Appendix F.2
Terrestrial Wildlife and Marine Birds
Information Request #2

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Dear Ms. Ponsford:

Reference: Marbled Murrelet Effects Assessment Information Request #2

This letter responds to the request for Outstanding Information received from the Canadian Environmental Assessment (CEA) Agency on August 14, 2014.

Information Request #2

Government of Canada –Outstanding Information:

Agency: *The proponent did not conduct additional surveys as requested, instead providing a rationale to support the adequacy of the information in the EIS and the supporting Technical Memo. Additional information is required to support the rationale that field surveys are not required and elaborate on the information in the memo.*

EC: *The proponent referenced the proposed Marbled Murrelet (MAMU) Recovery Strategy (RS) in its MAMU Habitat Technical Memo (the Memo) and advises that it will reassess upon finalization of the RS. The date of this memo is June 23, 2014, but the final RS was posted on June 3, 2014. There were no changes to the identification of critical habitat (CH) in the final RS; however, there were clarifications to the CH section, the addition of quantitative 2012 habitat levels for each Bird Conservation Region, and some clarification of the text in the population and distribution section. While CH polygon coverage as identified in the final MAMU RS does not include Lelu Island, the proponent should note that suitable habitat that qualifies as CH is likely to be added in the future. Specific timelines for future identification of CH has not been set. It is important to note that the 91 ha of moderately suitable nesting habitat identified on Lelu Island could in the future be identified as CH should it contain the necessary biophysical attributes for the species at that time.*

1. *Update the assessment for the Marbled Murrelet according to the final RS issued on June 3, 2014.*
2. *Identify proposed mitigation measures for Marbled Murrelet and explain how these measures are consistent with the recovery objectives outlined in the final recovery strategy.*
3. *It remains unclear whether the RISC 2002 methods were used to assess MAMU occupancy. This information is important as the proponent's survey indicates that MAMU forage in the adjacent marine environment. Identify which standard was used to assess Marbled Murrelet occupancy.*
4. *It is not evident how some information was assessed and interpreted to draw the conclusions as presented in the Memo. For example, the proponent concludes that disturbance to marine foraging areas can be managed through reduced vessel speed. This threat is not well understood for MAMU and, as such, is listed in the Recovery Planning table in the final RS as a threat requiring additional research. Provide the evidence (i.e., references and/or reports) that support the conclusion that disturbance to marine foraging areas can be managed through reduced vessel speed presented in the Marbled Murrelet Habitat Technical Memo.*

5. *Clarify the meaning of the term 'habitat management directives', per the Memo (first paragraph of the cumulative effects section, fourth sentence).*

Pacific NorthWest LNG Limited Partnership (PNW LNG) – Response:

1) Assessment of Marbled Murrelet Habitat and the Recovery Strategy

Marbled Murrelet is listed as Threatened on Schedule 1 of the *Species at Risk Act* (SARA). Under SARA, the Government of Canada is required to develop recovery strategies for species listed as Threatened, Endangered, or Extirpated on Schedule 1. On June 3, 2014, the finalized *Recovery Strategy for Marbled Murrelet (Brachyramphus marmoratus) in Canada* (Environment Canada 2014) was released.

Terrestrial Habitat

As a component of the recovery strategy, critical habitat (as defined under Section 41(1)(c) of the SARA) is identified, to the extent possible given current limitations in knowledge of marbled murrelet habitat preferences. Critical habitat is identified as "that portion of the suitable habitat required for the survival and recovery of the species as specified by the short and long term population and distribution objectives" (Environment Canada 2014).

Within British Columbia (BC), six marbled murrelet conservation regions are divided into geographic location polygons. Within each region, marbled murrelet candidate critical habitat was identified through a combination of habitat mapping based on biophysical attributes, known nest sites, and known occupied detections (Environment Canada 2014). In the final recovery strategy, areas of potentially suitable murrelet nesting habitat have been spatially delineated by the recovery team using a combination of available habitat mapping, known nest sites and known occupied detections. These areas are considered to be potentially suitable because many areas have not been verified in the field. Accordingly, critical habitat for this species is identified as "a state where greater than 70% of the 2002 suitable nesting habitat coast-wide remains". This includes at least 68% critical habitat retention in the Northern Mainland Coast conservation region in which the Pacific NorthWest LNG Project (the Project) is located.

