Comment	Response
Offshore – 3. Alternate Offshore Loading System The C-NLOPB requested a side-by-side risk profile for the two alternatives. EMCP responded "*EMCP is no longer considering this option*.". The C-NLOPB questions "which option"?	The option that is no longer under consideration is the direct offload option, as was described in the updated project description.
EMCP Comment 4: C-NLOPB 3 It appears EMCP has not understood the C-NLOPB's response, in that EMCP has narrowly focused on a pumping system, where the pumps used to pump mud down the hole are used to generate sufficient head to move cuttings to higher levels of the platform, where CRI is located. The C-NLOPB does not dispute EMPC assertion that under this pumping scenario, hydrostatic head may exceed that of the substrate and the integrity of the well bore could be compromised. What the C-NLOPB has put forth is that once the cuttings are on the platform, a hydraulic break [i.e. a tank] with a pumping system that would lift a fluid [mud] to whatever height one wishes be installed. Since this is a separate pumping system not connected to the one that circulates mud in the hole, well bore pressure is not affected because the pumps used to circulate mud in the well bore would only create sufficient pressure to return the cutting to the lower level of the platform, as EMPC has proposed to do in the CSR. EMCP's statement that "The proposed pumping system would challenge well bore integrity by imposing hydrostatic loads on the wellbore…" is simply irrelevant as they have failed to consider introduction of a hydraulic break. The proponent states properties of cuttings are based on samples captured from the Hibernia Platform. The Proponent has not made a connection between the geology of the formation the Hibernia platform drills trough and that of geology obtained from Hebron drilling programs. For such assertions to be valid, the proponent needs to provide a comparison of the geology of the Hibernia formation to that of Hebron to show they are similar.	The overall waste management strategy is to ensure sufficient injection capability for the waste that poses the highest potential environmental risk. In the case of drilling operations, this will be the Non-Aqueous Drilling Fluid- (NADF-) related cuttings. Injecting Water-Based Drilling Fluid (WBDF) and related cuttings into a subsurface injection zone would consume capacity of available zones to accept the NADF related cuttings.. While studies are ongoing, preliminary assessment of candidate zones at the Hebron location indicate less capacity exists compared to the offset operation, Hibernia. Hibernia has experienced challenges with its waste injection program in that capacity has been reached in specific wellbores where injection has been used only for NADF-related cuttings. Three wellbores have been used for waste injection, whereas the original program only envisioned two. Hebron has a lower well count than Hibernia, and as such, is exposed should primary candidate wellbores fail to accept the targeted volume. For Hebron, the WBDF used in the upper hole sections, and which will be discharged to sea, will be primarily composed of seawater, with some added viscosifiers. Since a very simple low density drilling fluid is required, there is little else, including very little barite, needed in the upper hole sections. Discharge of WBDF and related cuttings has been proven to pose little environmental risk, as previously described in the Hebron Comprehensive Study Report (EMCP 2010). In addition, microcosm and field studies conducted to date (Neff 2010) on the effects of WBDF and related cuttings discharges (from studies conducted in North Sea, Barents Sea, Off Sakhalin Island,

Comment	Response
The Proponent has provided its objectives for disposal of cuttings with a reference to disposal at the Hibernia project. This does not address that disposal formations capacity has not been demonstrated or shown by the proponent or, as more detailed information is gained through injection of cuttings, that the proponent will reassess injection of WBM and cuttings. The description of the disposal formation capacity is relevant.	Beaufort Sea) on the environment have shown: • no or minimal short term effects on zooplankton communities • effects on benthic macro- and mega-faunal communities are minimal and restricted to approximately 100 m • no evidence of ecologically-significant bioaccumulation of metals and petroleum hydrocarbons by marine organisms residing or deployed in cages near WBDF and related cuttings discharges • no evidence of toxicity effects associated with WBDF constituents • ecological effects are due to physical disturbances of water column and benthic environment • ecological effects associated with WBDF and related cuttings are similar to physical disturbances associated with natural process, such as ice scour, river floods, and storms • benthic communities, if affected at all, recover quickly from WBDF and related cuttings The most abundant metal (and contaminant) in most WBDF and related cuttings is barium, with nearly all the barium in drilling fluid in the form of inert barite ($BaSO_4$), which is added when it is necessary to increase the drilling fluid's density (Neff 2005). Using barium as a tracer, the zone of detection for both single and multiple wells found that background levels for barium were achieved at 1,000 to 3,000 m from the drill source. The extent of barium contamination has been confirmed by the Grand Banks Environmental Effects Monitoring (EEM) programs. Drill cuttings releases at White Rose and Terra Nova are a mixture of WBDF and related cuttings and NADF-related cuttings, all which contain barium as an available tracer. Background barium concentrations have been achieved at Terra Nova within 1,000 to 2,000 m from drill source (Suncor Energy 2010) and within 2,400 m at White Rose (Husky Energy 2009). Hibernia

