: 3

Topic/Discipline: Project Siting

Issue or Concern: Foundations

Application Page: 7-15

Rescan Comments/ Recommendation: It is unclear why a range of scour radius is used for the different foundations. If the maximum scour radius is used for the 110 WTGs, a total footprint of 18.35 ha is calculated instead of 14.9 ha. Therefore individual piles must have different planned scour protection, but it is unclear which ones or why.

NaiKun Response: The first sentence of the first paragraph on page 7-15 describes the assumptions for using different radii for the different habitat types (sand ridge versus armoured (i.e., gravel, cobble) sand). A line of information in Table 7.2 was missing in the first box under Project Component. "WTG foundations in armoured sand areas" was added to correspond to "55 WTGs with 20-25m scour radius" from the adjacent box.

Rescan's Final Comments / Recommendation: Details: for scour protection estimate ranges are provided in the original text on page 7-15.

Comments addressed.

Comment #: 4

Topic/Discipline: Project Siting

Issue or Concern: Cable installation and removal

Application Page: 7-19

Rescan Comments/ Recommendation: According to the 'rule of thumb' the estimated trench width, based on a depth of 1 to 2 m, should be 3 to 8 m wide. This will affect the estimated footprint of all cables.

NaiKun Response: The 'rule of thumb' range from Michel et al. is more conservative than the numbers we used to calculate the footprint. However at a burial depth of 1m for HaidaLink and the inter-array cables and 1.5m burial depth for the mainland cable, ranges provided in Table 7.2 encompass the upper width ranges of 4 and 5m.

Rescan's Final Comments / Recommendation: Estimated trench widths in Table 7.2 (page 7-15) do not reflect the potential values if the Ocean Plough is used.

Comments addressed during meeting – information on different habitat types and conservative 1.1 m width used for calculations will be added to EA text.

Comment #: 5

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Substrate composition

Application Page: 7-21

Rescan Comments/ Recommendation: How will the wind farm affect the substrate composition identified here, because of slowed winds and changed water currents affecting particle motility? See comments on Section 5: Marine Wind and Wave Environment

NaiKun Response: Sediment will be affected locally, leeward of foundations for the turbines and offshore converter station. Sand will be the dominant material moved by scour and as quantities are small in relation to the wind farm, the sand is likely to be distributed thinly in most cases with occasional wakes leeward of a turbine. In the eastern part of the wind farm any sediment distribution from scour pits at turbines will be masked by the much larger volumes of sand moved naturally in this area. This would give rise to limited change to substrate composition. The design of scour protection will be important in a local context, with options to create substrates best suited to the ecology of the area. This is discussed in Section 7 of volume 1.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – information on substrate changes in other sections will be cited and/or summarized within the EA text.

Comment #: 6

Topic/Discipline: Fish & Benthic Invertebrates

Issue or Concern: Magnetic fields

Application Page: 7-37/44

Rescan Comments/ Recommendation: It is likely there will be negligible negative effects from magnetic fields generated by the cables

NaiKun Response: Agreed

No issues

Comment #: 7

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Temperature

Application Page: 7-37/44

Rescan Comments/ Recommendation: It is likely there will be negligible negative effects and potentially positive effects due to the nominal temperature increase generated by the cables

NaiKun Response: Agreed

No issues

Comment #: 8

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Community changes

Application Page: 7-49

Rescan Comments/ Recommendation: Colonization of the piles is discussed, but not what effects this may have on the population dynamics or predator-prey interactions in the area. This kind of information is critical to try and understand if crab and flatfish populations will be adversely affected. More information is available in Technical Volume 6 that may help answer these questions.

NaiKun Response: Agree this is an important point. More information regarding predator/prey interactions is included in MAE Technical Volume 6 (Section 6.3.4) including a food web. The pile

colonization discussion on page 7-49 is based on results from monitoring in Denmark. Pre- and post construction monitoring at Dogfish Banks (yet to be determined) will be designed to provide information on changes to the benthos.

Rescan's Final Comments / Recommendation: The text (page 7-46/7-49) includes mention of a large increase in biomass due to colonization of the scour protection and monopiles drawing new predators to the area with possible effects on flatfish populations. The effects on flatfish populations and crab populations are not discussed. Key information needed includes whether the predators drawn to these islands of biomass include flatfish and crabs in their diet to a degree that could effect their populations.

Comments addressed during meeting – information on community changes in other sections will be cited and/or summarized within the EA text.

Comment #: 9

Topic/Discipline: Hydrological Conditions

Issue or Concern: Changes in seabed characteristics

Application Page: 7-50

Rescan Comments/ Recommendation: If modelling was performed for Codling Bank, why was it not performed for Dogfish Banks? It is stated that differences exist in the number of WTGs and spacing. The species present will be different as well. How will the types of changes predicted within this wind farm area affect these species (e.g. Dungeness crabs, flatfish). Further, the modelling study for the wind farm in Ireland needs to be cited properly. The citations (RPS 2008) in Section 7 and (RPS Energy) in Section 6 both refer to a comparison of these studies with the NaiKun Project in Hecate Strait. Clarification is needed.

NaiKun Response: The approach used for the NaiKun project was determined when the terms of reference were developed almost 2 years ago. The Project has benefitted from the work at Codling Bank and the expertise of RPS Energy. The assessment of effects for sediment changes associated with the Project is based on time series surveys and field sampling rather than modelled predictions. The results of the surveys provide a reasonable basis for the assessment.

Citation correct for Section 7.

Rescan's Final Comments / Recommendation: Although good comparison of sand eel (previous study) and sandlance (Dogfish Banks) is in the original text (Page 7-51), this example does not address how hydrological changes may affect important species in the Project area such as crabs and flatfish.

Comments addressed during meeting – information on changes in seabed characteristics other sections will be cited and/or summarized within the EA text.

Comment #: 10

Topic/Discipline: Hydrological Conditions

Issue or Concern: Changes in seabed characteristics

Application Page: 7-51

Rescan Comments/ Recommendation: Have the recommended increase in monitoring stations and multiple pre-construction surveys been employed?

NaiKun Response: A detailed pre- and post monitoring program for Dogfish Banks has yet to be determined. Consideration of recommendations from European offshore wind farm monitoring programs will be given.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – information on crab, halibut, and salmon fisheries in socio-economic section of EA will be cited and/or summarized within the EA text.

Comment #: 11

Topic/Discipline: Contamination

Issue or Concern: Release of Copper

Application Page: 7-53

Rescan Comments/ Recommendation: It is unclear whether the 2.57 kg of copper per WTG was discharged into the water, especially because it is later stated all the copper is contained within the compartment. If the copper does reach the water, what are baseline copper levels at the Project site?

NaiKun Response: The reference for the Horns Rev site (Leonhard 2000) indicated that was the expected discharge per WTG based on their total annual discharge of 206 kg of copper for 80 turbines. It is anticipated that carbon or metal dust from the slip rings will be contained and cleaned during regular maintenance at Dogfish Banks.

More detailed information will be gathered from the manufacturer. In addition, containment methods on the turbines will be reviewed and detailed as part of the EMP. Finally, pre-construction ambient water and sediment baseline copper levels will be measured and serve as a baseline.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – information on copper to be obtained from manufacturer and added to EA.

Comment #: 12

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Alteration of Community Assemblage by Scour Protection

Application Page: 7-79

Rescan Comments/ Recommendation: It should be possible to estimate the fouling community by examining any other offshore structures in Hecate Strait (if they exist) or similar structures elsewhere. It is very important to try and determine the community that may arise and the potential predator-prey interactions to estimate the effect on crab and flatfish populations in the Project area before construction of the the wind farm. Information is also available in Technical Volume 6 that may help answer these questions.

NaiKun Response: Currently, there is one structure in place on Dogfish Banks (met mast) that could be examined for fouling communities. Please see the response for point #8.

Rescan's Final Comments / Recommendation: Comments addressed. Structure will be surveyed and data added to EA.

Comment #: 13

Topic/Discipline: Sediments

Issue or Concern: Sediment Transport due to Scour

Application Page: 7-79

Rescan Comments/ Recommendation: Why is 95,000 to 316,000 m³ of sediment material being moved from around the piles if the planned scour protection measures are in place?

NaiKun Response: This volume is based on no scour protection, as one strategy to minimize the vertical profile of the scour protection may be to initially allow scour to occur and then fill the scoured areas with protective material. It is yet to be determined if this strategy will be employed.

Rescan's Final Comments / Recommendation: Comments addressed.

Comments during meeting: Test strategy likely, allowing initial scour to occur. Scour protection will be added with appropriate fish and invertebrate deterrent. *Note that subsequent to these discussions NaiKun seems to have moved away from the concept of providing scour protection; instead favouring "natural forces".*

Comment #: 14

Topic/Discipline: Hydrological Conditions

Issue or Concern: Changes in seabed characteristics

Application Page: 7-80

Rescan Comments/ Recommendation: If changes to the hydrological regime and sediment dynamics cannot be distinguished from natural variation, then why is the magnitude rated as being low instead of negligible (and nearly a minor significant effect)? Also, why has pre-construction modelling not been performed for the study area?

NaiKun Response: The rating of low for magnitude reflects a pre-cautionary assessment, recognizing that in some locations a small detectable effect may occur. It is also noted that this effect may in some cases be positive rather than negative, depending on the sediment change that occurs. The rating of negligible is more associated with the amount of sediment moved in relation to the wind farm.

Refer also to the discussion in #5 above with respect to modelling.

Comments addressed.

Comment #: 15

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Alteration of Community Assemblage by Scour Protection

Application Page: 7-86

Rescan Comments/ Recommendation: Same as comment on predicting species assemblage prior to construction as #12

NaiKun Response: There is information on species assemblages for harder substrate types contained in MAE Technical Volume 6 (the description of naturally occurring boulder/cobble substrate in the wind farm area). If similar material and topography is used for scour protection (the recommended mitigation approach) then the species assemblage is expected to be similar to that described for the existing boulder/cobble substrate. However there is some uncertainty regarding the type of scour protection that may be used, which will be determined during the detailed design stage.

Rescan's Final Comments / Recommendation: Comments addressed in pages 7-46/7-47 of original text. Technical volume will also be cited in EA text.

Comment #: 16

Topic/Discipline: Benthic Fish & Invertebrates

Issue or Concern: Mortality and Injury

Application Page: 7-89, 7-97

Rescan Comments/ Recommendation: Why are no mitigation measures listed for reducing risk of mortality and injury to mobile invertebrates (e.g. crabs) and benthic fish during construction of the pilings and scour protection, similar to pelagic fish (page 7-104)? Some information should be available on the times of least risk (e.g., avoid spawning and moulting times). Further mitigation should involve the dumping of scour protection immediately after piling installation to take advantage of noise avoidance by mobile species.

NaiKun Response: As pelagic fish are considered more sensitive to noise than benthic fish or macroinvertebrates, the noise mitigation methods proposed for pelagic fish were considered to be adequate for benthic fish and mobile macroinvertebrates. Construction timing windows will be developed in consultation with DFO. Our experience monitoring subtidal areas disturbed by construction activity (particularly underwater blasting and dredging) suggest that scavenging fish and invertebrates rapidly move into recently disturbed areas, so immediate post installation placement of scour protection material may not reduce the risk of mortality or injury to fish. However use of lower level noise to illicit a flight response prior to placing scour protection material is a good suggestion that we should investigate further.

Rescan's Final Comments / Recommendation: Comments during meeting – Noise avoidance technique will be explored for use if scour protection added well after piles driven. Text will be added to section indicating benthic some invertebrate mortality expected.