Change in marbled murrelet terrestrial nesting habitat was assessed in the Environmental Impact Statement (EIS) through detailed habitat suitability modelling and information presented in the recovery strategy. Habitat suitability models were verified through baseline vegetation and wildlife habitat assessment field surveys (see Appendix H and Section 11.3 of the EIS for further details). Wildlife habitat assessments followed methods outlined in the *Field Manual for Describing Terrestrial Ecosystems* (BC MOFR and BC MOE 2010) and the *British Columbia Wildlife Habitat Rating Standards* (RIC 1999a). Prior to field work, plots were selected to proportionately represent the variety of habitat types that exist within the study area.

A total of 71 habitat assessment plots were completed on or near Lelu Island on August 11 to 16, 2012 and May 2 to 6, 2013. In accordance with RIC (1999a), the habitat suitability rating for marbled murrelet was assigned using a four-class rating system for species where the provincial government has determined there is a moderate level of knowledge on species' habitat requirements. In the four-class system, habitat is ranked as nil, low, moderate, or high; preferred habitat includes those ranked as moderate or high. The ratings are then paired with data from baseline and project disturbances (e.g., roads, railways, urban areas) and are used to adjust the suitability ratings to calculate the overall loss or alteration of habitat as a result of the Project. For marbled murrelet, areas that border disturbance features with hard edges (e.g., roads) were downgraded in suitability within 50 m of the edge to account for increased likelihood of predation. Malt and Lank (2009) describe higher marbled murrelet nest predation rates, particularly among corvid species, within 50 m of a hard forest edge. Northwestern crow, Stellar's jay, and other non-avian predators (e.g., red squirrel) were frequently detected during baseline surveys (Appendix H of the EIS). The habitat rating adjustment within 50 m of a hard forest edge is expected to accurately reflect decreased marbled murrelet nesting suitability from higher predation pressure. A detailed account of habitat rankings assigned to each unique TEM polygon within the project habitat modelling limits, including the habitat ratings adjustments applied to the model, is provided in the species account for marbled murrelet (Appendix H).

The biophysical attributes used to model habitat suitability for marbled murrelet in the EIS are consistent with those attributes identified by Environment Canada (2014) to assess the likelihood of critical habitat polygons containing suitable microhabitat biophysical habitat attributes. These are described in detail in Section 4.1.2 and Appendix 2 of Appendix H (of the EIS). A comparison of those attributes is provided in Table 1.

The habitat suitability models in the EIS used a conservative approach in the ranking of habitat as having high or moderate suitability. The models included in the EIS considered preferred habitats within 500 m of shore if they were identified as having suitable nesting characteristics. Consistent with Burger (2002, 2004) and Mather et al. (2010), these habitats were assigned a maximum habitat value of moderate suitability. The Project will result in the direct removal of 164 ha of terrestrial habitat, including 79 ha of nil or low suitability shrub-dominated wetland in the centre of Lelu Island (Figure 1). Construction of the project development area (PDA) will remove 85 ha, and indirectly alter 6 ha of moderate suitability nesting habitat. The majority of this habitat comprises coniferous forest on the perimeter of Lelu Island and is located <500 m from shore.

The final recovery strategy did not identify any polygons within which critical habitat (i.e., 'most likely' and 'moderately likely' nesting habitat) with potential to support suitable marbled murrelet nesting on Lelu Island. A small (0.13 ha) critical habitat polygon was identified on the mainland within the habitat modeling limit for the EIS. This polygon falls within the PDA as part of the access road to Lelu Island (Figure 2). Baseline suitability modelling characterizes this polygon as low or moderate suitability for marbled murrelet nesting (Figure 1). Based on an evaluation of habitat characteristics within this critical habitat polygon, there is a low likelihood that the polygon supports nesting habitat for marbled murrelet. This evaluation is based on the following criteria:

- The polygon is located <500 m from shore
- The polygon is situated between an existing active railway and highway corridor; therefore, this area experiences a relatively high degree of regularly occurring disturbance from passing road and railway vehicle traffic
- Because this polygon is small, elongated, and situated between existing disturbance features, it has a higher edge-to-forest ratio and increased potential for predation of active nests (Burger 2004, Malt and Lank 2009).

Marine Habitat

Potential effects to marine habitat supporting marbled murrelet was discussed in the technical memo "Marbled Murrelet Habitat", submitted June 23, 2014 and is summarized below (Stantec 2014a).

Although a definition for critical marine (foraging) habitat for marbled murrelet is not currently provided in the final recovery strategy, the report describes important marine habitat as shallow (<30 m) nearshore or sheltered waters with sandy or gravel sea floors that support Pacific sand lance, their primary prey (Burger 2002; Environment Canada 2014). Environment Canada (2014) acknowledges that predictive marine habitat features contributing to marbled murrelet aggregations are not well understood, but are likely related to availability and proximity to terrestrial breeding habitat. The final recovery strategy recommends that studies characterizing critical marine habitat be included as part of future government research.