Comment	Response
	has been discharging only WBDF and related cuttings since 2002, although prior to Q3 2002, WBDF and related cuttings, as well as NADF-related cuttings were released. Barium concentrations remain elevated out to 500 m from the Hibernia discharge point. The results beyond 500 m are comparable to baseline levels (Stantec 2009). In respect of WBDF and related cuttings, recovery begins as soon as discharge of drilling wastes is completed and often is well advanced within a year. This was demonstrated by Daan and Mulder (1993, 1996), who studied the effects of WBM discharges from a platform in the Dutch Sector of the North Sea, where surveys were performed two months and one year after completion of drilling. These surveys revealed no measurable adverse effects on the benthic community, even at stations as close as 25 m from the discharge (the transect studies ranged from 25 to 5,000 m down-current from the WBM discharge). Only small amounts of drilling fluid and cuttings solids were detected in sediments near the platform, suggesting that the discharged solids were transported away from the site and diluted to non-detectable concentrations within two months after completion of drilling. As described in the CSR, and supported by the above effects summary, the residual environmental effect of disposing WBDF and related cuttings has been assessed as not significant; injection would not change this assessment. In contrast, injecting WBDF and related cuttings into a disposal reservoir, will put the available capacity of the disposal reservoir for NADF-related cuttings at risk, and is misaligned with EMCP's overall waste management strategy.

Comment	Response
EMCP Comment 5: C-NLOPB 4 The Proponent appears not to have contemplated how natural convection, as proposed, will achieve the desired effect. For the propose of this environmental assessment, the proponent should consider the need to add chemicals, i.e. biocides, to the as the worst case and should assess their use on the receiving environment. If the use of chemicals has not been assessed, it may be necessary for the proponent to amend its environmental assessment to account for the use of chemicals. The proponent should set aside the natural convection theory and assess a worst case, the use of chemicals so that if chemicals need to be used the Proponent will not have to amend its environmental assessment.	The use of biocides as a controlling agent for biological growth in the processing systems has been identified in Chapter 2. Any biocides used will be screened in accordance with an approved and established chemical management system. The discharge of waste streams, including biocides, have been assessed within the CSR. Therefore, if biocides are to be used in the GBS shaft, it is predicted that there will be a not significant environmental effect. The Operator will identify, in its EPP, any biocide that may used and the concentrations that may be discharged to the marine environment.
EMCP Comment 8: C-NLOPB 6 It is understood that reinjection of produced water into a producing reservoir has certain risks which, if not mitigated, can have a serious effect on the quality and volume of oil recovered. Some of these risks are difficult to address until production has commenced and volumes of produced water obtained. EMCP appears to have taken an all or nothing approach to reinjection of produced water, and is unwilling to consider other options to dispose of produced water or the possibilities to re-inject a portion of produced water. The proponent has not presented information to preclude injection of some of the produced to a non-producing reservoir or that injection of produced water into selected parts of the reservoir is not possible. The proponent has not addressed if additional equipment may be required for the successful reinjection of produced water as mentioned in the C-NLOPB's response. The proponent has focused on the fact that no significant effects on the receiving environment due to the discharge of produced water have been detected to justify the discharge of produced	It is EMCP's understanding that the purpose of environmental assessment is to identify potential environmental effects of project activities, apply mitigation, where warranted, to reduce these environmental effects, and with the application of mitigation, determine the significance of the residual adverse environmental effects. As such, the potential environmental effects that may be associated with the discharge of produced water into the marine environment for each Valued Ecosystem Component (VEC) was fully assessed in the Comprehensive Study Report (CSR) and determined to be not significant. Notwithstanding the results of the environmental assessment, EMCP has undertaken a feasibility assessment of produced water re-injection (PWRI). Furthermore, pending the results of additional studies, EMCP has committed to establishing PWRI, once it is demonstrated that the risks are manageable and costs are not prohibitive. The CSR provided an evaluation of the applicability of "best available / practicable technology (e.g., PWRI), as outlined in the Scoping Document (C-NLOPB *et al.*

Comment	Response
water. EMPC has stated meeting the a 44 mg/L daily oil concentration for produced water may be challenging but is unwilling to consider that with reinjection of produced meeting this oil content is irrelevant nor the implication of not meeting this target may have on their operation. The proponent has not also considered produced water reinjection comparing CO_2eq estimates (150,000 t of CO_2eq being released into the atmosphere annually) to other alternatives or to CO_2eq from degradation of discharged oil.	2009). In addition, the Platform design includes the best proven technology currently available today for the treatment of produced water prior to overboard discharge. An assessment of the various options for partial re-injection of produced water is not necessary for determination of significance. The determination in the CSR, regarding the residual environmental effects associated with the marine discharge of treated produced water, as not significant would not change should PWRI be implemented. While there may be questions regarding the technical feasibility of PWRI, the Produced Water Management Strategy (submitted as a Part 2 document to the Development Plan) addresses some of these issues in greater detail. With regard to the potential to dispose into multiple reservoirs, EMCP undertook an evaluation to identify non-producing subsurface formations that could potentially serve as repositories for produced water. Screening of wireline well logs and mud logs revealed only two prospective non-producing formations that would merit quantitative analysis of their potential water storage capacity. These units were subjected to preliminary investigation as possible storage compartments for Hebron produced water. Screening-level calculations were performed to estimate the thickness trend, average net-to-gross, average porosity and, subsequently, the net pore volume of these sand members within the Hebron Unit boundary. Results indicated that these sand members were predicted to have far too little combined storage capacity to accept the forecasted volume of produced water over the life of the Hebron Project. As indicated in the Development Plan (EMCP 2011), pre-investment has been made in the water injections system design to allow for PWRI to be initiated at a later date. This pre-investment includes deck space and connections for the future installation of the low-pressure incremental equipment required to route produced water into the water injection system. With regard to $C0_2$ equivalent estimates, the figure given for