Comment #: 17

Topic/Discipline: Pelagic Fish

Issue or Concern: Increased predation

Application Page: 7-101

Rescan Comments/ Recommendation: This is the first mention of designing scour protection to minimize colonization by demersal (*i.e., live on or near the sea bottom*) predators. It is not mentioned in the Project design or elsewhere in this section, nor are plans for how this would be achieved.

NaiKun Response: The first statement is true. The introduction to this topic is included in section 7.2.2.4, changes to benthic habitats.

Comments addressed

Comment #: 18

Topic/Discipline: Pelagic Fish

Issue or Concern: Noise

Application Page: 7-104

Rescan Comments/ Recommendation: The noise mitigations listed in the table and on page 7-111/112 are very good.

NaiKun Response: Thank you

No issues

Comment #: 19

Topic/Discipline: Residual Effects

Issue or Concern: Summary

Application Page: 7-108

Rescan Comments/ Recommendation: The bars used for Table 7-15 are somewhat meaningless without numbers to back up the visual display. The meaning of the scores should be defined as well (*i.e., scores under 15 mean they are not significant, and the reason for this is not mentioned*).

NaiKun Response: Scores are explained in 7.3.3.1 and in more detail in Section 4.0.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – appropriate sections will be cited in conjunction with the table.

Comment #: 20

Topic/Discipline: Mitigation & Management

Issue or Concern: Introduced species

Application Page: 7-110

Rescan Comments/ Recommendation: If any ships from outside of North America are bringing equipment to the Project site, they should dump ballast water outside of Canadian waters.

NaiKun Response: NaiKun and all contractors and suppliers will be required by NaiKun to comply with the Federal Government Ballast Water Control and Management Regulations. . As part of the EMP suppliers will be notified of relevant regulations in this regard.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – compliance text will be added to the EA section.

Comment #: 21

Topic/Discipline: Noise

Issue or Concern: Noise

Application Page: 7-113

Rescan Comments/ Recommendation: The number of days required to drive the piles should be 60 to 120 (vs. reported 50 to 120)

NaiKun Response: Corrected.

Rescan's Final Comments / Recommendation: Comments addressed

Comment #: 22

Topic/Discipline: Fisheries

Issue or Concern: Crabs, Halibut, Salmon

Application Page: 7-8

Rescan Comments/ Recommendation: There is little to no information in the Marine Aquatic Ecology section of the EA on the main fisheries currently present within Dogfish Banks (crabs, halibut, salmon) or a summary of the direct/indirect effects of the Project on those fisheries as a whole. Information from Technical Volume 6 (A - desktop; B - field study) needs to be summarized to detail the current and past crab, halibut, and salmon fisheries in the area (commercial, recreational, first nation) as well as the general survey results. While individual aspects of the Project have been examined with respect to the different VECs, their effects on each of these fisheries need to be clarified in order to get a better understanding of any changes that may occur.

NaiKun Response: MAE Technical Volume 6 contains information known about commercial, recreational and some FN fishing on Dogfish Banks and in Hecate Strait. The small text boxes at the end of each section in Part A summarize any anticipated spatial interactions with the wind farm project. A summary table, reflecting this information could be added to Volume 1 if determined to be helpful.

Note that the intent of the marine aquatic ecology section was to assess the potential impacts of the project on the resource, not the associated fishery, which is addressed in the socio-economic section (Section 13 of Volume 1). Other reviewers have commented that Volume 11 and Section 13 of Volume 1 does not address fisheries other than Dungeness crab. This has been addressed in the revised versions of these reports now available from the EAO office.

Rescan's Final Comments / Recommendation: Comments addressed during meeting – information on crab, halibut, and salmon fisheries in socio-economic section of EA will be cited and/or summarized within the EA text.

5.0 MARINE MAMMALS

Relevant Section of Application	Section 8: Marine Mammals
Rescan Specialist	Katie Kuker, M.Sc.
NaiKun Specialist	Sonya Meier, M.Sc., R.P.Bio
Company	LGL

5.1 COMPLIANCE WITH ToR

Rescan Comment:

Not all of the Requirements of the ToR have been met in the Environmental Assessment:

- 1) *It is unclear if traditional knowledge was incorporated, as outlined in the ToR (Section 7.3.2, page 61).*
- 2) *Marine mammal vocalization surveys were not conducted, as outlined in Section 7.4.2.3 of the ToR, page 64-65.*

The remaining requirements of the ToR have been addressed in the Environmental Assessment.

NaiKun Response (included in Annotated Concordance Table):

- 1) The EA Application meets the Terms of Reference in respect of the methodologies followed and SARA and COSEWIC have been addressed in the Application. Traditional knowledge will be reported out on during the Application review stage as required and where possible, as noted in responses to 10.1, 10.2 and 10.3 of the annotated concordance table.
- 2) Marine mammal vocalization surveys were conducted as specified in the TOR, and are outlined in the following sections:
 - a. Volume 4, Section 6.3.4 Marine Mammals p42
 - b. Volume 7, Section 7.2.1 Killer Whale p126

An underwater ambient noise measurement study was designed and carried out specifically to meet the requirements of Section 7.4.2.3 of the ToR. Underwater noise recordings were obtained from seafloor moored hydrophone systems deployed by JASCO Applied Sciences. The hydrophones were attached to data recorders housed in water-tight pressure cases. The recording systems were deployed by boat and remained on the seafloor for four months at a time. Recorders were deployed at two different locations. Eight months of data (two recording cycles) were obtained in the WFG area and four months of data (one recording cycle) were obtained at a control location to the south. These recordings were used to characterize the ambient noise conditions of the area including an assessment of the presence of marine mammal vocalizations.

The recorders collected data for 13 minutes of every hour throughout the entire deployment period providing information about the ecological significance of the area on an hourly time-scale. The numbers of recorded marine mammal vocalizations were counted as part of the data post-processing stream. The recorded vocalizations were also classified by species. Total daily counts of marine mammal vocalizations are presented in the EA report, broken-down by species.

Both killer whale and humpback vocalizations were noted at each location at specific times throughout the deployment period. The killer whale vocalization recordings were also examined by Dr John Ford of Fisheries and Oceans Canada to identify the populations and pods of the whales that were present in the area.

Details about the recording equipment, the deployment procedures, the analysis approach, as well as the results are presented Volume 4 Sections 6 and 7. The methods used specifically to detect marine mammal vocalizations in the noise recordings are detailed in Volume 4 Section 6.4.3.2 (pp 49-50). The marine mammal vocalization results are found in Volume 4 Section 7.2 (pp 68-72).

Rescan Response:

Ok, thank you for clarifying and pointing that out.

5.2 RESPONSE TO DETAILED COMMENTS – MARINE MAMMALS

Comment #: 1

Topic/Discipline: Marine Mammals

Issue or Concern: General

Application Page:

Rescan Comments/Recommendation: Given the present lack of scientific knowledge on the impacts of anthropogenic sound in the ocean and the presence of wind farms in the ocean, we recommend that a cautionary approach is most appropriate. Because of this lack of confidence in existing data, there could be unknown impacts due to an absence of data or limited amount of information.

NaiKun Response: A pre-cautionary approach is warranted and has been taken. Modelling of the sound fields associated with construction activities takes a precautionary approach as does the use of the conservative 120 dB RMS sound level used for cetacean disturbance response to a continuous sound source and the 160 dB RMS sound level used for cetacean disturbance response to an impulsive sound source. While there is more limited information available on cetacean responses to wind farms, there is considerable information available on cetacean responses to human activities in the marine environment, including vessel traffic, seismic surveys, and pile driving. To illustrate our precautionary approach, we present data using the conservative 120/160 dB RMS levels as well as the revised disturbance criteria that were published in Southall et al. (2007) and represent the most current level of understanding of cetacean responses to anthropogenic sounds.

Rescan's Final Comments / Recommendation: Yes, there is information regarding marine mammal response to vessels and seismic surveys, but there is **no** information on marine mammal response to wind farms to the scale of this project in the North Pacific.

Comment #: 2

Topic/Discipline: Marine Mammals

Issue or Concern: Magnitude, Confidence, and Significance Ratings of the Effects

Application Page:

Rescan Comments/Recommendation: Magnitude of residual effects was considered **Low** or **Negligible** for all effects, with **High** confidence (except one was **Medium** confidence for the tower layout and operation); this is an understatement of the magnitude and an overstatement of the confidence, based on the definition of these ratings (see section 4.6.1). For recommendations, please see following cell.

NaiKun Response: It is the opinion of the scientists who completed the studies that a confidence rating of high is justified based on the data available. However, moving the confidence to medium (to place more emphasis on the limited local data) would not change the overall assessment.

Rescan's Final Comments / Recommendation: It is still important to recognize that there is LOW certainty, as there is no available information on marine mammal response to wind farms to the scale of this project in the North Pacific. (in particular, baleen whales, as most of the research is on small toothed whales such as porpoises). Although this might not change the anticipated significance ratings, recognition of uncertainty is essential. Magnitude, however, given this uncertainty, should be reconsidered.

Comment #: 3

Topic/Discipline: Marine Mammals

Issue or Concern: Confidence Ratings Recommendations

Application Page:

Rescan Comments/Recommendation: There are extreme data gaps in our knowledge and understanding of the effects of wind farms and noise on marine mammals (including the low frequency noise during operation), and the current noise exposure criteria considered by the authors (provided by Southall et al. 2007), is considered to be "merely an initial step in an iterative process to understand and better predict the effects of noise on marine mammal hearing and behavior" (Southall et al. 2007, pg. 474). Moreover, "the current lack of knowledge of impacts should result in the application of a highly precautionary approach" (Dolman et al. 2003, IWC, "Marine Windfarms and Cetaceans"). This uncertainty is acknowledged on page 8-44 of the EA, yet confidence was considered High when evaluating the effects. Therefore, the confidence for all effects should be set as LOW ("Determination of significance based on incomplete understanding of cause-effect relationships and incomplete data pertinent to the project area"), which could lead to modifications in the significance ratings.

NaiKun Response: While there is variability in the responses of marine mammals to anthropogenic noise sources, we do have a considerable amount of relevant information to draw upon (see Southall et al. 2007 for a review). We do recognize, however, that data is limited in some areas, for example on the effects on wind farms on baleen whales. Our use of precautionary injury and disturbance criteria was designed to ensure that we did not underestimate the potential area of influence of the project. Additionally, adaptive management practices will be in place to revise monitoring plans if necessary. Marine mammal interactions with continuous and impulsive noise sources, including sources larger than those proposed here, support our high confidence level. As noted in the comments, our confidence level is defined as medium for operation of the windfarm; this is based on the limited amount of long-term disturbance data.

Rescan's Final Comments / Recommendation: Good that adaptive management practices will be in place, but again, same as above – LOW certainty should be noted (especially given the quotes mentioned in earlier comments).

Comment #: 4

Topic/Discipline: Marine Mammals

Issue or Concern: Behavioural response of marine mammals to noise and physical barriers (e.g., barrier to movement)

Application Page:

Rescan Comments/Recommendation: There are no existing projects that are similar in extent and location that can be used as a reference point in the north Pacific; therefore, we do not know the effects of noise and physical barriers on marine mammals at such a large scale (30 - 60 sq. km). The biological significance of any observed behavioural response is difficult to assess - whether there are effects of survival and reproductive success is unknown. For example, large whales have extremely low potential population growth rates, are poorly known, and difficult to study; therefore, small decreases in their

reproductive rate could have serious impacts on population size yet be undetected by any known monitoring system.

NaiKun Response: Although there are no existing projects that are similar in extent and location, as offshore wind farms are a relatively new technology, there are numerous studies examining the effects of noise on marine mammals from high impulsive noise sources such as seismic surveys. Observation of how certain species have responded to other high noise activities does provide some insight into the threshold for behavioral responses and can guide monitoring and mitigation programs to reduce potential behavioral changes that could result in population level effects.