The EIS used ecological community modelling to estimate potential project effects on marine habitats likely to support murrelet (see Section 4.1.1 of Appendix H and the technical memo "Habitat Modeling"). The EIS predicted that a total of 92 ha of marine habitat would be removed for construction of the marine terminal and trestle. Following mitigative redesign of the marine terminal, only 3 ha of estuarine tidal flat and 5 ha of marine habitat will now be permanently affected by the Project. Loss of murrelet foraging habitat is largely isolated to a small eelgrass community that will be occupied by the materials offloading facility (MOF). Fish habitat offsetting will replace eelgrass beds removed by the MOF through the construction of benches

and/or reef structures to support eelgrass establishment on the southwest portion of Lelu Island (Appendix K of the EIS). Marbled murrelet were observed across multiple marine bird survey periods to have higher abundance in this area of Flora Bank (Appendix H) and are expected to benefit from eelgrass restoration activities in this area.

Collectively, the assessment of effects of change in habitat for marbled murrelet is consistent with the approach used in the final recovery strategy. Potential project effects will be reduced through the implementation of mitigation measures (see the following section of this memo for more details). Based on the information provided in this report, combined with information presented in Section 11 and Appendix H of the EIS and the previous technical memo response "Marbled Murrelet Habitat", no additional changes to the assessment are considered necessary. Mitigative redesign of the marine terminal will reduce the area of marine habitat removed during project construction and includes a suspension bridge to avoid constructing pilings on or adjacent to Flora Bank.

Table 1: Marbled Murrelet Microhabitat, Stand, and Landscape Level Attributes in the Recovery Strategy compared with the Wildlife Habitat Ranking Scheme Applied in the EIS

	Habitat Ranking Scheme			
Microhabitat, Stand, and Landscape Level Attributes in the Recovery Strategy	**Most Likely**	**Moderately Likely**	**Least Likely**	**N/A**
	• Distance to shore = 0.5 to 30 km • Elevation = 0 to 600 m • Stand age is greater than 250 yr • Tree height > 28.5 m • Canopy closure class 4 to 7 • Canopy complexity is moderately uniform • >25% of trees support suitable nest platforms	• Distance to shore ≤0.5 km and 30 to 50 km • Elevation = 600 to 900 m • Stand age is 140 to 250 yr • Tree height > 19.5 to 28.4 m • Canopy closure class 3 • Canopy complexity is non-uniform or uniform • 6-25% of trees provide suitable nest platforms	• Distance to shore ≥50km • Elevation ≥900 m • Stand age is <140 yr • Tree height <19.5 m • Canopy closure class 2 and 8 • Canopy complexity is very uniform or very non-uniform • <6% of trees provide suitable nest platforms	
Habitat Attributes Applied to Suitability Rankings in the EIS	**High (1)**	**Moderate (2)**	**Low (3)**	**Nil (4)**
	• TEM polygons that are between 0.5 and 30 km • TEM polygons that are less than ≤600 m elevation • Mature or old coniferous forest (structural stage 7a or 7b) • Coniferous trees >30 m tall with large boughs (> 15 cm diameter) for nests • High canopy closure with small openings for access • Large amount of epiphytes (e.g., moss) for nest sites • Overhanging foliage for cover	• TEM polygons that are ≤0.5km and > 30 km from marine water have a maximum value of 2 • TEM polygons that are between 600–900 m elevation have maximum value of 2 • Mature coniferous forest with minor deciduous component (structural stage 5, 6 or 7) • Moderate canopy cover • Moderate amount of epiphytes (e.g., moss) for nest sites • Moderate amount of overhanging foliage	• Distance to shore is ≥50 km • TEM polygons that are > 900 m elevation have maximum value of 3 • Coniferous-deciduous mixed forest (structural stage 3 or 4) • Moderate to low canopy cover • Low amount of epiphytes (e.g., moss) for nest sites • Low amount of overhanging foliage	• Deciduous dominated forest • Structural stage 1–3 • Low to nil canopy cover • No epiphytic (e.g., moss) cover • No overhanging foliage • Developed area presenting no habitat

2) Marbled Murrelet Mitigation Measures

The recovery strategy identifies both short-term and long-term population objectives for murrelet recovery. Short-term objectives are related to halting the decline of the species in Canada, while long-term objectives relate to ensuring the species will have a high probability of persistence after 2032 across its range (Environment Canada 2014).