Comment	Response
	greenhouse gas equivalents applies to the case of produced water disposal (*i.e.*, into a non-producing reservoir) and recognizes that there is significant additional energy required to concurrently inject produced water for disposal in addition to seawater injection for reservoir pressure maintenance. This is different from PWRI where produced water is used for reservoir pressure maintenance. If PWRI could be realized for pressure maintenance (needs further study given the potential reservoir impacts discussed), then the difference between greenhouse gas emissions from PWRI compared to seawater injection would be negligible
EMCP Comment 9: C-NLOPB 7 See C-NLOPB Response to EMCP Comment 8: C-NLOPB 6.	See preceding response.
EMCP Comment 10: C-NLOPB 8 The proponent is reminded that a further review of the technologies employed and that they are reasonable to minimize emissions to as low as reasonable practicable, will be applied at the development plan stage.	Noted.
EMCP Comment 24: EC 10 Environment Canada is satisfied with this response, providing the information to EC once the detailed design process has advanced is acceptable. Clarification to comment (received May 12, 2011) 1. Regarding graph 3-14: In the column to the right, the title should be *"Derived ice thickness based on the medium ice type" (max cm for category)* 2. Regarding Figure 3-13: After rechecking the data, the figure refers to CIS atlas for the period 1971-2000, not CIS charts for the 1983-2008 period. 3. Regarding figure 3-25: The data doesn't agree with CIS ice charts from 1978-2008. Maybe the reference to the	**1) The table will be amended.** **2)** Figure 3-13 cites the Source as Canadian Ice Service 2001, which is the CIS atlas for the period 1971-2000. From list of references: CIS (Environment Canada Canadian Ice Service). 2001. *Sea Ice Climatic Atlas: East Coast Canada, 1971-2000.* Ottawa, ON. **3) The figure referenced should be Figure 3-35. The reference to CIS (1978-2008) will be removed.**

Comment	Response
CIS charts (1978-2008) could be removed.	
EMCP Comment 28: EC 14 <u>EC 14 a and b, on the Offshore Wind Climate</u> Clarification on the source for the platform winds being Ocean Ltd archives, rather than ICOADS as assumed, is acknowledged. **Request**: Specify, in the revised CSR, the source for the platform winds (Oceans Ltd archives, based on MANMAR data), since this was not indicated. This should also specify that MANMAR refers to reports generated in ship code format (World Meteorological Organization (WMO)-FM13) for transmission on the Global Telecommunications System (GTS).	**Response: The text in Section 3.2.1.2 will be revised as follows:** Low pressure systems crossing the area are more intense during the winter months. As a result, mean wind speeds tend to peak during this season. Mean wind speeds at Grid Point 10632 (approximately 5 km south of the Hebron Platform location) and in the MANMAR **(refers to reports generated in ship code format (World Meteorological Organization (WMO)-FM13) for transmission on the Global Telecommunications System (GTS))** data sets peak during the month of January (Table 3-23). A description of the data sources used is provided in EMCP (2010). MANMAR data sets are 10-minute average winds. For consistency, wind speeds from the MSC50 data set have been adjusted to 10-minute mean wind speeds. The adjustment factor to convert from 1-hour mean values to 10-minute mean values is usually taken as 1.06 (US Geological Survey 1979). **Oceans Ltd. archives, based on MANMAR data, are the source for the Platform winds.** **Note that the citation to Oceans and AMEC (2010) has been revised as EMCP (2010) and the list of references cited have been revised as follows:** EMCP (ExxonMobil Canada Properties). 2010. Physical Environment Setting for the Hebron Nearshore and Offshore Project Areas. Prepared by Oceans Ltd. (Physical Environment Setting for the Hebron Nearshore and Offshore Project Areas) and AMEC Earth and Environmental Ltd. (Physical Oceanography Setting for the Hebron Nearshore and Offshore Project Areas) in support of the Hebron Project Comprehensive Study Report.
<u>EC 14 c and d, on the Offshore Wave Extremal Analysis</u>	**1a)** The calibration equation and reference will be included in the