Rescan's Final Comments / Recommendation: There is still no information on long-term, low frequency sounds over such a large area, especially considering that for low frequency hearing species (such as baleen whales), the zone of audibility can be greater than 10 km (Madsen et al. 2002), which would extend toward shore and therefore areas used by gray whales and humpback whales.

Comment #: 5

Topic/Discipline: Marine Mammals

Issue or Concern: Direct injury and mortality

Application Page:

Rescan Comments/Recommendation: Considerably more data are needed on how noise impacts in single animals can be extended to the population level.

NaiKun Response: The likelihood of direct injury and mortality are very low with the proposed marine mammal observer monitoring and mitigation program incorporating safety distances from noise sources where activities will be discontinued if marine mammals enter the safety zone.

Rescan's Final Comments / Recommendation: Good, assuming this is implemented.

Comment #: 6

Topic/Discipline: Marine Mammals

Issue or Concern: Direct injury and mortality - effect of pile driving noise

Application Page: 8-54

Rescan Comments/Recommendation: Because of the uncertainty of the effects of pile driving sound on marine mammals, trained marine mammal observers **AND** sound insulation devices (such as bubble curtains) during pile driving and construction should be implemented to reduce significance ratings. without both of these mitigation measures, significance could be much higher than indicated due to the uncertainty of the impacts.

NaiKun Response: NaiKun is committed to deploying effective and practical noise attenuation strategies. Bubble curtains can have limited effectiveness in some situations and consequently a site specific evaluation will be required. Modeling indicates that the risk of injury from sound levels related to pile driving will be restricted to a fairly small zone around the activity. Visual monitoring of this zone will be carefully implemented to ensure that marine mammals are not within this potential safety zone. "Soft starts" of equipment will also be implemented to give animals an opportunity to leave the area prior to full implementation of the activity.

R Rescan's Final Comments / Recommendation: Glad there will be soft starts – this will help mitigate impacts. However, it is also critical to have bubble curtain eqpt on site at all times to deploy if/when needed.

Comment #: 7

Topic/Discipline: Marine Mammals

Issue or Concern: Timing of construction

Application Page:

Rescan Comments/Recommendation: Construction (pile driving, foundation installation, converter station, as well as all of the associated vessel and aerial traffic) is scheduled to occur between April and October. This timing overlaps with whale migration through the area, as well as calving and pupping periods. The magnitude and significance of the effects during construction should therefore be reconsidered and rated higher.

NaiKun Response: The gray whale migration is expected to be highly coastal and is not expected to occur within the project area. Construction activities such as pile driving will only occur during daylight hours, leaving hours of darkness largely unenisonified. Although some animals may be deterred from moving through the area when pile driving is occurring, they are not expected to face such a barrier to movement at other times. There are no known cetacean calving areas in the project area and information does not indicate that the area is a particular focus for cetacean species (for feeding or breeding). Pinnipeds (*"fin-footed mammals"*, eg. seals or sea lions) will be pupping at known rookeries on the island and in-air transmission of sound is not expected to cause significant disturbance.

Rescan's Final Comments / Recommendation: Still "high level" concerns over migration, as potential for impacts are not fully understood. Following on the comment above, all reasonable measures should be in place to protect cetaceans and pinnipeds from harm, particularly the birthing mothers and new-born calves/pups.

Comment #: 8

Topic/Discipline: Marine Mammals

Issue or Concern: Impact on prey?

Application Page: not considered

Rescan Comments/Recommendation: Noise may also affect prey species and so indirectly affect whale populations or habitat use. Fishes may avoid locations with high noise sources, such as pile driving. There is also evidence from the grey literature that pile driving can directly kill fish. The zone of direct mortality was about 10 - 12 m from piling, the zone of delayed mortality was assumed to extend out at least to 150 m to app. 1 km from piling (Caltrans, *Fisheries Impact Assessment, San Francisco Bridge*, 2001). The impact on marine mammal prey in the area should be considered (reduced prey availability is identified as current threats for SARA listed species in their recovery strategies - see killer whale recovery strategy, 2008, for example). Noise exposure criteria that consider ecosystem-level effects are needed. It is possible that the effects of noise exposure on some elements of food webs may have a cascading effect to other elements within the web.

NaiKun Response: Baseline monitoring suggests that the wind farm grid area is not an area of high use and does not appear to be significant feeding habitat for marine mammals. The majority of encounters of killers whales in Haida Gwaii are with transients (Heise et al. 1993, 2003) and as no haulout sites occur along Dogfish Bank, transient feeding likely occurs near sites such as Rose Spit outside of the project area where high noise sources will occur. Other SARA listed species such as humpback whales are common in BC waters but are uncommon in the wind farm grid where high noise sources will occur. Although noise may affect fish during the construction period, the effects will be localized and short-term and the possibility of population level effects low.

Rescan's Final Comments / Recommendation: Understand that there may not be a direct impact, but it is important to recognize the high connectivity of marine food webs, which could lead to indirect impacts (i.e., impact on prey's prey). This may be more of an issue for fisheries (i.e., the fact that little or no baseline work was done on salmon or other fishes).

Comment #: 9

Topic/Discipline: Marine Mammals

Issue or Concern: Magnetic field & Whale migration

Application Page: not considered

Rescan Comments/Recommendation: Baleen whales and other marine mammals **may** possess a magnetic sense that they use to travel in areas of low geomagnetic field gradient and possibly low magnetic intensity during migration (fin whale example, Walker et al., *J. Exp. Biol.*, 1992), and should therefore be addressed. Very little is known about whale migration; therefore impacts on whale migration should be approached using the precautionary principle.

NaiKun Response: Marine mammals are not thought to be sensitive to electromagnetic fields generated close to the cable (Gill 2005). Valberg (2005) suggested that buried underwater cables would not be capable of interfering with the navigation of marine mammals because of the limited area over which they could be sensed. However, it is acknowledged that there is some uncertainty in how marine mammals respond to EMF (Michaels et al. 2007). Baseline monitoring of marine mammal migration, primarily gray whales, is being conducted and if migratory patterns appear to change during construction or operation, the biological significance of these changes will be addressed and mitigation plans adapted.

Rescan's Final Comments / Recommendation: Agreed, as long as this is recognized.

Comment #: 10

Topic/Discipline: Marine Mammals

Issue or Concern: effect of cable laying (entanglements)

Application Page: 8-55

Rescan Comments/Recommendation: Effects of cable laying and entanglement are unknown and confidence should not be set as high.

NaiKun Response: There has been an absence of whale entanglements in cables since 1959 primarily due to advances in cable technology and laying techniques, including burial (Wood and Carter 2008). There is a remote possibility that fishing gear could become entangled in exposed cables during operation, and a marine mammal subsequently entangled. Reporting and retrieval of derelict gear by fishers would greatly mitigate this possibility. Operational procedures for this retrieval will be included as part of the EMP. We feel that the confidence level should remain high.

Rescan's Final Comments / Recommendation: Ok. I'm still a little worried about the cable laying/dredging to Hiada Gwaii.

Comment #: 11

Topic/Discipline: Marine Mammals

Issue or Concern: Issue or Concern not addressed in initial review:
effect of sediment transport on pinniped haul out (erosion of Rose Spit)

Application Page: Not considered

Rescan Comments / Recommendation: Based on discussions with our marine physics specialist, there is a possibility that the decrease of sediments transported to the northeast in the lee of the wind farm could cause the outer reaches of Rose Spit to erode (beach "starvation"). As identified in the technical report, sea lions and harbour seals haul out on Rose Spit. Peak numbers of Steller's sea lions hauled out occurred in September, 2007 (n = 841), and peak numbers of harbour seals hauled out occurred on June 19, 2008, with 1,250 individuals, the timing of which corresponds to the pupping period. Therefore, this potential effect will need to be considered if modeling is conducted and results indicate that Rose Spit may in fact be modified. The effect on their predators (killer whales) should also be considered in this case.

Comment #: 12

Topic/Discipline: Marine Mammals

Issue or Concern: Issue or Concern not addressed: Change in rating system for marine mammals from TOR definition (to rating of 18 as significant as opposed to 15 in the ToR)

Application Page: 8-26, 8-27

Rescan Comments/Recommendation:

NaiKun Response:

Rescan's Final Comments / Recommendation: I'm concerned about the change in rating system and how this is valid. If the original rating system was maintained (as it should have been) as stated in the ToR, the majority (if not all) effects would be considered significant. For a project of this size, and with no relevant previous information, (i.e., no similar projects in the North Pacific and no knowledge of the effect of windfarms on species other than small toothed whales such as harbour porpoises) it is much more appropriate to rate the effect as medium to high (medium with mitigation), with low certainty.

6.0 MARINE BIRDS

Relevant Section of Application	Section 9: Marine Birds + parts of Volume 8
Rescan Specialist	Mike Henry, PhD
NaiKun Specialist	Mike Demarchi
Company	LGL

6.1 COMPLIANCE WITH ToR

Rescan Comment 1:

Terms of Reference Section: 7.1.1.1 Marine Birds p57: 1. Rescan: Change in Physical Habitat not addressed as described on P 57-58 of ToR

NaiKun Response 1 (included in Annotated Concordance Table):

The impact of changes to the physical environment and the potential for this in conjunction with operation of the project to cause (somewhat indirect) effects on marine birds was addressed in the EA Application. This is considered an issue that requires clarification and explanation during the EA review, rather than an issue that would prevent the EA Application meeting the screening test. The presence of an assessment of this potential impact indicates the requirements of the EA Application were met. Documentation in the Marine Birds portion of the EA Application (Section 9.2 "SCOPE OF THE ASSESSMENT") indicates the issue was addressed, e.g.;

- From linkage diagram (Fig 9.1) "*Changes to benthic habitats*"
- From linkage diagram statements "*Changes to benthic habitat might affect the abundance and distribution of benthic food source for some species*".
- From hypotheses statements "*alter the physical structure of the benthic habitat... act like artificial reefs, providing hard substrates for the attachment of benthic invertebrates (some of which will be prey to birds)... changing the benthic habitat ... Altered habitats could therefore affect prey availability and thus marine bird behaviour or energetics or bird-species composition*". This statement goes on to note that the "*likelihood of altered habitat quality is assessed in the marine aquatic ecology portion of this EA*" (more on this below).
- From components assessed "*alteration of benthic habitat structure and ecological composition*" and "*The physical presence of WTGs is expected to alter patterns of marine-bird habitat use*"

In the summary table of potential project interactions assessed, the issue of physical habitat change is listed (i.e., "*Footprint effect of WTG foundations and associated scour on seabed*"), but (as a result of the assessment on potential for such changes noted in the marine aquatic ecology EA section [see below]) there is considered to be a minor interaction which is not considered further in the EA.

The marine aquatic ecology EA section addresses the issue of potential for physical habitat change in a number of locations:

- An extensive description exploring the issue; including an outline of the experiences learned from European wind energy projects and other offshore (oil and gas platforms) installations in section 7.2.2.4 "*Changes in benthic habitats*".

- The potential for “*alteration of community assemblage*” for epifaunal and infaunal communities (section 7.3.4) – considered non-significant.
- section 7.3.5 “*Alteration of the mobile macroinvertebrate community due to scour placement and possible change in hydrologic conditions on benthic community composition is expected to be minimal*”.
- section 7.3.6 “*The impact of the change in benthic habitats due to scour placement and possible change in hydrologic conditions on benthic community composition (Table 7-13, Rows 4 and 5) is expected to be minimal based on the small level of change relative to the wind farm area and cable corridor as outlined in Section 7.3.4 above*”.
- section 7.3.7 “*The impact of the change in benthic habitats due to scour placement on pelagic fish community composition is expected to be minimal...*”
- The above impact assessments consider the ability for mitigations to reduce the potential for impacts, and in this respect section 7.5 “... *Scour Protection*” outlines the key measure to achieve mitigation, the foremost and most effective being approaches that mimic the existing boulder / cobble habitats on Dogfish Banks.