To meet these objectives, broad strategies are identified for habitat management, monitoring, research, and stewardship. Several mitigation measures presented for the project support these broad recovery strategies. Table 2 identifies project mitigation measures that are consistent with the recovery objectives.

Table 2: Federal Recovery Planning Approaches and Relevant Project Mitigation or Activity

Broad Recovery Strategy	PNW LNG Mitigation or Activity
Habitat Management	• A 30 m vegetation buffer will be retained around the perimeter of Lelu Island, except at access points (e.g., at the bridge, MOF, trestle, and pipeline interconnection) • Boundaries of the PDA will be clearly marked and clearing, grading or dredging, construction, and temporary storage of materials of terrestrial and marine habitat will be limited to within the PDA boundaries • If temporary workspace or storage areas are required beyond the extent of the PDA, they will be located in existing cleared areas to the extent possible • Mitigations for the acoustic environment will reduce noise disturbance to adjacent terrestrial and marine habitats • Lighting mitigations will follow objectives contained within the Canada Green Building Council LEED guidelines and the International Commission on Illumination. The use of exterior lighting (including portable lighting structures at the LNG facility, the MOF, marine terminal, trestle, berth, and on berthed vessels will be limited where practical and permissible under federal safety and navigation regulations. • The Conceptual Fish Offsetting Strategy (Appendix K of the EIS) will outline restoration and compensatory activities to recover the net loss of marine fish habitat used for foraging by marine birds.
Monitoring	• No mitigation is presented that relates to Marbled Murrelet monitoring.
Research	• Provide marbled murrelet habitat and seasonal occurrence data within the Local Assessment Area to the Canadian Wildlife Service to facilitate research, monitoring, and other recovery initiatives.
Stewardship and Conservation	• Wildlife education and awareness training will be provided o Educational materials will be provided to all employees and contractors to increase awareness of lighting effects. Educational posters will be posted in public locations during peak migration periods to remind personnel to implement lighting mitigation during sensitive timing windows.

3) Marbled Murrelet Occupancy

An overview of the survey methods used to verify potential marbled murrelet occupancy are described for terrestrial and marine habitats, below.

Terrestrial Occupancy Surveys

Inventory Methods for Marbled Murrelets in Marine and Terrestrial Habitats (RIC 2001) and *Inventory Methods for Marbled Murrelet Radar Surveys* (Manley 2006) recommend the use of audio-visual (A-V) surveys) and radar surveys to detect murrelet occupancy and, where possible, relative abundance in forest stands. The objective of baseline studies to support the EIS was to assess avian occupancy, but not relative

abundance, in terrestrial habitats in and around the PDA. To do this efficiently, multi-species survey methods were used, including breeding bird surveys and acoustic recorder surveys.

Breeding bird surveys followed methods for conducting point counts outlined in *Inventory Methods for Forest and Grassland Songbirds* (RIC 1999). Stations were spaced a minimum of 200 m from each other and were placed to provide survey coverage of the island and to target suitable habitats for species of management concern. Six point count stations were located in old coniferous forest, habitat with the greatest likelihood to support marbled murrelet breeding on Lelu Island (Appendix H). Point counts were conducted in mid-June or late-June by two biologists beginning 30 minutes after sunrise and continued for four hours. Eight-minute surveys were conducted at each station, where biologists recorded bird species by sight or sound from within a 100 m radius of the station centre. Biologists recorded the sex, age, behaviour, direction, and estimated distance of each bird observation from their location.

Passive acoustic recording surveys are a relatively new method for sampling avian populations. Most Resource Information Standards Committee (RISC) avian survey standards have not been updated in recent years, so new methods are typically not identified despite their beneficial use. Four Song Meter SM2+ acoustic recording units (ARUs) were installed at four stations on Lelu Island. Units were installed on April 23 and removed between June 28 and July 1, 2013. ARUs were programmed to record from approximately 30 minutes before dusk through to 30 minutes after sunrise in 10-minute intervals every 30 minutes.

Although methods did not follow those recommended in RIC (2001) and Manley (2006), the objective of these methods centred on confirming occupancy. Objectives of baseline surveys were to also consider seasonal presence, distribution, and habitat requirements which are better addressed through a suite of survey methods. No murrelets were recorded using terrestrial habitats in and around the PDA, and thus occupancy was not confirmed. However, the assessment of potential effects did not assume that murrelets were absent in terrestrial habitat; the assumption was that they were potentially present (but unconfirmed) where suitable habitat was identified as part of the effects assessment.