Comment	Response
1) The cited reference (Berek and Wang 2009) was provided as requested, although it only states that it was a memo, and does not give number of pages. This was cited in the Nov. 2010 response to request for information about how the MSC50 hindcast significant wave heights (Hs) were calibrated to Hibernia measurements, prior to development of the design wave criteria (as described in CSR Section 3.2.2.1 Waves, referencing ExxonMobil Upstream Research Company (2009)). The Nov. 2010 response gave the calibration equation derived by Berek and Wang 2009 ($H_{s,calibrated} = 1.0507*H_{s,hindcast} – 0.4793$). Only the first 2 years of the detailed Hibernia wave radar measurements are available on the Integrated Science Data Management (ISDM) online archive at Fisheries and Oceans Canada. The Nov 2010 response indicated that the Hibernia wave radar data are considered proprietary and are not being provided to ISDM, even though ISDM is the repository for the detailed wave measurements provided by wave buoys at the other sites on the Northern Grand Banks. Thus most of the detailed wave radar data, on which the calibration equation was based, are not available and are of unknown quality. **Request:** **a)** Include the calibration equation and its reference in the revised CSR in the section on wave extremes, along with the information that the calibration was based on MIROS Wave Radar measurements from Hibernia, rather than nearby wave buoy measurements. **b)** Include in the revised CSR or a background supporting document, validation information (or a published reference), if available, for the Hibernia MIROS wave radar measurements compared to nearby wave buoy measurements. If not available, it may be advisable to consider such comparisons for any further more detailed design studies.	appropriate section under Chapter 3. Regarding the MIROS Wave Radar data, our stated response in our March 2011 Response to Comments was: **28-EC-14-d:** The MIROS wave radar is the source of all wave observations from the Hibernia platform, including the later wave data in the MANMAR reports from Hibernia. Oceans Ltd. is responsible for archiving and quality controlling all MIROS wave data from the Hibernia platform and, as such has access to all wave data including those in the C-NLOPB archives. Since this data had not been quality controlled at the time of the report nor had it been made available in the ISDM and C-NLOPB archives, it was still considered proprietary to Hibernia Management and Development Corporation and therefore was not used in this report. As stated above, these data were not used in the report. Our November 2010 response did not state that the data were proprietary. Rather, our March 2011 response indicated that the data, as they have not been released to ISDM, are considered proprietary by Hibernia Management Development Company and not available to the Hebron Project, and therefore were **not** used in the report. **1b)** See above response regarding the Hibernia MIROS data. These data were not used in the report as it had not yet been released to ISDM. Regarding future environmental assessments, if such data are available, they will be considered, where appropriate to the scope of the environmental assessment. **1c) The reference will be revised as follows:** ExxonMobil Upstream Research Company. 2009. Hebron Project Metocean Design Criteria. Memo dated 2 September 2009. 91 pp. **2)** For the purposes of environmental assessment, the data

Comment	Response
c) Complete the CSR Reference for ExxonMobil URC (2009) to indicate that it is a Memo dated 2 September 2009, 91 p. (as indicated by the Oceans Ltd and AMEC (2010), AMEC (2010) report). **2)** The Nov 2010 response states that the calibration leads to a reduced operation criteria and increased extreme criteria. However the CSR extremal analysis in Section 3.2.2.6 and the Oceans Ltd and AMEC (2010) report-Oceans Ltd (2010), which appears to be based on MSC50 data without the Berek and Wang calibration, gives 100-yr extreme significant wave heights that are slightly higher: 15.1 m or 15.8 m, depending on the method, compared to 14.8 m from ExxonMobil URC 2009. **Request:** In the revised CSR, please indicate the level of uncertainty or confidence interval for the extreme wave estimates, given the different results presented in the CSR and its sources. **3**) The CSR gives a Table 3-33 Wave Height Directional Weighting Factors, which the text says may be used to scale the extreme wave estimates for consideration of waves from a particular direction. The text says the directional factors account for the reduction in long period waves as they move over the relatively shallow sea bottom. However, it would not be appropriate to scale results for depth based on the MSC50 data since these are based on a wave model that includes the bathymetry and shallow water wave physics. **Request:** Please clarify in the revised CSR how these factors are intended to be used, or justify why they would be used with MSC50 derived wave statistics.	presented provides an overview of the meteorological and oceanographic conditions for offshore Newfoundland. It is likely that the data are within the confidence interval for the extreme wave estimates. The differences described above result from differences in approach to extreme value analysis do not affect the overall environmental assessment. **3) The paragraph will be replaced with the following**: ExxonMobil Upstream Research Company also provides directional scale factors for extreme waves. Due to the fact that the various return period wave height values of Table 3-35 (Table 3-32 in June 2010 CSR) are based on observations from all directions, scaling factors were determined to enable estimation of extreme wave heights expected for a particular wave direction. The MSC50 Grid Point M10834 significant wave heights were segregated into eight 45° bins and a directional sc aling factor was calculated for each bin. This was accomplished by dividing the maximum significant wave height for a given bin by the maximum significant wave height from all bins (directions), to yield eight directional factors (ExxonMobil Upstream Research Company 2009). These factors are reproduced in Table 3-36 (Table 3-33 in June 2010 CSR) and could be applied to an extreme wave value such as those reported in Table 3-35 (Table 3-32 in June 2010 CSR).
EMCP Comment 43: C-NLOPB 20 The proponent is reminded that a further review of the	Noted.