The assessment of non-significant impacts as a result of changes to benthic communities in the marine aquatic ecology section forms the basis for the marine bird section to consider the issue of secondary (indirect impacts) to birds, but to dismiss the issue as not needing a detailed assessment. As noted above, this issue has been addressed in the EA Application and as such the EA Application meets the Terms of Reference and EA Application screening needs.

Rescan Comment 2:

Terms of Reference Section: 7.3.1 Marine Birds p60: *It was not clear if much traditional knowledge was collected; it was not apparent that bird abundance etc was related to weather conditions.*

NaiKun Response 2 (included in Annotated Concordance Table):

An extensive amount of literature was reviewed in the desktop study. Traditional knowledge, insofar as it was presented in documents like Harfenist et al. (2002), and as available through local biologists such as Norm Sloan and Peter Hamel, was incorporated.

The EA Application meets the Terms of Reference in respect of the methodologies followed. Note “*surveys will be done only when winds are below 15 knots*” (page 62 of ToR). In this respect the EA Application meets the needs for screening. Further clarification and explanation of the methods used will be presented during the EA review. A brief explanation of the methods and rationale for them is given below.

All surveys were conducted according to protocols that was assessed and approved as appropriate by the Canadian Wildlife Service (CWS) during consultation on the Terms of Reference. In this respect they follow methodologies used by that organization and accepted as standard practices. The surveys (boat and aerial) were not conducted in all weather conditions, thus as per the recommendations of the appropriate protocols for:

- boat surveys (Ken Morgan, pers. comm., CWS 2006, CWS 2007, Pyle 2007 and RISC 1997);
and

- aerial surveys(Johnson et al. 2005, Pyle 2007, Petersen and Fox 2007 and Hodges et al. 2005), the results are indicative of observations in conditions of 7–10 kt (usually 8–9.5 kt, but always wind < 15kt and seas < 1 m as per RISC 1997) for boat surveys and < 20 kt for aerial surveys. Ferry surveys were conducted under a range of conditions, but winds > 35 kt were avoided. The size of BC Ferry Corp vessels used for these surveys provided flexibility to sample in rougher weather conditions than was possible for the boat and aerial surveys (as noted in the ToR page 63). However, the effect of weather on bird distribution and abundance was not specifically examined—largely due to the confounding effect of weather on bird sightability. We did factor glare into some analyses. For example, observations made during conditions of severe glare were censored from the density estimates of the IUP Aerial Survey results. Also note information in Section 8 Table 7.6 and similar tables giving information on environmental conditions (Beaufort and glare) during surveys.

Rescan Comment 3:

Terms of Reference Section: 7.4.1.1 Surveys and Benthic Sampling p61: 3 -> it was not apparent that bird abundance etc was directly related to aquatic resources that may have been collected in Marine Ecology section.

NaiKun Response 3 (included in Annotated Concordance Table):

These details are provided in the EA Application, and as such the information presented is compliant with the Terms of Reference (page 60). Details on the location of information pertinent to the comment are provided below.

Bird abundance for was analyzed as a function of benthic prey resources. Regarding boat surveys, please see Volume 8, page 132 (Table 7.9) for details of species / groups of birds seen during TBA boat surveys in the various habitat types identified on benthic habitat mapping. See Sections 7.3.4, 7.4.4, 7.5.4, 7.6.4, 7.7.4, 7.9.4, and 7.10.4 for text and figures (Figure 7.26 for LTD, 7.33 for scoters) describing the distribution of bird species / groups with respect to benthic habitat type.

Regarding aerial surveys, please see Volume 8, page 140 (Table 7.14) for details of species / groups of birds seen during IUP aerial surveys in the various habitat types identified on benthic habitat mapping. See Sections 7.3.5, 7.4.5, 7.5.5, 7.6.5, 7.7.5, 7.9.5, and 7.10.5 for text describing the distribution of bird species / groups with respect to benthic habitat type.

6.2 RESPONSE TO DETAILED COMMENTS – MARINE BIRDS

Comment #: 1

Topic/Discipline: Marine Birds

Issue or Concern: "...predictive confidence ranges from high to low..."

Application Page: 9-1

Rescan Comments/Recommendation: this implies a statistical basis or at least could be interpreted as such. Would like to see a reference to methods if this is the case. If this is a subjective statement I would use another way of phrasing this term

NaiKun Response: The assignment made was indeed qualitative .Had a probability value (e.g., percentage) been assigned, then yes, a description of the method would be warranted.

Rescan's Final Comments / Recommendation: noted

Comment #: 2

Topic/Discipline: Attraction to Wind Farm

Issue or Concern: Hypothesis#7

Application Page: 9-7

Rescan Comments/Recommendation: this is my largest concern. The effects of seabird avoidance/displacement of the wind field has been heavily discussed throughout this section, but there is little discussion regarding the potential for bird attraction via the formation of artificial reefs even though it's stated in Hypothesis#7. Section 7 of this EA has given evidence for the increase of marine life that follows installations of scour protection measures (rock beds/ rip-rap surrounding tower base), and there is abundant info regarding the aggregation of marine life around off-shore oil platforms and discarded drill casings. In this case, it can be expected (if anti-fouling agents are not used) that the towers will be covered in mussels and barnacles, and the anti-scouring bases will aggregate crab, sea stars, and other sea life. As well, fish could collect along the entire length of the submerged towers. This potential increase in biomass could affect all feeding classes of the seabirds in this area. **Long Tail Ducks (LTDUs)**, which have their highest abundances inside the **Turbine Buffer Area (TBA)**, could feed through the length of the water column from the mussels on the tower to crustaceans at the base. Scoters, while not able to dive as deeply as LTDUs, would be able to graze along the upper section of the tower. This could bring scoters from more inshore areas to the wind farm area, particularly since so many can be found in the vicinity of the TBA. An increase in fish density could affect loons, murrelets, shearwaters, auklets, murrelets, cormorants, and other piscivores.

Overall, the tower structures could act as aggregation points and thus facilitate trophic focusing. The consequence could be increased mortality rates through collision (although this could be offset by increased fitness levels), although this would still remain quite low I suspect. It would be interesting to know whether any increase in bird densities within the wind farm would be a consequence of habituation or due to increased food resources. I feel this 'effect' needs to be addressed more comprehensively in this section.

NaiKun Response: The Canadian Wildlife Service, relying largely on information from European offshore projects, has not identified attraction as a potential concern—quite the opposite in fact, as potential displacement of foraging birds from the project area was their greatest concern.

Bird attraction to the wind farm as a result of navigational lighting presents a greater concern regarding potential collisions. This potential impact is addressed and design will benefit from ongoing studies at existing offshore wind farms.

The European experience, together with information from the Marine Ecology portion of the EA, leads us to believe that the project will not create large artificial reefs that will notably alter the benthic or pelagic communities of the area.

The case of oil platforms is not directly comparable to turbine towers in that the former involves multiple pilings in close proximity, together with a greater shadowing effect of the platform infrastructure. In this regard, the offshore converter station most closely resembles an offshore oil platform, albeit on a smaller scale.

In the event that birds are attracted to the project area in time, long-term monitoring, in accordance with a BACI (before-after control-impact) design, is expected to reveal this. Together with collision monitoring, as part of an adaptive management process, if problems arise as a result of bird attraction to the project area, mitigation can be sought.

NaiKun continues to explore the feasibility of using anti fouling agents and removing sessile marine life from the towers periodically.

Even in the event that birds are attracted to the area to feed, research from Europe has shown that they are very good at detecting and avoiding the towers during flight, thereby greatly diminishing collision risks as compared with the case of bird flight not involving avoidance.

Rescan's Final Comments / Recommendation: -still my greatest concern. While other off-shore windfarms have shown little effect from this phenomenon other off-shore structures have (e.g. off-shore

oil platforms). I feel that because the Dogfish Bank area could be much more productive than the European Off-shore windfarms, this effect could be much more probable here. We discussed this and it was mentioned this would certainly be a part of the proponent's adaptive management strategy, which I am satisfied with. **However, I am adamant that this potential effect should be visible in print somewhere so at least its importance is emphasized and it is stated in a publicly available document.**

An important point we don't seem to know yet is whether anti-foulants will be used. If used these should eliminate this issue, but could lead to others (toxicity). I.e. appropriate monitoring and mitigation needs to be designed and deployed for whichever option is selected. And note that a case could be made to try both approaches on a comparative basis for a defined period.

Comment #: 3

Topic/Discipline: Attraction to Wind Farm

Issue or Concern: Increased birds in project area

Application Page:

Rescan Comments/Recommendation: With the assumption that the proposed area supports higher numbers of birds than their European wind farm counterparts, is there any chance that increased attraction to wind farm area is possible through increased birds in the area being able to flock to other flocks already occupying the area (i.e. feeding on increased food availability)? Are there any mitigations planned if large numbers of birds enter the areas and collisions increase (i.e. shearwaters)? It will be interesting to note how large flocks of birds react to the wind farm region.

NaiKun Response: The "decoy effect" certainly creates the possibility that the presence of some birds will lead to the attraction of others. Radar monitoring, as proposed, represents the best means of quantifying bird distribution and abundance over closely spaced, sequential time periods. This, coupled with collision monitoring, will allow collision risks to be quantified.

It remains to be seen whether large numbers of birds flock to the area. There is no reason to expect that the prey of shearwaters and other pelagic feeders will be notably altered by the wind farm. However, in the event that this happens and collision risks become unacceptable, as part of the adaptive management regime, mitigation measures can be sought.

Rescan's Final Comments / Recommendation: Related to above

Comment #: 4

Topic/Discipline: Marine Birds

Issue or Concern: Effects of noise during construction/operation/decommissioning

Application Page:

Rescan Comments/Recommendation: I am in agreement with effects assessment and mitigations, particularly soft-starts during pile driving. If there is no evidence whether soft-starts work, monitoring during the construction phase could aid in establishing the validity of this method. Is there any way it can be proposed to test this beforehand? What about bird dispersion after ship horn-blasts? Or develop mitigation plans that ensure diving birds must be clear of pile driving region?

NaiKun Response: Bird/mammal observers will document bird distribution and abundance in the vicinity of piling operations before, during and after piling. It is possible that such data will reveal the effectiveness of soft starts in dispersing birds. Soft starts are recognized as a best practice (particularly in regard to marine mammals), but because of the costs of piling operations and the large number of samples needed to draw valid conclusions, there are no plans to test the efficacy of this mitigation prior to construction.

Present mitigation plans call for no piling operations (or cessation of piling) under certain conditions involving the presence of threatened species of diving birds in the vicinity.

Rescan's Final Comments / Recommendation: Noted. However, despite costs of piling operations and the large number of samples needed to draw statistically valid conclusions,

mitigation and monitoring plan options must be developed prior to construction. I.e., it may be better to invest some \$\$ now to demonstrate commitment to the concern of Haida citizens with the birds/ mammals. Or, at a minimum, list out what the options will be and anticipated duration vis-à-vis the pile-driving process? A time frame should also be defined – i.e. when will the respective mitigation measures be deployed. Eg., air horn blasts (for birds) 1 hour? 5 minutes? before soft start begins??

Further, will measures be developed to deter nesting behaviour once the initial structures are put in place? Fledgling success could be significantly compromised if nesting is not deterred, particularly in commissioning and decommissioning phases.