Marine Occupancy Surveys

Marine bird surveys were conducted following protocols for vessel fixed-width transects and stationary counts outlined in *Inventory Methods for Seabirds: cormorants, gulls, murres, storm-petrels, Ancient Murrelet, auks, puffins, and Pigeon Guillemot* (RIC 1997a) and *Standardized Inventory Methodologies for Components of British Columbia's Biodiversity. Shorebirds: plovers, oystercatchers, stilts, avocets, sandpipers, phalaropes and allies* (RIC 1997b). The objectives of these surveys were to record abundance, distribution, and seasonal occurrence of marine bird and shorebird species in the waters surrounding Lelu Island. The recommended method for surveying Marbled Murrelets from a vessel is using a line transect method, but vessel fixed-width methods can also be applied if multi-species inventories are an objective of the survey (RIC 2001), as was the case for the Project.

Vessel fixed-width surveys were conducted in the near shore waters surrounding Lelu, Ridley, Stapledon, and Kitson islands including Flora Banks. Surveys were conducted in November, January, April and July. Transects were completed between 8:00 a.m. and 5:00 p.m., at times that are consistent with timing of murrelet surveys in RIC (2001). Surveys were completed from a 6-m aluminum fishing boat travelling an average speed of five knots, in the near-shore waters around Lelu Island, including Porpoise Channel, Flora Banks, and Lelu Slough. Each survey was led by a Registered Professional Biologist with a minimum of five years of experience in marine bird surveys and species identification along on the north coast of BC. For each detection, biologists recorded the species, number, age, sex, behaviour. Birds that were observed at a distance greater than 150 m from the transect centre-line were recorded as incidental observations. Vessel transects were divided into 10-minute time intervals (transects) where the start and end locations of each transect were recorded using a handheld GPS device.

Stationary count surveys were also conducted at 10 stations spaced approximately 600 m apart, to provide coverage of the shoreline of Lelu and Stapledon islands. Surveys were conducted in August, November, January, April and July. For each seasonal period, surveys were conducted from 8:00 a.m. to 5:00 p.m. At each station, two biologists surveyed for 20 minutes within a 300-m radius of the survey point using binoculars and a spotting scope. For birds identified on shore or within 300 m of the shoreline, biologists recorded species, number, age, sex, behaviour, and estimated distance from shore (shoreline, 0 to 150 m, and 151 to 300 m). Birds that were observed further than 300 m from the station were recorded as incidental observations.

Marbled murrelets were commonly observed in the Local Assessment Area (LAA) during marine surveys. Most observations of murrelets were made during vessel fixed-width transects and generally observed in higher densities near the southwest corner of Lelu Island (see Appendix H of the EIS).

4) Technical Memo "Marbled Murrelet Habitat"

A discussion of potential effects to marine birds, including marbled murrelet, as a result of vessel traffic is supported by project-specific and regional data and scientific literature that have been presented previously in Appendix H and Section 11 of the EIS, the technical memo "Marbled Murrelet Habitat", and the technical memo "Effects of Shipping on Marine Bird Movement" (Stantec 2014a, 2014b). Conclusions presented in the technical memo "Marbled Murrelet Habitat" are based on existing information of marbled murrelet distribution, combined with scientific literature used to support the effects assessment. Here, we present a review of the effects of shipping on movement and behaviour as it relates more specifically to marbled murrelets.

Background

For marine birds overall, the extent of disturbance (e.g., diving, flushing, or general avoidance behaviour) exhibited in response to vessel activities varies among species and age classes. A review of scientific literature indicates that larger birds and breeding individuals demonstrate higher degrees of sensitivity (Chatwin et al. 2013, Clyde et al. 20012, Rodgers and Schwikert 2002). A consistent pattern appears to persist across species showing that increased proximity to, and speed of, transiting vessels cause higher rates of disturbance (Chatwin et al. 2013, Schwemmer et al. 2011, Bellefleur et al. 2009, and Speckman et al. 2004). These studies also indicate marine birds demonstrate greater habituation to vessels transiting at constant speeds along established shipping lanes than to those with unpredictable speed and course (Schwemmer et al. 2011, Speckman et al. 2004, Rodgers and Schwikert 2002).