Comment	Response
technologies employed are reasonable to minimize emissions to as low as reasonable practicable will be applied at the development plan stage.	
EMCP Comment 61: EC30 The proponent was not specifically asked for an emissions prediction, but just for more information related to emissions from upset scenarios of a more catastrophic nature. This could take the form of a discussion highlighting the range of scenarios based on historic upsets - i.e. how long did these last until they were brought under control? What do we know about the ranges in both magnitude and constituents of the emissions in situations such as this? While recognizing that the probability of such an upset is very low, it is not zero.	It is recognized that the probability of a catastrophic event is low and not zero. However, if such an event were to occur, the primary objective of EMCP would be to ensure the safety of its workers and bring the incident under control. The Operator is not aware of historical air emissions data from catastrophic events. However, it is expected that emissions from catastrophic events can be of an extremely wide range and type. Depending on well flow rate and duration, a blow-out could lead to the loss of thousands cubic metres of crude oil (see Section 14.1 for a listing of historical blow-outs). In the event of an extremely large release, there may be effects on the atmosphere due to the evaporation emissions of the volatile fraction. The emissions would be odorous and unpleasant, and would move downwind from the spill. In the event of a fire, the atmospheric effects could include copious amounts of smoke, containing products of incomplete combustion ranging from simple carbon rings to a variety of residuals from the constituents of the reservoir. Catastrophic events in which fire is involved produce substantial amounts of heat, so that the smoke and byproducts are, to a large extent, lifted by thermal buoyancy and dispersed in the atmosphere. For events that do not include fire, the spill of buoyant material will continue to evaporate into the atmosphere and move downwind due to shearing force of the wind superimposed on current movements. Releases to the atmosphere will cease after the product is either totally released, sinks due to depletion of the buoyant fraction, or disperses adequately.
EMCP Comment 75: DFO 13 This response is considered inadequate.	**The tables (7-11 to 7-14) in Section 7 have been updated to reflect the comments.** These tables are provided in a revised (track changes) version of Section 7, which is enclosed with this

Comment	Response
As indicated in the previous two rounds of comments, information provided in the tables needs to be discussed in the text within Section 7.5. While the revisions provided in the proponent's most recent response addresses some of DFO concerns, further information is still required for some activities. These additional revisions may be addressed through new text or cross-referencing applicable information from other sections. The tables below outline the requested revisions, which have been made based on information contained in Tables 7-11 to 7-14. Note: Although the commitment made by the proponent to change the text in Section 7.5.4.1 to include the possible change in habitat quantity as a result of offshore spills is acceptable (see "*Hebron Project Comprehensive Study Report: Response to Review Comments, Part 1*" dated November 2010), Table 7-14 will also need to be updated to reflect this information.	response document. Table 7-14 has been updated to reflect noted comments and is enclose with this response document.
EMCP Comment 77: DFO 17 This response is considered adequate, provided the following comment is addressed: The proponent indicates that the text provided will be incorporated into Section 7.5.1.4, however as offshore temporary moorings would likely affect habitat quality and use, it would be better to include the revised text in Section 7.5.1.2 or 7.5.1.3.	Noted. **The text will be included in Section 7.5.1.2 and cross-referenced in Section 7.5.1.3.**
EMCP Comment 78: DFO 14 This response is considered adequate, provided the following comments are addressed: The proponent needs to make a commitment in the CSR that the correct substrate classes will be used to construct the proposed fish habitat compensation. The response provided by the proponent indicates that, "*rock/cobble 100 to 210 mm along with dredged native sediments*" will be relocated from the bund wall to create compensation habitat. However, the creation of productive	**The following revised text will be incorporated into the CSR**. As discussed with DFO, EMCP anticipates seeking separate HADD authorizations for the nearshore and offshore Project Areas, and therefore separate compensation plans may be required. With respect to the Offshore Project Area, the increased hard surface area afforded by protective rock cover over structures in the Hebron offshore production field may offset footprint losses, in particular the base area of the Hebron Platform. Therefore,

Comment	Response
fish habitat requires the addition of rocky materials that are clean and free of sediment and is a combination of equal portions of boulder (250-750 mm), rock (130-225 mm) and cobble (65-130 mm). If the proponent cannot provide the full range of substrate sizes indicated, then the artificial reefs may not meet their full productivity potential. There are also several inaccuracies related to the offshore project area that need to be corrected. The footprint of the OLS on the sea floor would in fact constitute a loss of fish habitat, therefore it is incorrect to say that, "*…increased hard surface area afforded by structures (not including the Hebron Platform itself) and associated rock cover in the Hebron offshore production field will likely offset any footprint losses…*" While the rock cover over the flowlines and the armoring around the Hebron platform may constitute fish habitat compensation, it would be contingent upon the size of rock material used and its benefit to species present within the area. Until DFO has received all information regarding the existing habitat and species within the area as well as details on the rock covering material, it cannot be concluded that this habitat creation will be sufficient to, "*offset any footprint losses*" within the offshore project area. In any case, it is incorrect to make the statement that, "*HADD compensation will not be required for the offshore Project Area*".	EMCP submits that HADD compensation may not be required for the Offshore Project Area based on preliminary design of these elements[1] and current understanding of the existing fish and fish habitat within the Offshore Project Area. EMCP will provide DFO with a habitat quantification report for the Offshore Project Area once final design details of these structures are available in order to make a final determination on HADD and fish habitat compensation requirements. With respect to the Nearshore Project Area, a HADD compensation plan will be required, since installation of a bund wall and de-watering of the proposed drydock area to allow for construction of the GBS and some potential dredging (and blasting) of native sediments in selected locations within Great Mosquito Cove will likely be considered a HADD by DFO. As its preferred option for HADD compensation, EMCP is proposing to enhance fish habitat in Great Mosquito Cove by re-locating bund wall material[2] to featureless sedimentary areas of the sea floor, which currently have low commercial fish productivity. The re-located rock material will be deposited in closely-spaced piles (to maximize 'edge' effects) with the intention of creating 'artificial reefs'. In addition, local fishers have recommended that the rock 'reefs' be placed in shallow, sub-tidal areas of Great Mosquito Cove (<20 m water depth), which are adjacent to areas with bedrock, boulder and medium to coarse gravel substrates, which will provide access corridors to allow for development of juvenile lobsters into later life stages and ultimately into mature, commercial-size adult lobsters and facilitate the growth of kelp species that provide food and/or cover for a variety of fish and invertebrate species.