Comment #: 5

Topic/Discipline: Importance of Hecate Strait Frontal Region

Issue or Concern: Barrier to movements

Application Page: 9-31/ 32

Rescan Comments/Recommendation: It's important to acknowledge the importance of the Hecate Strait Frontal region in the mid-Strait. This is considered an Ecologically and Biologically Significant Area in the Pacific North Coast Integrated Management Area (PNCIMA; Clarke and Jamieson 2006) and marine birds may fly east/west from the northwest Hecate Strait to access this region, which has abundant and diverse zooplankton and ichthyoplankton populations (Perry and Waddell 1997). While planktivorous seabirds are not particularly abundant in this area (at least compared to the west coast of the Haida Gwaii), fronts can concentrate fish grazing on zooplankton, and thus, loons, auklets, shearwaters, murrelets, phalaropes may have to change their flight pattern if they are moving from western Hecate Strait through the wind farm to gain access to the Hecate Frontal region (In volume 8, many of the species show up in the mid-strait region). Many of the above birds consume euphausiids, which are plentiful in this section of Hecate Strait.

The avoidance path would therefore comprise a much greater proportion of the total flight path if movement is from east-west as opposed to a north-south flight pattern (as described in this section). If the wind farm hinders the flight to this potential feeding ground, an important foraging area could be lost for some species. For the sake of completion, this area and flight path should be commented on.

NaiKun Response: The potential importance of east-west movements in Hecate Strait is acknowledged, although not with regard to the specific factors the reviewer mentions. In the event that this section is revised, it could be revised so as to reflect this information. In any event, as discussed in the text, there is no reason to anticipate that the wind farm will serve as a barrier to east-west bird flights. Further, while it may represent a greater change to the overall proportion of flight than for the case described in the text, there is no indication or reason to believe that birds aggregate in a localized area due west of the wind farm for one purpose (i.e., roosting) that would then require them to fly due east then around the wind farm in order to access the Hecate Strait Frontal Region. Accordingly, it is untenable to think that a foraging area would be lost for some species.

Rescan's Final Comments / Recommendation: We discussed this and its importance was generally agreed upon. I really think a few sentences discussing the east-west diversion of the flight path (% increase in flight path) from birds on the eastern shore of Graham Island that could fly to the Hecate Front (and vice-versa) would complete this section. In addition, it acknowledges the Hecate Front as an important biological area in the vicinity of the wind farm. Somewhere the importance of the Hecate Frontal region has to be mentioned.

Comment #: 6

Topic/Discipline: Sediment Effects

Issue or Concern: effects of turbidity

Application Page:

Rescan Comments/Recommendation: Could elevated turbidity levels affect foraging efficiency during construction/decommissioning?

NaiKun Response: Turbidity levels will rise in the vicinity of cable-trenching operations, but there is no reason to expect that the sediment plume will be of notable consequence regarding bird foraging. Dogfish Banks provides an extensive area of foraging habitat for marine birds, and the temporary exclusion from a small portion of it is not deemed capable of causing a notable adverse effect.

Rescan's Final Comments / Recommendation:

Comment #: 7

Topic/Discipline: Marine Birds

Issue or Concern: Oil Spills/Toxic compound release

Application Page: 9-55

Rescan Comments/Recommendation: Are there no management plans for containment in case there is a spill? Particularly since the vessels will be working alongside the towers, which they could run into, or if a tower is dropped, broken, thereby releasing chemicals into the marine environment. What happens if there is an oil spill or leak?

NaiKun Response: A comprehensive program of spill prevention, containment, and cleanup will be in place at all times.

Rescan's Final Comments / Recommendation: noted

Comment #: 8

Topic/Discipline: Marine Birds

Issue or Concern: referencing

Application Page:

Rescan Comments/Recommendation: when Volume 8 is referred to, a page or section number would be helpful.

NaiKun Response: Comment noted.

Comment #: 9

Topic/Discipline: Volume 8

Issue or Concern: trendlines/pearson correlation in CBC data

Application Page: pg 22 etc

Rescan Comments/Recommendation: Pearson's correlations appear to be used when data is non-normal. Suggest using Spearman's rank correlation. Trendlines used for various CBC graphs, Fig. 3.9 for example, require non-linear methods. Fig 3.9 is heavily leveraged by 2004-2008 counts. This is not a linear increase over time. Give sample size (n) for Table 3.2.

NaiKun Response: These analyses are not meant to be overly quantitative, but rather to substantiate general comment on the overall trends over time. CBC data are known to suffer from a number of biases. Perhaps a nonparametric test, such as Spearman's Rank, would be more appropriate, but given the way the data are presented and the fact that not much emphasis of consequence is placed on the actual trends, retesting does not seem warranted.

Rescan Response: Discussed. I realize this would take some work but I think it would reflect positively on the researcher's work. Otherwise, it leaves the researchers analytic skills to be questioned.

Comment #: 10

Topic/Discipline: Marine Birds Volume 8

Issue or Concern: unequal variance t-test

Application Page:

Rescan Comments/Recommendation: I would include the Ruxton (2006) reference for this test since it's quite uncommon. [Ruxton, G.D. (2006)] The unequal variance t-test is an underused alternative to Student's t-test and the Mann-Whitney U Test. Behav. Ecol. 17:688-690. 2206

NaiKun Response: Thank-you for this. The reference can be added if the report is revised.

Rescan's Final Comments / Recommendation noted

Comment #: 11

Topic/Discipline: Marine Birds mortality

Issue or Concern: perching platforms

Application Page:

Rescan Comments/Recommendation: will there be any surfaces for perching birds (i.e. gulls) on the towers? If so, maybe mitigative deterrents to decrease potential for mortality from attraction-related collisions

NaiKun Response: The potential that perching/roosting site will be created is real. Specific advice has been forwarded to the design engineers to minimize horizontal surfaces and install perching/roosting deterrents where such surfaces exist; this is included in Volume 1 Section 18 table 18-2, Siting Guidance for the Project Facilities.

Rescan's Final Comments / Recommendation: noted

Comment #: 12

Topic/Discipline: Radar Monitoring

Issue or Concern: Lack of baseline radar monitoring

Application Page:

Rescan Comments/Recommendation: While there may be plans to deploy a radar system to record bird flight patterns once the infrastructure is in place, is there any reason why baseline radar information cannot be collected pre-construction by deploying a radar on the meteorological mast erected in 2007? This would facilitate a BACI-style monitoring program.

NaiKun Response: Pre-operational radar monitoring has been considered, but it has been deemed unfeasible to deploy a radar unit on the met mast at this time due to the inability to provide an adequate and practical power supply. Should the practicality for providing a reliable power supply arise, this option would be re-considered.

Rescan's Final Comments / Recommendation: noted

Comment #: 13

Topic/Discipline: Marine Birds, confidence level of assessment

Issue or Concern:

Application Page: 9-20 and throughout

Rescan Comments/Recommendation: it would be nice to see an explanation for a specific confidence level of assessment (i.e. low, moderate, high). Why is the confidence low/moderate/high? Seems arbitrary. Is there a grading system in Section 4 like the threshold value? If so, mention. If not, an explanation would be helpful.

NaiKun Response: See first comment and response.

Rescan's Final Comments / Recommendation: noted

Comment #: 14

Topic/Discipline: Marine Birds, colour/pattern deterrents

Issue or Concern: collision mortality

Application Page: 9-48

Rescan Comments/Recommendation: if radar is going to be used to monitor post-construction flights through the wind field, could a random grid of colour/pattern/no colour be set up to determine avoidance/collisions with certain visual cues, for example, decrease flight density by patterned towers than non-coloured etc. This could provide important info for other wind farm projects and lead to important collision mitigation in this project.

NaiKun Response: Tests of the effects of colour and pattern on collision risk have been attempted elsewhere. Presently, there is insufficient information to indicate that colour or pattern can reduce collisions. NaiKun is monitoring new developments in the industry related to this topic.

In the event that collisions become a notable problem, consideration of such tests might be warranted as a means of identifying suitable mitigation. Some new data is available regarding navigation lights. This information will be considered in final design. Transport Canada will also have to be consulted in this matter to ensure compliance with regulations.

Rescan's Final Comments / Recommendation e: noted

7.0 TERRESTRIAL ECOLOGY

Relevant Section of Application	Section 10: Terrestrial Ecology and Volume 9
Rescan Specialist	Not Applicable
NaiKun Specialist	Matt Hammond
Company	Pottinger Gaherty Ltd.

Terrestrial Ecology was not, at this time, identified as a high priority item in Haida Gwaii (eg. as the point of landing for the proposed submarine power feed is yet to be confirmed).

8.0 ARCHAEOLOGY

Relevant Section of Application	Section 11: Archaeological and Heritage Resources
Rescan Specialist	Lisa Seip M.A., RPCA
NaiKun Specialist	Dave Hall (Tsimshian) / Morley Eldridge (Haida Gwaii and Underwater)
Company	Arrowstone Archaeology / Millennia Research Limited

8.1 COMPLIANCE WITH ToR

Rescan Comment:

Not all of the Requirements of the TOR have been met in the archaeological assessment; no data for underwater archaeological resources exists yet. It appears that this is under way and will be reported during the EA review.

NaiKun Response (included in Annotated Concordance Table):

Underwater precontact archaeological resources are reported in both Volume 1 and the main body of Volume 10. Most of this was negative data, in that no archaeological resources were found during testing. Appendix 1 to Volume 10 deals with historical archaeological resources protected under the *Heritage Conservation Act*, and does not address precontact archaeological matters. Additional information on spring 2009 Archaeological fieldwork on Haida Gwaii is provided in the Spring 2009 Addendum to Volume 10. Both are included with the revised submission of the Application to the BCEAO.

Rescan Comment:

No underwater archaeological field studies have been conducted for the mainland portion of cable corridor or the Haida link portion of cable corridor and additional testing is required to complete the assessment of the wind farm study area.

8.2 RESPONSE TO DETAILED COMMENTS – UNDERWATER ARCHAEOLOGY

Comment #: 1

Topic/Discipline: archaeological resources - mainland portion of cable corridor

Issue or Concern: impacts on underwater archaeological resources on mainland portion of cable corridor

Application Page: sec 11-24

Rescan Comments/Recommendation: There is a low level of confidence that underwater archaeological sites will not be impacted due to a lack of data. There may be an affect on significant underwater archaeological resources, if present, on the mainland portion of the cable corridor. Recommend review of findings of underwater archaeology work when available.

NaiKun Response: There was sufficient data on sea level histories to determine that most of the underwater mainland corridor has low to nil precontact archaeological potential, as the sea levels appear to have never been low enough to subaerially expose lands east of Dogfish Bank. On Dogfish Bank, there is potential for drowned terrestrial sites. However, any such sites are likely to be heavily impacted by marine

transgression (direct exposure to heavy surf). The reviewer is correct in stating that limited additional archaeological work has been recommended along the route.

Rescan's Final Comments / Recommendation: While parts of this corridor may not have archaeological potential, available core data (TUL91C34) (refer to page 4 of report) adjacent to the corridor on Dogfish bank found buried soil containing in situ terrestrial plant roots and "there is no evidence of an erosional contact, and gradual deposition of silts continued for a time after transgression" (Barrie et al. 1993) in this area. This suggests that the portion of the corridor that travels along Dogfish bank may have archaeological potential. Testing of this area should be conducted to confirm the assessment, evidence in the form of solid core or vibrocore data for this area should be obtained.

Comment #: 2

Topic/Discipline: archaeological resources - Haida link portion of cable corridor

Issue or Concern: impacts on underwater archaeological resources on Haida link portion of cable corridor

Application Page: sec
11-27

Rescan Comments/Recommendation: As fieldwork has not been conducted yet the effects of the installation of the submarine transmission cable in the underwater HaidaLink portion is uncertain. Recommend review of findings of underwater archaeology work when available.