Effects of Vessel Activity on Marbled Murrelets

Limited research has been conducted to investigate effects of marine traffic on marbled murrelets, specifically, but was considered to the extent available for the EIS (e.g., Sections 11.5.2 and 11.5.4). Consistent with studies conducted on other marine bird species, results from Bellefleur et al. (2009) reveal that faster boats cause a greater proportion of murrelets to flush at greater distances. Both Bellefleur et al. (2009) and Speckman et al. (2004) specify that increased vessel density may produce habituation amongst murrelets, as indicated by decreased flushing distances in areas of higher vessel traffic. The EIS recognizes that the energetic costs associated with general avoidance of infrastructure and transiting vessels can also negatively affect marine bird fitness (EC 2014, Velando and Munilla 2011, Bellefleur et al. 2009, Kaiser et al. 2006, Ronconi and St. Clair, 2002). Both Bellefleur et al. (2009) and Speckman et al. (2004) have found that marbled murrelet flushing behaviour in response to boat traffic decreases the time and efficiency of foraging. The increased energetic cost and decreased foraging effort associated with flushing behaviour can, in turn, result in decreased survival rates of juvenile birds (Bellefleur et al. 2009, Speckman et al. 2004).

Under baseline conditions, marine bird movements in the LAA (including those of marbled murrelet) are expected to be influenced by pre-existing vessel activities, including traffic from the marina in Port Edward and the shipping terminals on Ridley and Kaien islands. Existing commercial and recreational vessel traffic from these areas is expected to cause localized displacement of marbled murrelets. The increase in vessel traffic during project construction and operations will contribute to additional displacement within

the LAA. Project-related effects on marbled murrelets from the marine terminal, materials off-loading facility, and bridge are expected to be negligible. Results of baseline studies indicate that marbled murrelets are regularly observed along the southwest portion of Lelu Island. Project-associated infrastructure and vessel traffic will avoid Flora Banks, particularly in nearshore areas of Lelu Island with highest murrelet occupancy.

Marbled murrelets tend to occupy nearshore waters within a few kilometers of the shoreline. Murrelets using marine areas extending out towards the pre-existing shipping lanes are exposed to contemporary vessel traffic from shipping of cargo (including tankers, barges, tugboats, bulk carriers), ferry and cruise ship traffic, commercial and recreational fishing, and commercial and recreational boating (see Section 15 of the EIS). Along the shipping lanes, the disturbance caused by LNG carriers for the Project will be short in duration as vessels pass through a given area. Effects will be restricted to portions of the LAA within a few kilometers of shore, and will be a multiple-regularly occurring event. As indicated previously, vessels travelling at consistent speeds in predictable areas cause fewer disturbances than those travelling at irregular speed and course (Schwemmer et al. 2011, Speckman et al. 2004, Rodgers and Schwikert 2002). LNG carriers vessels will transit at speeds less than 16 knots along pre-established shipping lanes, slowing as they approach the terminal. The Project's contribution to increased vessel traffic (approximately one LNG carrier per day) is expected to have a minor incremental effect on marine bird movement along the shipping lanes.

The Project is not expected to result in a measureable change in murrelet use of nearshore waters surrounding Lelu Island. Project infrastructure will not impose a barrier between important habitats for murrelets along Flora Banks. While project vessels have the potential to influence daily movement patterns of murrelets, disturbance will be temporary (i.e., a few minutes) in any given area as vessels transit, and will be limited to the immediate area surrounding the vessel. Potential impacts of disturbance are expected to decrease over time as individuals habituate to the presence of vessels in the LAA.

5) Habitat Management Directives

For clarification, the term "habitat management directives" was referring to guidance in the recovery strategy on approaches (or directions) of specific recovery strategies, objectives, or actions described within the document (e.g., Environment Canada 2014, p. 21).

Summary

Conclusions for the assessment for marbled murrelet in the EIS and elaborated upon above, are consistent with the final federal Recovery Strategy and with information presented in available scientific literature. Terrestrial habitat removed or altered by the PDA is comprised of 79 ha of nil or low suitable habitats in the centre of Lelu Island and 85 ha of moderate suitability coniferous forest communities bordering the island. Critical habitat, as it is defined in the final Recovery Strategy, will not be removed by clearing for the Project. Based on baseline survey data and terrestrial habitat suitability, there is low potential for marbled murrelet to occupy habitats on Lelu Island. Murrelets have been detected regularly in nearshore waters surrounding Lelu Island and are expected to represent residents and individuals that may be breeding in suitable habitat on the mainland. Project alteration to and avoidance of marine habitats surrounding Lelu Island will be negligible. Construction and vessel traffic will largely avoid sections of Flora Banks frequented by marbled murrelets. Project mitigations include activities to further reduce impacts to marbled murrelet and are consistent with recovery objectives.

Closure

This letter and the attached figures provide the Outstanding Information requested by the Government of Canada. If you have any questions, please contact PNW LNG.