[1] While the rock cover over the flowlines and the armouring around the Platform has the potential to constitute fish compensation, it would be contingent upon the size of the rock material and its likely benefits to species within the area.
[2] According to DFO guidelines, the re-located rock material should be clean and free of sediment and a combination of equal portions of boulder (250 to 750 mm), rock (130 to 225 mm) and cobble (65 to 130 mm). In addition to the bund wall material, there is also the possibility that some dredged native sediments would be available for incorporation into the proposed rock reefs if not taken to an onshore site for disposal / reuse.

Comment	Response
EMCP Comment 108: GF 13 **(Refer to the November 26, 2010 EMCP response)** The proponent uses data from seismic surveys to support several of their responses regarding issue of attraction to light/flares. These data (e.g., T. Lang personal communication) should be summarized and presented in the EA (at the very least as an appendix), or the reports with the data should be readily available to the public (e.g., on C-NLOPB's website). Then when the proponent uses a phrase such as "large scale stranding" the public may have some understanding as to the scale at which they are referring (e.g., what constitutes a large scale stranding).	The stranding data from the various seismic programs are typically included in the marine mammal observer reports submitted to the C-NLOPB and the bird data are submitted to CWS as a requirement under the Migratory Bird Handling Permit. These raw data, to date, have not been analyzed and formally reported either through scientific literature or government agency websites. Without formally analyzing the raw data, the following is a summary of observations taken during seismic programs. To date, the bird strandings in the Newfoundland offshore have been almost entirely Leach's Storm-Petrels. This is not surprising, given the huge numbers of this species in these waters, coupled with their relative inability to become airborne after landing on a ship or platform. Numbers of strandings per-day on seismic vessels have ranged from zero early in the season to tens of birds, mostly late in the season after fledging. On a Grand Banks seismic vessel, tens of birds in one night can be considered a "large scale stranding". The largest single stranding event observed by biologists on seismic vessels was 46 birds, all of which were released alive (LGL Limited, unpublished data). Monitoring of pelagic seabirds stranded (presumably due to light attraction) on board seismic vessels has been conducted by biologists during 14 seismic programs from 2004 to 2010 off both Newfoundland and Labrador. Seismic programs were initiated as early as 7 May and terminated as late as 8 November; however, most were conducted during some portion of the months of June to September. In total, 758 nights were monitored during these seismic programs. The number of nights per week with strandings and the number of individuals stranded per night was greatest from late August to mid-October. This period coincides with the fledging of Leach's Storm-Petrels from Newfoundland colonies. Young of this species fledge from Great Island (Witless Bay), Newfoundland, as early as 10 September, but the majority

Comment	Response
	fledges from mid-September to late October (Huntington *et al.* 1996). The mean fledging date is 25 September. In other areas of the North Atlantic, juveniles also account for most strandings of Leach's Storm-Petrels. For example, near a Leach's Storm-Petrel colony off Scotland, juveniles make up the large majority of birds stranded due to light attraction (Miles *et al.* 2010). However, in wintering areas, adults may also strand because of light attraction (Rodríguez and Rodríguez 2009). Visibility during nights when storm-petrels stranded on seismic vessels off Newfoundland and Labrador was usually reduced due to fog, rain or overcast conditions. This has been documented among other seabird species (Telfer *et al.* 1987; Black 2005). Strandings have also been noted to peak around the time of the new moon (*i.e.*, when moonlight levels are lowest (Telfer *et al.* 1987; Rodríguez and Rodríguez 2009; Miles *et al.* 2010)). The mitigation of releasing birds by experienced environmental observers, according to CWS protocols established by CWS and offshore operators, appears to reduce mortality to a few birds per seismic vessel per season. The reviewer is also referred to the November 2010 responses by EMCP to Comments 107: GF 12; 108: GF13; 111: GF16; 112: GF17; and 113: GF18. **References** Black, A. 2005. Light induced seabird mortality on vessels operating in the Southern Ocean: incidents and mitigation measures. *Antarctic Science*, 17: 67-68. Huntington, C.E., R.G. Butler and R.A. Mauck. 1996. Leach's Storm-Petrel (*Oceanodroma leucorhoa*). In: A. Poole and F. Gill (eds.). *The Birds of North America, No. 233*, The Academy of Natural Sciences and The American Ornithologists' Union. Philadelphia, PA, and Washington, DC. 32 pp. Miles, W., S. Money, R. Luxmoore and R. W. Furness. 2010. Effects of artificial lights and moonlight on petrels at St Kilda. *Bird*