NaiKun Response: As detailed in the report, there was at least minimal potential for archaeological remains assigned throughout this corridor. The chances of impact, however, are low. The reviewer is correct in stating that additional work should be completed. However, this concern can adequately be addressed during final siting.

Rescan's Final Comments / Recommendation: Any pre-contact archaeological remains found in the underwater study area would be highly significant. As stated above the only available core data on this area suggests that there is potential for archaeological material to be present. For the assessment to be complete this area should be tested, at the very least to confirm the assessment of low archaeological potential. Currently there is no data, such as solid cores, to confirm the assessment of potential.

Comment #: 3

Topic/Discipline: Underwater Archaeological predictive model

Issue or Concern: Using inland archaeological data from the Williston Lake area to predict coastal artifact density in the Dogfish Banks area

Application Page: sec
11-22

Rescan Comments/Recommendation: The Williston Lake data, while the only available data, may not be suitable for predicting artifact density in this area. The prediction of the number of artifacts that may be encountered may not be appropriate for a coastal environment where you would expect denser artifact concentrations and archaeological site density. Archaeological sites on the coast may contain higher artifact concentrations due to the preservation of bone in shell middens and potential wet site components (such as basketry) then sites located inland such as in the Williston Lake area.

NaiKun Response: The reviewer is incorrect in stating that coastal environments lead to the expectation of denser artifact concentration, higher site density, and preservation of bone in shell middens and wet site components than inland areas. Bone artifacts are not expected because these need to preserve in shell midden. Shell middens are not expected to survive the extremely high energy environment of completely exposed conditions of Hecate Strait during transgression. While both shell midden and wet site materials have survived marine transgression, regression, and long-term intertidal exposure at Kilgi Gwaii in southern Haida Gwaii, that particular site is in the extremely protected archipelago environment of Rose Harbour, Huston Stewart Channel, and is not an appropriate model for any site taphanomics (= *site formation processes*) for the Windfarm or Haidalink study areas. In addition, the extensive plain tundra/lightly wooded

and extremely dynamic environment of the exposed Hecate Strait is unlikely to have locations that were habitually reused and would lead to the formation of shell middens in the first place. A modest density lithic scatter is expected to be the dominant site type, but this would be scattered and much reduced in density by surf during the decades to hundreds of years of exposure during transgression.

By contrast, the Williston data represents a long-term use of a plains landscape changing from grassland tundra to boreal forest by mobile hunter-gatherers, who left a scatter of lithics behind. This plain has had 40 years of exposure to waves, albeit not the heavy surf of Hecate Strait. The site formation processes, temporal span, and modern conditions of the Williston artifacts are therefore a much more appropriate model for Hecate Strait than are archaeological resources dating from the middle and late Holocene in sheltered areas on the coast. The late pre-contact and historic 'storm houses' at Tlell, Rose Spit, and East Beach would be quite appropriate models. The lack of cultural materials in and around these features suggests that even occasional storm surges can significantly scatter cultural materials. As the reviewer states, this is in any case the only comparable data available. From the arguments presented above the Williston data almost certainly over-represents, rather than under-represents, the chances of finding archaeological material in our testing program, and the expected impacts to archaeological resources from wind farm activities.

Rescan's Final Comments / Recommendation: Shell middens are not the only environments that may preserve bone or other organic materials (see Section 2.1.2 paragraph 3 of your report). For the portion of the project that is on Dogfish Bank, available core data suggests that there is potential for archaeological materials such as wet site materials to have survived (see comment 1 above). Testing of areas assessed as having low potential, by either solid core or vibrocores to confirm the assessment should be considered at a very minimum for this area due to the very high scientific significance of any archaeological materials that may be found. Regardless of whether or not the Williston Lake model is appropriate with so much of the project area being classified as low potential by this model a percentage of the low potential areas should be tested to confirm that the model is actually scientifically accurate.

9.0 FIRST NATIONS

Relevant Section of Application	Section 12: First Nations Considerations
Rescan Specialist	Andrew Robinson, M.Sc.
NaiKun Specialist	George Meadows
Company	Hemmera

9.1 COMPLIANCE WITH TOR

Rescan Comment:

With respect to consultation, as per its definition and scope within the TOR, requirements of the TOR have been addressed in the Environmental Assessment.

Non-traditional land-use requirements of the TOR have been addressed in the Environmental Assessment.

Requirements related to the study area as defined in the TOR have been addressed in the Environmental Assessment.

NaiKun Response (included in Annotated Concordance Table):

No additional comment.

9.2 RESPONSE TO DETAILED COMMENTS – FIRST NATIONS CONSIDERATIONS

Comment #:1

Topic/Discipline: FN Consultation and Information sharing - Pre-Application Phase

Issue or Concern: information sharing gap

Page:12-5, 12-6

Rescan Comments/ Recommendation: Summary of information Provided to First Nations since 2006 is provided, though previous page mentions engagement and discussions since 2002. May be worth mentioning what type of info was shared in earlier project discussions

NaiKun Response: Primary focus of discussions prior to 2006 was on relationship building and commercial arrangements. As it was non-EA focused, relevant detail was not provided in the EA Application.

Comment #:2

Topic/Discipline: FN Consultation and Information sharing - Pre-Application Phase

Issue or Concern: Vague terminology on First Nations participation

Page:12-7

Rescan Comments/ Recommendation: Terms used to describe First Nations participation are vague (not quantified). Terms such as "invited to participate in a variety of consultation activities" or "participated to varying degrees" provide little clarity on their degree of involvement. Although this info is quantified later in the report, a few numbers here would help, as well as cross-referencing to specific pages where additional, quantified and further qualified information is provided.

NaiKun Response: NaiKun has kept detailed records of all meetings with participating First Nations during the pre-Application period. That said, NaiKun felt it more appropriate to define the nature and effectiveness of their relationships with the respective First Nations rather than to quantify them. If the Haida Nation would like specific numbers of meetings undertaken during pre-application, NaiKun can provide that information.

Comment #:3

Topic/ Discipline: Haida Information sharing

Issue or Concern: lack of partnership agreement details

Page:12-17

Rescan Comments/ Recommendation: Partnership agreement between Haida and NaiKun is mentioned, but without any details. Would perhaps be of benefit to include some details or add it as an appendix and reference it if the agreement is non-confidential. Otherwise state that the Agreement is Confidential.

NaiKun Response: Such Agreements are confidential and are not particularly relevant to a technical review of the EA Application. Commercial arrangements are not a requirement of the EA process nor the TOR and, as such, were not detailed in the Application.

Comment #:4

Topic/Discipline: cont'd

Issue or Concern: unquantified information throughout

Page:12-11/19

Rescan Comments/ Recommendation: Vague, non-quantified terms are used to describe level of collaboration, information sharing, and participation throughout this section (i.e. several, numerous, occasional, etc.). Also applies, though to a lesser degree, with other FN groups.

NaiKun Response: NaiKun has kept detailed records of all meetings with participating First Nations during the pre-Application period. That said, NaiKun felt it more appropriate to define the nature and effectiveness of their relationships with the respective First Nations rather than to quantify them. If the Haida Nation would like specific numbers of meetings undertaken during pre-application, NaiKun can provide that information.

Comment #: 5

Topic/Discipline: Metlakatla

Issue or Concern: Missing tables of reserve land base

Application Page: 12-28

Rescan Comments/Recommendation: Page 12-28 includes Metlakatla IR land base, but similar tables are lacking for Haida Nation, LaxKw'alaams and Gitxaala

NaiKun Response: Comment noted. NaiKun will prepare an updated table that includes this information for all participating First Nations.

Comment #: 6

Topic/Discipline: Reserves

Issue or Concern: Incorrect reserve size allocation

Application Page: 12-46

Rescan Comments/Recommendation: Text refers to the Gitxaala as having the smallest reserve size(1,885 ha) whereas the table indicates the Haida have a smaller total area of 1,811 ha.

NaiKun Response: Comment noted. NaiKun will make the appropriate revisions.

Comment #: 7

Topic/Discipline: Reserve demographics

Issue or Concern: Old Census data used

Application Page: 12-47

Rescan Comments/Recommendation: Statistics Canada 2001 Census has been used when 2006 Census data is available on Aboriginal communities (released May 2008). Why not use more recent data?

NaiKun Response: Comment noted. NaiKun will look into the potential for using this data and making the appropriate revisions.

Comment #: 8

Topic/Discipline: Labour, Mobility, Education

Issue or Concern: Data presentation

Application Page: Section 12.3

Rescan Comments/Recommendation: Use of percentages as well as absolute figures would be helpful in reviewing results and community characteristics

NaiKun Response: Comment noted. NaiKun will look into the potential for reporting this data using percentages.

Comment #: 9

Topic/Discipline: Potential project effects

Issue or Concern: Lack of cross-referencing in Table 12-23

Application Page: 12-63

Rescan Comments/Recommendation: As the table is not meant to replace mitigation measures mentioned elsewhere in the Application, appropriate cross-referencing within the table to the related mitigation measures found elsewhere within the Application would be helpful.

NaiKun Response: Comment noted. NaiKun will look into the potential for including such cross-referencing in a revised table.

10.0 SOCIO-ECONOMIC

Relevant Section of Application	Section 13: Socio-Economics
Rescan Specialist	Andrew Robinson, M.Sc.
NaiKun Specialist	Trina Gaddes, B.A. (Social Sciences)
Company	Hemmera

10.1 COMPLIANCE WITH TOR

Rescan Comment:

Requirements of the TOR for navigation, noise, marine traffic, marine safety and aviation effects have been addressed in the Environmental Assessment.

Socio-economic requirements of the TOR have been addressed in the Environmental Assessment for hypotheses #1 – 12. Socio-economic Hypotheses #13 – 15 relate to archaeology, while #16 – 18 relate to TU and although I assume they were addressed within their respective sections, I cannot comment to that effect.

Notably, however, the TOR cross-references potential biological effects (on shellfish and marine fish) of the project to their potential related socio-economic impact. Such cross-referencing is weak within the socio-economic Effects Assessment, but is perhaps more evident within the biological assessment. Although socio-economic impacts would be nearly impossible to model, acknowledging the possibility would benefit the assessment. Further, potential insurance costs from navigational risks to fishing vessels could be more strongly captured.

NaiKun Response:

Hypotheses #13 to #15 have been addressed in Section 11 of Volume 1 and in Volume 10 and Hypotheses #16 to #18 have been addressed as part of Section 12 of Volume 1 and arrangements have been made regarding maintaining the confidentiality of the TU studies at this time.

NaiKun has been actively consulting fisheries which operate in the area where the project is proposed, including the Area 'A' Crab Association, Sablefish Advisory Committee, Halibut Advisory Committee, Groundfish Hook and Line Advisory Committee and Groundfish Trawl Advisory Committee. With the exception of the Dungeness crab fishery (Area A), analysis demonstrates that most groundfish fisheries active in the region take place outside the footprint of the wind farm and therefore have the potential to interact with the project primarily within the cable route. Feedback from these consultations has indicated limited concerns, primarily related to the cable and fishing gear interactions and EMF. Given that NaiKun has committed to burying the transmission cables to a depth of at least 1 metre, interactions between fishing gear and the transmission cable are not considered likely. In addition, the assessment of potential effects related of EMF indicates that no significant effects on marine aquatic resources are expected

Insurance costs are specific to the vessels and operators qualifications and claim histories, and their policies. Additional information could be investigated during the review period.

10.2 RESPONSE TO DETAILED COMMENTS

Noted Relevant Concerns/ Comments Received from CHN: Review Socio-Economic assessment as they pertain to the Haida AND impacts on the crab fishermen

Sections of EA Reviewed: Section 13: Socio-Economics

Name and Section #s: Compliance with TOR

Issue of Concern: Requirements of the TOR for navigation, noise, marine traffic, marine safety and aviation effects have been addressed in the Environmental Assessment.