Attachments:

Figure 1: Marbled Murrelet Critical Habitat and Breeding Habitat Suitability at Baseline
Figure 2: Marbled Murrelet Critical Habitat and Breeding Habitat Suitability at Project Build-out

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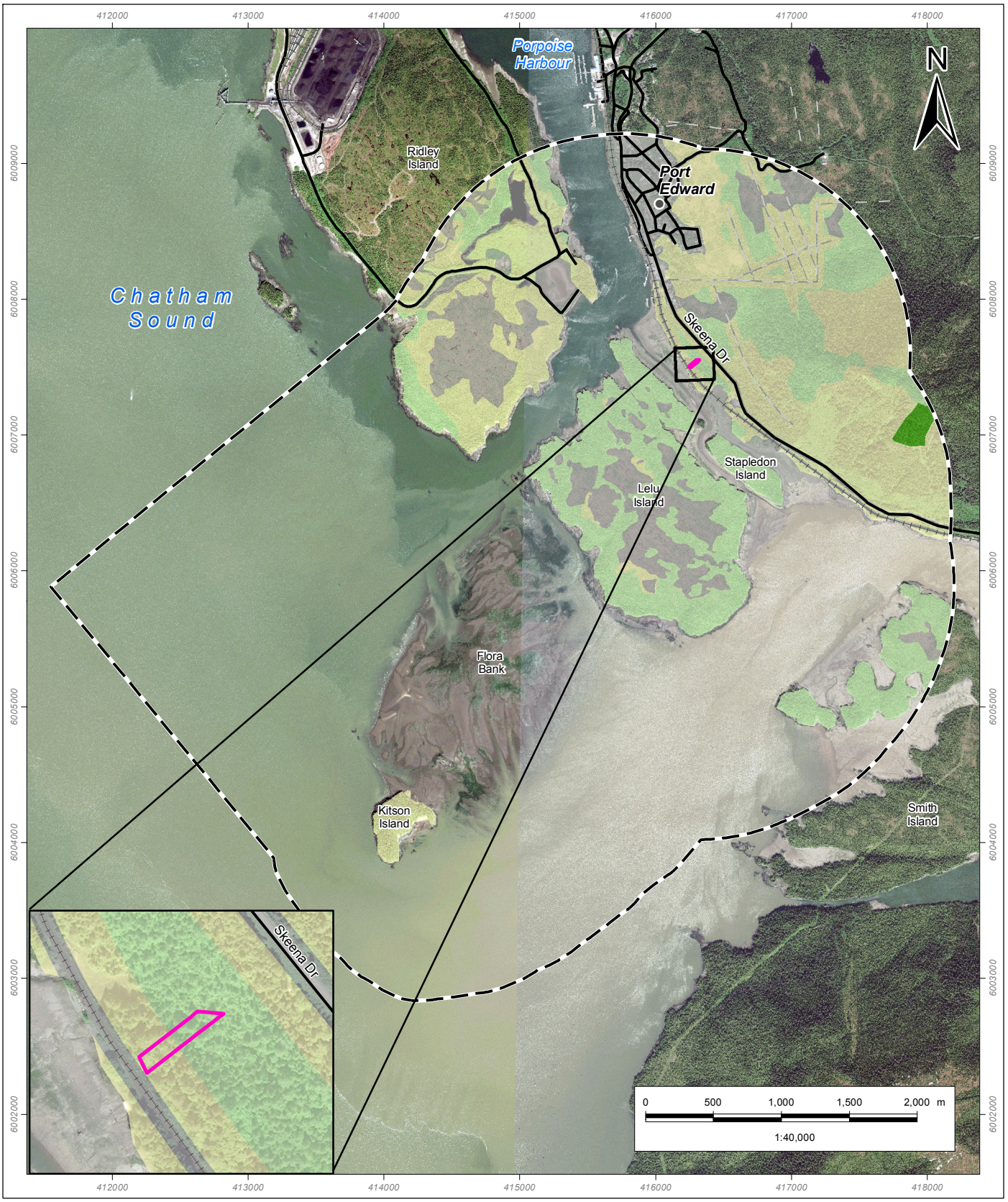

Critical Habitat

Habitat Suitability Class

- High
- Moderate
- Low
- Nil

Terrestrial Wildlife and Marine Bird LSA

- City or Town
- Cutline or Seismic Line
- Railway
- Road

Pacific NorthWest LNG

Marbled Murrelet Critical Habitat and Breeding Habitat Suitablity at Baseline

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd. WorldView-2 Imagery. Imagery date: 2011.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-SEP-14	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-802	DATUM: NAD 83
DRAWN BY: T. CARDINAL	CHECKED BY: M. WILLIE