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	Study, 57: 244-251. Rodríguez, A. and B. Rodríguez. 2009. Attraction of petrels to artificial lights in the Canary Islands: effects of the moon phase and age class. *Ibis*, 151: 299-310. Telfer, T.C., J.L. Sincock, G.V. Byrd and J.R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Society Bulletin*, 15: 406-413.
EMCP Comment 112: GF 17 **(Refer to the November 26, 2010 EMCP response)** The proponent notes "Also, the height of the flare (approximately 98 to 108 m above sea level) is much higher than the altitude that Leach's Storm-petrels (and Dovekies) typically fly (B. Mactavish, LGL, pers. comm..)". While this is an interesting observation, presumably, it was made during day light. Until there are detailed data on how birds are behaving at night around platforms, statements such as the one above only demonstrate how little is known. If there are data which can be presented, which were collected at night by repeatable methods, by all means, please present them.	**Response:** The Operator is not aware of any systematic studies of the behaviour of Leach's Storm-Petrels and Dovekies around flares. The above notwithstanding, EnCana is presently proposing a study of bird behaviour around platforms offshore Nova Scotia. The results from this study should provide valuable data regarding bird behaviour.
EMCP Comment 114: GF 19 **(Refer to the November 26, 2010 EMCP response)** **<u>Providing Scientific Certainty and Probability of Occurrence for Each Prediction</u>** In the current EA, each phase, rather than each prediction is provided with a confidence level rating and scientific certainty. I am very concerned about the change in formatting between White Rose and Hebron EAs. This is the fourth development and production EA for this jurisdiction and each EA has a difference approach. One could argue that the different approaches are an improvement on the process. But I would argue that the change between the White Rose EA and the Hebron EA up reduces the available information rather than improves on the process. As the RA, the C-NLOPB should be ensuring consistency and	Each Project activity for each phase of the project has been assessed and this assessment includes the required factors (i.e., magnitude, duration, frequency, geographic extent, reversibility and ecological / socio-economic context) to determine significance of environmental effects, as described in Section 4 Environmental Assessment Methodology. The summary statement of residual environmental effects was based on the assessment of each activity and associated levels of confidence. While this approach appears to the reviewer to differ from the White Rose EA, the methodology is consistent with it and more recent environmental assessments. With respect to how predictions were linked to follow-up programs, such programs have been proposed for those VECs

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improvement for each EA. This current change is not an improvement. The proponent's response, "This is consistent with guidance provided by the CEA Agency (CEA Agency 1994) and represents a comprehensive level of certainty for each effect that occurs within that Project phase." does not answer why there was a change. It is very important to understand which predictions do not have strong scientific certainty and link these predictions to a follow-up program. By providing an overall rating for each phase does not allow the C-NLOPB, as the RA to make these clear linkages; nor does it allow the public to understand how predictions were linked to follow-up programs.	where interactions with the Project have been predicted. The rationale for the types of follow-up programs that have been proposed does not rely exclusively on the level of confidence, but rather on the collective experience of the offshore oil and gas industry in Newfoundland and Labrador. The requirement for a follow-up program is ultimately determined by the Responsible Authorities for this environmental assessment.
Presentation of Oil Sheen Data The data I was requesting are oil sheens which occur with the legal discharges of oil content of produced water. The proponent's response "*The CSR concluded that, aside from accidental events (e.g., oil spills) (see Section 14.1.3), sheens are unlikely to occur from routine Project operations*." does not address my request that oil sheen data are presented in the EA. To reach such a conclusion that something is unlikely to occur requires data. Based on past correspondence with the C-NLOPB, it is my understanding that the operators are required to collect such data. An EA where predictions are being generated based on data not presented is problematic.	The CSR includes spill data from the C-NLOPB website, including spills less than 1 L. However, sheening events are not specifically identified within this data set.
EMCP Comment 120: GF23 **(Refer to the November 26, 2010 EMCP Response)** I requested that the following information be included in the EA "…paragraph which discusses small spills known to originate from all production platforms in the C-NLOPB's jurisdiction, the frequency of these spills *and* follow-up on them especially regarding persistence & size. Information should be provided on whether attempts were made to contain/clean up small spills from platforms and how the impacts of theses small spills on seabirds were assessed and by whom (i.e., CWS or operator). If data on estimated mortality associated with small spills were not	All spills are reported to the C-NLOPB. Section 14.1.4 (Platform Spills Involving Small Discharges) discusses the probability of such spills (see Table 14-13) occurring. Spills <1 L are usually dissipated before spill containment equipment can be deployed. The operator, including our environmental contractors, are not aware of data collected on seabirds potentially affected by spills <1 L. The environmental assessment of accidental events is presented in Section 9.5.4. The conclusion of the effects of spills on seabirds was assessed as significant, but unlikely to occur.