Socio-economic requirements of the TOR have been addressed in the Environmental Assessment for hypotheses #1 – 12. Socio-economic Hypotheses #13 – 15 relate to archaeology, while #16 – 18 relate to TU and although I assume they were addressed within their respective sections, I cannot comment to that effect.

Notably, however, the TOR cross-references potential biological effects (on shellfish and marine fish) of the project to their potential related socio-economic impact. Such cross-referencing is weak within the socio-economic Effects Assessment, but is perhaps more evident within the biological assessment. Although socio-economic impacts would be nearly impossible to model, acknowledging the possibility would benefit the assessment. Further, potential insurance costs from navigational risks to fishing vessels could be more strongly captured.

NaiKun/Hemmera response: Hypotheses #13 to #15 have been addressed in Section 11 of Volume 1 and in Volume 10 and Hypotheses #16 to #18 have been addressed as part of Section 12 of Volume 1 and arrangements have been made regarding maintaining the confidentiality of the TU studies at this time.

NaiKun has been actively consulting fisheries which operate in the area where the project is proposed, including the Area 'A' Crab Association, Sablefish Advisory Committee, Halibut Advisory Committee, Groundfish Hook and Line Advisory Committee and Groundfish Trawl Advisory Committee. With the exception of the Dungeness crab fishery (Area A), analysis demonstrates that most groundfish fisheries active in the region take place outside the footprint of the wind farm and therefore have the potential to interact with the project primarily within the cable route. Feedback from these consultations has indicated limited concerns, primarily related to the cable and fishing gear interactions and EMF.

Rescan's Final Comments / Recommendation: Given that NaiKun has committed to burying the transmission cables to a depth of at least 1 metre, interactions between fishing gear and the transmission cable are not considered likely. In addition, the assessment of potential effects related of EMF indicates that no significant effects on marine aquatic resources are expected.

Insurance costs are specific to the vessels and operators qualifications and claim histories, and their policies. Additional information could be investigated during the review period.

Socio-Economics

Comment #: 1

Topic/Discipline: Socio-economic effects

Issue or Concern: SECs not established up front

Application Page: Section 13

Rescan Comments/Recommendation: Socio-Economic Components are not clearly defined or described (as found within other EA documents) and it is not clear how they were identified. Would be helpful to have a summary table of SECs, descriptions and identification source.

NaiKun/Hemmera response: The SECs and potential interactions assessed are set out up front in a table in Section 13.1.4 Summary of Assessed Impacts.

Rescan's Final Comments / Recommendation Unchanged. However, this is primarily a preference in how information is presented (i.e. Rescan style adopts a different approach).

Comment #: 2

Topic/Discipline: Effects hypotheses

Issue or Concern: inconsistent employment pattern definition

Application Page: 13-3,13-4

Rescan Comments/Recommendation: Hypotheses 10 & 11 state that construction & operations will alter employment patterns, whereas hypothesis 12 claims that decommissioning will actually **create** new regional employment opportunities. Not sure how decommissioning is the only phase assumed to create such opportunities vs construction and operation.

NaiKun/Hemmera response: The construction and operations phase of the project are both considered to create employment opportunities. Language could be amended for consistency

Rescan's Final Comments / Recommendation: Unchanged. Recommendation stands for consistency and clarity.

Also, an additional 3 socio-economic hypotheses (on Traditional land use) and an additional 3 physical hypotheses (on fossil fuel use) have been added in this resubmission. These traditional land use hypotheses have been misnumbered (should be #13, #14, #15)

Comment #: 3

Topic/Discipline: Assessment methodology

Issue or Concern: assumptions on reversibility

Application Page: 13-5

Rescan Comments/Recommendation: Socio-economic conditions are presumed to be reversible if construction or operations cease. However, if tower bases have been installed in Dogfish Bank, these may potentially change the habitat and species distribution which would not necessarily be reversible. Further, impacts on crab fishing are presumed to be positive (may be negligible as well)

NaiKun/Hemmera response: The assumptions on reversibility are associated with adverse impacts and are not readily transferable to positive effects. As indicated in Volume 2, if decommissioning is required, offshore structures and supporting infrastructure will be dismantled and removed and the Project area will be returned to its natural state. Again, the natural variation in crab population makes it difficult to predict the effect of environmental change related to the removal of the foundations in the event that construction or operations cease.

Rescan's Final Comments / Recommendation: Issue clarified by this response.

Comment #: 4

Topic/Discipline: Operation and Maintenance activities and facilities

Issue or Concern: Crab and fishing impacts absent

Application Page: 13-12,
13-13

Rescan Comments/Recommendation: Assumes there will be no impact or interaction with crab and fishing activities during operations. Possible fishing effects are only noted for construction and decommissioning.

NaiKun/Hemmera response: The impacts of the operations phase on the crab fisheries are considered to be more or less the same or less than during construction. Potential interactions with commercial fisheries during operations are identified as Effect #8 in Section 13.5.5.2 and summarized in Table 13.6.

Rescan's Final Comments / Recommendation: As this is discussed in Section 13.5.5.2 and Table 13.6, it should be included within the summarized bulleted list on page 13-13 for clarity and consistency.

Comment #: 5

Topic/Discipline: Communities effects assessment - existing conditions

Issue or Concern: more detail required on economic options

Application Page: 13-14

Rescan Comments/Recommendation: The report states there has been a substantial shift away from traditional sectors of employment in the region. It would be helpful to note a shift towards *what* to give a high level impression of how much/little economic diversification exists within the region. If not an actual shift, suggest using different term.

NaiKun/Hemmera response: This statement has been replaced in application documents submitted May 6, 2009 and now generally refers to declining traditional sectors such as forestry and fishing.

Rescan's Final Comments / Recommendation: Issue clarified by stating "decreasing reliance on more traditional sectors"

Comment #: 6

Topic/Discipline: Project interactions with community services

Issue or Concern: Table does not match following text

Application Page: 13-17

Rescan Comments/Recommendation: In the text that follows the table, project effects are sometimes stated to be negligible, yet are included in the table as requiring further study (CF). This inconsistency is not defined or described. Further the text includes 5 SECs, but the 5th SEC (increase in traffic) is not included as a SEC on Infrastructure. Renders table confusing to read.

NaiKun/Hemmera response: Items marked CF are determined to require further assessment as they are considered likely to have some potential interactions with project activities. However, with the proper mitigation measures applied during the assessment the residual effects were found to be negligible. This is in-line with the methodology for the EA. Transportation and access falls under the broader Community Services SEC.

Rescan's Final Comments / Recommendation: Issue clarified without changes needed to document.

Comment #: 7

Topic/Discipline: Decommissioning (Socio-Ec and Economics Assessment)

Issue or Concern: Lack of data

Application Page: 13-23, 13-51

Rescan Comments/Recommendation: No effects related to closure. Although decommissioning is several decades away, it is known that roughly 60 jobs are required during operations. Although baseline conditions and potential impacts of losing these jobs remain highly speculative due to the time-frame, acknowledging the potential job losses as well as mentioning possible mitigation/retraining options would be beneficial.

NaiKun/Hemmera response: Section 13.3.6 of the application describes actions planned for each phase of the project, including decommissioning. Training and education programs will be initiated in advance of any closure to facilitate re-employment elsewhere.

Rescan's Final Comments / Recommendation: Issue clarified without changes to document. Mitigation and management is discussed for all project phases in summary form. Would be beneficial to break these down (or integrate into a table) for which mitigation measures apply to which respective phase. Recommendation remains as it is unclear whether training and education programs relate to the decommissioning phase.

Comment #: 8

Topic/Discipline: Table 13-2

Issue or Concern: Figures (i.e. rankings) from TORs absent.

Application Page: 13-25

Rescan Comments/Recommendation: Table columns (duration, frequency, geographic extent and magnitude) use a scoring/ranking from 0 - 4 which are defined in TOR. It would be helpful for public, First Nations and stakeholder readers to include this ranking/scoring again here for readability.

NaiKun/Hemmera response: Explanation of effects characterization is provided in Volume 1 Section 4.6.

Rescan's Final Comments / Recommendation: Issue clarified without changes to document. Note: this is essentially a cross-referencing issue.

Comment #: 9

Topic/Discipline: Land Use - residual project effects

Issue or Concern: Lack of defined mitigation options

Application Page: 13-30 to 13-33

Rescan Comments/Recommendation: Though project details are not finalized and there is mention of how land use changes may alter access or use of a site, examples of potential mitigation strategies would be useful. Stating "on-going consultation" with land users and owners is insufficient.

NaiKun/Hemmera response: On-going consultation will allow NaiKun to ensure that local land users and owners are able to provide input to minimize interruption to their use of project sites. Local input has already guided NaiKun in such decisions as choosing potential landing sites in Tlell.

Rescan's Final Comments / Recommendation: Issue clarified without changes to document. However, as land use is limited to cable landfall (i.e. very limited area) impact is expected to be negligible. Nevertheless, a discussion (or listing) of potential mitigation strategies adopted in other landfall situations would still be helpful (even if not necessarily required).

Comment #: 10

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Spatial Scope

Application Page: 13-37

Rescan Comments/Recommendation: Three different spatial areas are mentioned, however it is unclear as to which area the effects assessment is being made for in reading the text.

NaiKun/Hemmera response:

Comment #: 11

Topic/Discipline: Economic Effects Assessment

Issue or Concern: description of GDP

Application Page: 13-38

Rescan Comments/Recommendation: Need to state that GDP is measured in basic prices if this is the case (which is typically the case). Some statements are misleading/ inaccurate. Suggest removing "... based on the amounts spent on goods and services supplied, less the costs expended by the supplier in providing those goods and services, as Project investment cascades through the supply chain" as this implies GDP simply equals the final value of goods and services minus the cost of production, which is not technically correct. Also the sentence which begins "This GDP value-added is measured in terms of labour...." is also misleading. Make sure that what is written is strictly accurate.

NaiKun/Hemmera response:

Comment #: 12

Topic/Discipline: Economic Effects Assessment

Issue or Concern: List of SECS

Application Page: 13-39

Rescan Comments/Recommendation: The effects assessment doesn't appear to link the effects of the Project with the identified SECS (e.g. using sub-headings). Furthermore, it seems strange to assess the Project's effects on expenditure. Suggest framing in terms of economic development.

NaiKun/Hemmera response: The selection of the SECS provide a broad framework for the range of effects associated with the project. While they are not referred to in sub-heading the effects fall within each of these categories of SECS. Clarification could be made. The expenditure SEC was at the request of the EAO and economic development is considered as part of economic diversification.

Rescan's Final Comments / Recommendation: The discussion of the effects is still not clearly linked to the SECS. Table 13-5 still shows expenditure as a socio-economic component to be affected by the Project (as per EAO's request), however it is a component of the project which will generate effects which are listed under the Project Activities and Physical Works (e.g. demand/ expenditures for goods and services/ business growth opportunities)

Comment #: 13

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Table 13.5 and Broadening the economic base of the region

Application Page: 13-39

Rescan Comments/Recommendation: First row under construction, "Project investment in the local and provincial economy" should arguably read CF under SEC#3 And a discussion of "Broadening the regional economic base" effect should be included for construction also?

NaiKun/Hemmera response:

Comment #: 14

Topic/Discipline: Economic Effects Assessment

Issue or Concern: BCIOM model

Application Page: 13-40

Rescan Comments/Recommendation: BCIOM is not a regional model. It is a provincial model. There needs to be some clarification around this fact and explicit mention of assumptions made to arrive at regional estimates. Furthermore, there is no mention of the models assumptions/weaknesses (e.g., based on 2004 economy, etc).

NaiKun/Hemmera response: Full details of the BCIOM methodology and assumptions is included in Volume 11 Section 11.4.4.