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: 1

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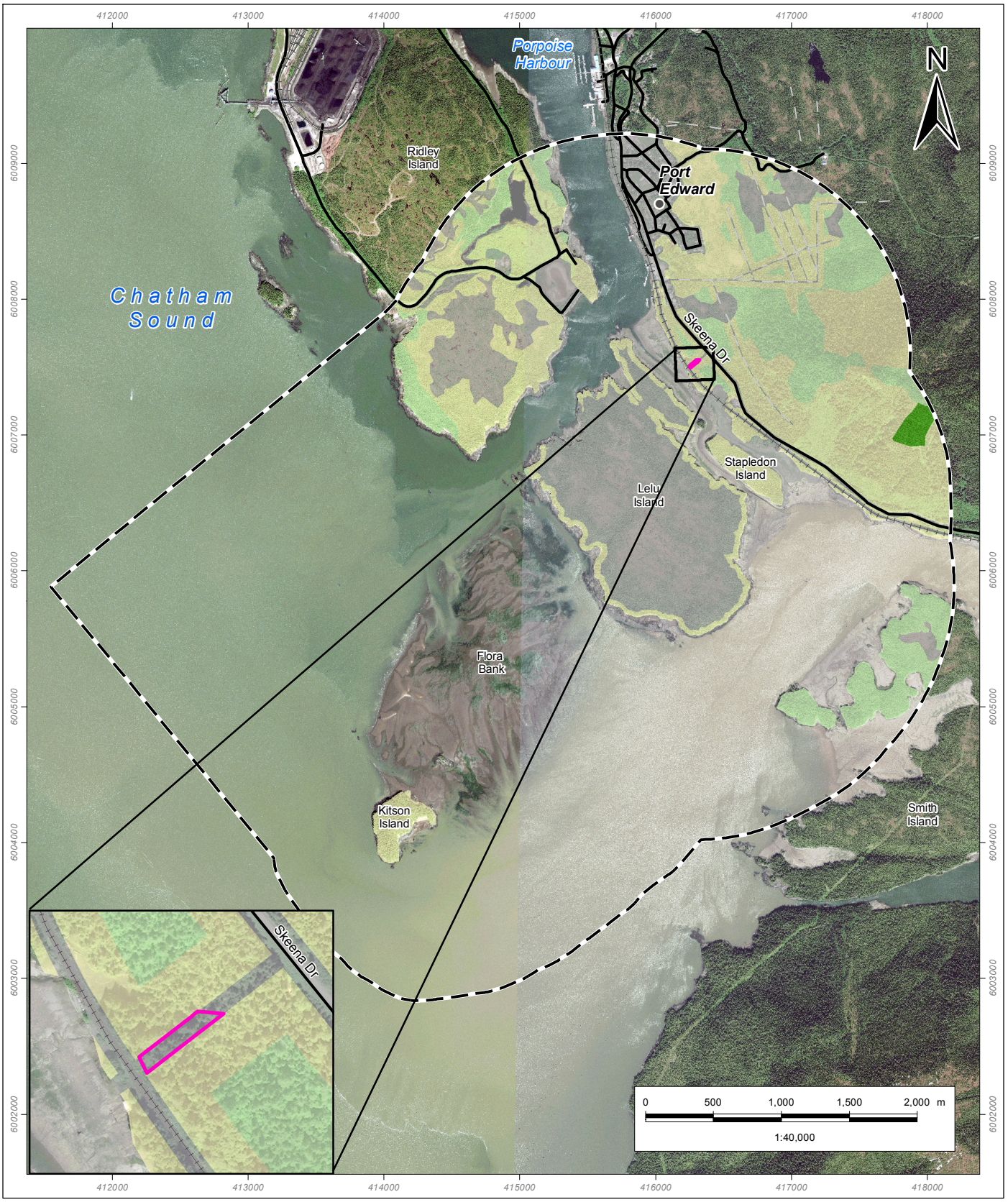

Critical Habitat

Habitat Suitability Class

- High
- Moderate
- Low
- Nil

Terrestrial Wildlife and Marine Bird LSA

- City or Town
- Cutline or Seismic Line
- Railway
- Road

Pacific NorthWest LNG

Marbled Murrelet Critical Habitat and Breeding Habitat Suitablity at Project Build-out

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd. WorldView-2 Imagery. Imagery date: 2011.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-SEP-14	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-798	DATUM: NAD 83
DRAWN BY: T. CARDINAL	CHECKED BY: M. WILLIE

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: **2**

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