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obtained, it should be discussed why this was not possible." I understand that the oil spill section is forthcoming, but based on the proponent's response, I assume they will not be providing data on how spills were assessed: persistence & size (spatially, not quantity spilled), on whether attempts were made to contain/clean up small spills from platforms and how the impacts of these small spills on seabirds were assessed and by whom. Predicting future impacts without using past data is not good EA practice. If the proponent does not want to disclose those data, then they should just state it. However, as RA, I think the C-NLOPB should require the proponent to provide these very important and relevant data for this EA.	
EMCP Comment 129: EC 46 Environment Canada is not satisfied with the response. The draft CSR indicates that "attraction to illumination on structures and vessels during all phases of the Project are predicted to be "…*low in magnitude, geographic extent, duration, frequency when mitigation measures are practiced*". To EC's knowledge, these effects have not been adequately demonstrated due to there being very little data worldwide on seabird attraction to platforms, and no studies in Atlantic Canada. It is our understanding that research is planned for the near future to assess attraction of sea birds to platforms in Nova Scotia, but has yet to be initiated. Environment Canada is satisfied that the detailed study design can be completed after the CEA Act section 38 decision is made, however, the need for, and the requirements of, any follow-up program in respect of the project is a clearly identified factor to be considered in the comprehensive study report. Environment Canada will not be able to exercise its section 38 decision making authority until this matter is resolved.	As stated previously, based on the Operator's assessment of environmental effects, an EEM program for seabirds may not provide sufficient evidence to determine environmental effects. However, EMCP is open to working with Environment Canada and other marine bird experts to develop a scientifically defensible research program regarding seabird attraction.

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EMCP Comment 138: DFO 32 This response is considered adequate, provided the following comments are addressed: Based on the new information provided in the Bull Arm Nearshore Spill Trajectory Modelling Report, Table 7-14 (Page 7-18 of the "*Hebron Project Comprehensive Study Report*", dated June 2010) appears to have some inaccuracies. Under "*Nearshore Spill*", both the magnitude and geographic extent appear to be understated. Many of the spill trajectory outcomes provided in the new report consisted of hundreds of kilometres of shoreline, which included shallow nursery habitats. The spill model also includes trajectories which appear to encompass several significant habitat areas in some of the stochastic scenarios. The ratings for magnitude and geographic extent should be re-evaluated and revised based on information provided in the new spill model. ExxonMobil's response states that, "*The fish species that are likely to be present in the eelgrass include juvenile and adult cunner, juvenile lumpfish, juvenile lobster and pelagic juvenile Atlantic cod and herring spawn in eelgrass.*" Although it is correct that pelagic juvenile Atlantic cod could be present between June and October, it is the recently post-settled demersal juvenile life stage that would be of greatest concern for this species. Please make the appropriate revisions based on this information.	**Table 7-14 will be revised as noted above.** **The existing text in Section 12.3.1.1 will be revised as follows:** Eelgrass beds perform important ecological functions including filtering of the water column, stabilizing sediment, and buffering shorelines from erosion (DFO 2009i). Eelgrass beds are highly productive ecosystems due to both rapid turnover of eelgrass leaves and epiphytic algae on leaf surfaces and represent a valuable component of the coastal food chains and contributor to the nutrient cycle. Densities of a variety of invertebrate species are high in eelgrass beds as they feed on the epiphytes on eelgrass. The organisms, in turn, support higher trophic levels. The fish species that are likely to be present in the eelgrass include juvenile and adult cunner, juvenile lumpfish, juvenile lobster and pelagic juvenile Atlantic cod **(between June and October), recently post-settled demersal juvenile Atlantic cod** and herring. Eelgrass beds are also an important feeding area for some species of migrating birds. **And the existing text in Section 12.4.1 will be revised as follows:** With respect to eelgrass beds and potential interactions with nearshore Project-related activities, the major concern is the potential for physical and/or chemical alteration or disturbance of areas in which eelgrass is present. Eelgrass beds are located at sufficient distance from the Nearshore Project Area such that there is no potential for physical disturbance of these sensitive habitats from routine Project activities and physical works, including Project-related sedimentation. Eelgrass is common in areas of high sedimentation such as estuaries (Short et al. 2002). There is potential for species that use eelgrass bed habitats (including **pelagic** juvenile Atlantic cod **(between June and October) and recently post-settled demersal juvenile Atlantic cod**) to experience disturbance and/or avoidance effects due to

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	Project-related noise and lights. These potential effects are fully considered and assessed in the respective VECs (i.e., Marine Fish and Fish Habitat, Marine Birds). The residual adverse environmental effects have been rated as not significant and these interactions are not further assessed in this VEC.
EMCP Comment 199: NDOEC 2 **Item F)** Based on the response to item F (in previous March 2011 response), the proponent would calculate the maximum PM2.5 concentration to be 27.7 ug/m3. This would be an exceedance of the standard (25 ug/m^3) in the *Air Pollution Control Regulations* if the province had jurisdiction in that regard. The current Canada-Wide Standard is 30 ug/m^3, and therefore the emissions would fall below that standard. The proponent should however, be cognizant of the fact that in 2012 / 2013 a new Canadian Ambient Air Quality Standard for PM2.5 is to be introduced and that their emissions may not be below this new standard. The proponent is therefore encouraged to take mitigative measures during the design phase of the project to limit PM2.5 during operation.	The potential for changes to federal air emissions standards are noted.
SECTION 5 OF EMCP RESPONSE	
<u>Additional Deficiencies and Editorial Comments from Fisheries and Oceans Canada</u>	
<u>B4) 7.3.2 Offshore</u>: Page 7-16 The DFO RV data for 3N was provided to Ms. Sandra Whiteway (Stantec) on March 30, 2011. This information should be incorporated into the next draft of the CSR.	This information has been incorporated into the revised CSR.