Rescan's Final Comments / Recommendation: Issue partially clarified. BCIOM now correctly described as a provincial versus regional model. However assumptions/information used to derive regional estimates still need to be made explicit. Not sure it is relevant to discuss BCIOM in baseline, as BCIOM analyses effects of project not baseline conditions.

Comment #: 15

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Effect on GDP

Application Page: 13-41, 13-46

Rescan Comments/Recommendation: Contribution to GDP in construction is approximately double that of operations, yet they are assigned same magnitude. Why?

NaiKun/Hemmera response:

Comment #: 16

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Discussion of projected GDP in relation to 2007 GDP

Application Page: 13-42,

Rescan Comments/Recommendation: Need to be aware that the model does not account for inflation and is based on 2004 or 2005 BC economy, so that comparing model GDP data to 2007 GDP data must be done with caution.

NaiKun/Hemmera response:

Comment #: 17

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Rationale for effects not being significant is not strong

Application Page: 13-42, 13-46, 13-48

Rescan Comments/Recommendation: E.g.s, Not significant due to "temporary nature of investment" , "revenues will cease at the end of the Project" and "given the localized nature of the effect" Are these assessments specific to the province or Haida Gwai? Perhaps significant at the most local level. Need to clarify throughout Economic Effects Assessment in text to help with rationale.

Comment #: 18

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Sentence does follow-on/ make sense

Application Page: 13-42, 13-46

Rescan Comments/Recommendation: "Estimates from the Proponent on direct government revenues from permit fees, taxes and levies not provided for the BCIOM analysis are also incorporated in the relevant portions of this assessment" This sentence doesn't flow with prior sentence. Also, isn't this is the most appropriate place to incorporate such data?

NaiKun/Hemmera response:

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Comment #: 19

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Decrease in access to marine harvesting areas

**Application Page: 13-45,
13-49**

Rescan Comments/Recommendation: Not specifically addressing the fact that fisheries may suffer income losses. Need to mention this and assess this, even if quantitative data cannot be generated. In addition, discussion is limited to crab fishing and no discussion or acknowledgement of marine fishing impacts.

NaiKun/Hemmera response: The commercial crab fishery was the focus of the assessment as it is considered the most likely to be affected. The other commercial fisheries have been consulted with and raised no immediate concerns with their ability to access their fishing grounds as a result of the project. The

variability in annual crab landings and revenues make it difficult to attach any monetary value to the potential loss in income as a result of the wind farm construction, operations or decommissioning. An assessment of a range of potential changes in revenues is included in Volume 11.

Rescan's Final Comments / Recommendation: Still not addressed. This effect is framed as a change in access which relates to land/ resource use. Need to acknowledge potential loss in income among those relying on marine harvesting activities for their livelihoods. Hemerra 's response comment was "An assessment of a range of potential changes in revenues is included in Volume 11." however effects should be discussed in assessment not baseline.

Comment #: 20

Topic/Discipline: Economic Effects Assessment

Issue or Concern: average crab landings reduction of 2.4% -2.8% (project) vs 40% - 400% ("natural" variation)

Application Page: 13-45

Rescan Comments/Recommendation: Seems questionable that the Project has such a small range of variation compared to observed "natural" or harvest variation. Surely if natural variance is so large, one would assume that crab populations are very sensitive to any change in their environment. Suggest that further justification be provided in this section.

NaiKun/Hemmera response: If the crabbers cannot fish within the WFA at all this equates to an exclusion zone of 6% from the total 'fished area' of sub-area 102-1. The 40 to 400% refers to the variability in the total landings set out in Table 11-41 which shows a variability of between -40% to 400% change between years. i.e. between 2000 and 2001 the landings (lbs) increased by 400% and between 2001 and 2002 they declined by 40% (though still relatively high landings). According to the three scenarios (Full exclusion zone, 50 m exclusion and 100m exclusion zone) there is a potential for decreased landings and revenues of between 0.06%(for 50 m exclusion zone) to 2.4%(for full wind farm grid exclusion zone). The value of the product taken from any of these 'lost catch' scenarios will vary widely year to year depending on the crab population for each year.

Rescan's Final Comments / Recommendation: Is this just the effects of having an area of fishing excluded or is this based on disturbance from construction activities? Beyond the impacts of not being able to access the area, it is of interest to know the extent to which marine habitats could be disturbed by physical construction activities and the economic implications?

Further, with the presumed "presence" of Dungeness crab in the vicinity of the towers due to the new/emerging food supply, an issue will be whether a % of the resident population shifts to the WFA, thus fewer crab are available for commercial catch, OR if the total population increases, thus no significant change in crab available for catch. Accordingly, crab landings and level of effort should be monitored throughout the duration of the project.

Comment #: 21

Topic/Discipline: Economic Effects Assessment

Issue or Concern: 500m Navigation Zones

Application Page: 13-45

Rescan Comments/Recommendation: Disturbance to Fisheries noted, but no clear description on benefits of this mitigation. Presumably regeneration period?

NaiKun/Hemmera response: The 500m exclusion zone is instituted mainly for the safety of both the fishers and the construction crews during construction.

Rescan's Final Comments / Recommendation: Clarified that this is not mitigation but necessary practice.

Comment #: 22

Topic/Discipline: Economic Effects Assessment

Issue or Concern: "estimated directly staff"

Application Page: 13-46

Rescan Comments/Recommendation: suggest "direct" vs directly

NaiKun/Hemmera response: Comment noted.

Rescan's Final Comments / Recommendation: Change still recommended.

Comment #: 23

Topic/Discipline: Economic Effects Assessment

Issue or Concern: direct employment low for province

Application Page: 13-46

Rescan Comments/Recommendation: In relative terms, arguably employment creation would be negligible for province and minor for region.

NaiKun/Hemmera response: There is low level employment created but it is acknowledged that the scale of employment generated is not considered significant.

Rescan's Final Comments / Recommendation: Change still recommended. Best to make a distinction between effect on region vs province due to dilution of effect over greater area.

Comment #: 24

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Decommissioning

Application Page: 13-50

Rescan Comments/Recommendation: Effects will always be speculative to some degree in the future but you can still predict key effects resulting from the decommissioning of the project such as reduced expenditures, reduced employment, business opportunities, etc. The future economic environment is uncertain, and as such it is unknown if alternative projects will offset effects. However it is important to acknowledge what will predictably occur when a project ends.

NaiKun/Hemmera response:

Comment #: 25

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Follow-up and Monitoring

Application Page: 13-50

Rescan Comments/Recommendation: Use more meaningful language "will" versus "should"

NaiKun/Hemmera response:

Comment #: 26

Topic/Discipline: Economic Effects Assessment

Issue or Concern: Mitigation and Management

Application Page: 13-51

Rescan Comments/Recommendation: Language is very vague. Can you provide more detail somewhere in the EA?

NaiKun/Hemmera response: More detail of NaiKun's commitment to employment and economic development is included in Volume 1 Section 19 'Commitments'.

Rescan's Final Comments / Recommendation: Details provided on top of page 13-44 under marine harvesting effects, on page 13-45 at the bottom of direct employment and under Effect 6 on page 13-47 should be added to mitigation section to bolster this section or cross referenced.

Comment #: 27

Topic/Discipline: Table13-12

Issue or Concern: Same number used for SEC

Application Page: 13-71

Rescan Comments/Recommendation: SEC #12 used for two different SECs (Country Foods and EMF)

NaiKun/Hemmera response: Typo to be amended.

Rescan's Final Comments / Recommendation: Unchanged. SEC numbering error in table heading not corrected.

Comment #: 28

Topic/Discipline: Residual project effects - Public Health

Issue or Concern: Dust and GHG mitigation
(EC #1 Air Quality)

Application Page: 13-73

Rescan Comments/Recommendation: Could also include use of electric or hybrid vehicles

NaiKun/Hemmera response: Comment noted.

Rescan's Final Comments / Recommendation: Unchanged in resubmission.

Comment #: 29

Topic/Discipline: Public health - Construction EC#4 Country foods

Issue or Concern: additional resource needed

Application Page: 13-75

Rescan Comments/Recommendation: Mention of mitigation plans within the 'Environmental Management Plan - **Construction**', but unable to assess mitigation measures as no copy of the EMP was provided. Perhaps in other Section?

NaiKun/Hemmera response: Included in Volume 2 and Section 15.

Rescan's Final Comments / Recommendation: OK, cross-referenced to other section within text would be helpful.

Comment #: 30

Topic/Discipline: Public health - Operations EC#4 Country foods

Issue or Concern: additional resource needed

Application Page: 13-78

Rescan Comments/Recommendation: Mention of mitigation plans within the 'Environmental Management Plan - **Operations**' but unable to assess mitigation measures as no copy of the EMP was provided. Perhaps in other Section?

NaiKun/Hemmera response: Included in Volume 2 and Section 15.

Rescan's Final Comments / Recommendation: OK, cross-referenced to other section within text would be helpful.

VISUAL RESOURCES

Relevant Section of Application	Section 13.6: Visual Resources
Rescan Specialist	Rose Spicker B.Sc., ADP (GIS)
NaiKun Specialist	Trina Gaddes, B.A. (Social Sciences) / Warren Nimchuk,
Company	Hemmera / Timberline

10.3 COMPLIANCE WITH ToR

Rescan Comment:

TOR in 11.3-1 states that computer-generated images of the wind farm, substations and overhead transmission line from different vantage points and climatic conditions are provided.

In the EA they have computer-generated images of the wind farm at different times of the day from different vantage points. All renders were in good climatic conditions. The EA mentions that in poor climatic conditions the wind farm would likely not be visible but there are no renders showing this.

There were no renders of the substations or overhead transmission line.

NaiKun Response (included in Annotated Concordance Table):

The professional opinion of those who modeled the wind farm view-scapes was that producing the views for poor weather was redundant. The views provided indicate the most visible images of the wind farm and for the purpose of assessing the visual impacts of operation, the assessment was completed for the most impacted viewpoint. Modeling the viewpoints in poor weather would not change the conclusions of the assessment.

Consideration was given to modeling the overhead transmission line on Kaien Island to address views from the forest land. However, the views were expected to be limited by terrain and forest cover. Should modeling of these views be necessary it can be completed during the review period.

10.4 RESPONSE TO DETAILED COMMENTS – VISUAL ASSESSMENT

Comment #: 1

Topic/Discipline: Viewpoints

Issue or Concern: Locations

Application Page: 13-57

Rescan Comments/Recommendation: It would be helpful to have a map in this section showing the locations of the viewpoints assessed

Naikun/Hemmera Response: A map is provided in Volume 11 Figure 11-64.

Comment #: 2

Topic/Discipline: Viewpoint Analysis

Issue or Concern: Viewshed Analysis and Hassell Matrix Assessment

Application Page: 13-57/58

Rescan Comments/Recommendation: Results of the analysis aren't shown. Figures showing the results of the viewshed analysis and/or a table showing the results of the Hassell Matrix on all viewpoints should be provided.

Naikun/Hemmera Response: As is standard practice, for the purpose of assessing the visual impacts of operation, the assessment was completed for the most impacted viewpoint. Data could be provided if required but would not change the conclusions of the assessment.

Comment #: 3

Topic/Discipline: Renderings

Issue or Concern: Image quality

Application Page: 13-59

Rescan Comments/Recommendation: Pdf quality of renders too low to clearly see the renders

Naikun/Hemmera Response: High resolution images have been provided.

Comment #: 4

Topic/Discipline: Visual assessment modeling images

Issue or Concern: Image locations

Application Page: 13-62

Rescan Comments/Recommendation: Incorrect link to modeling images (should be Volume 11)

Naikun/Hemmera Response: This has been corrected.