Figure 11.2-10
Seabird Observations Recorded during the Barge Survey, September 2010

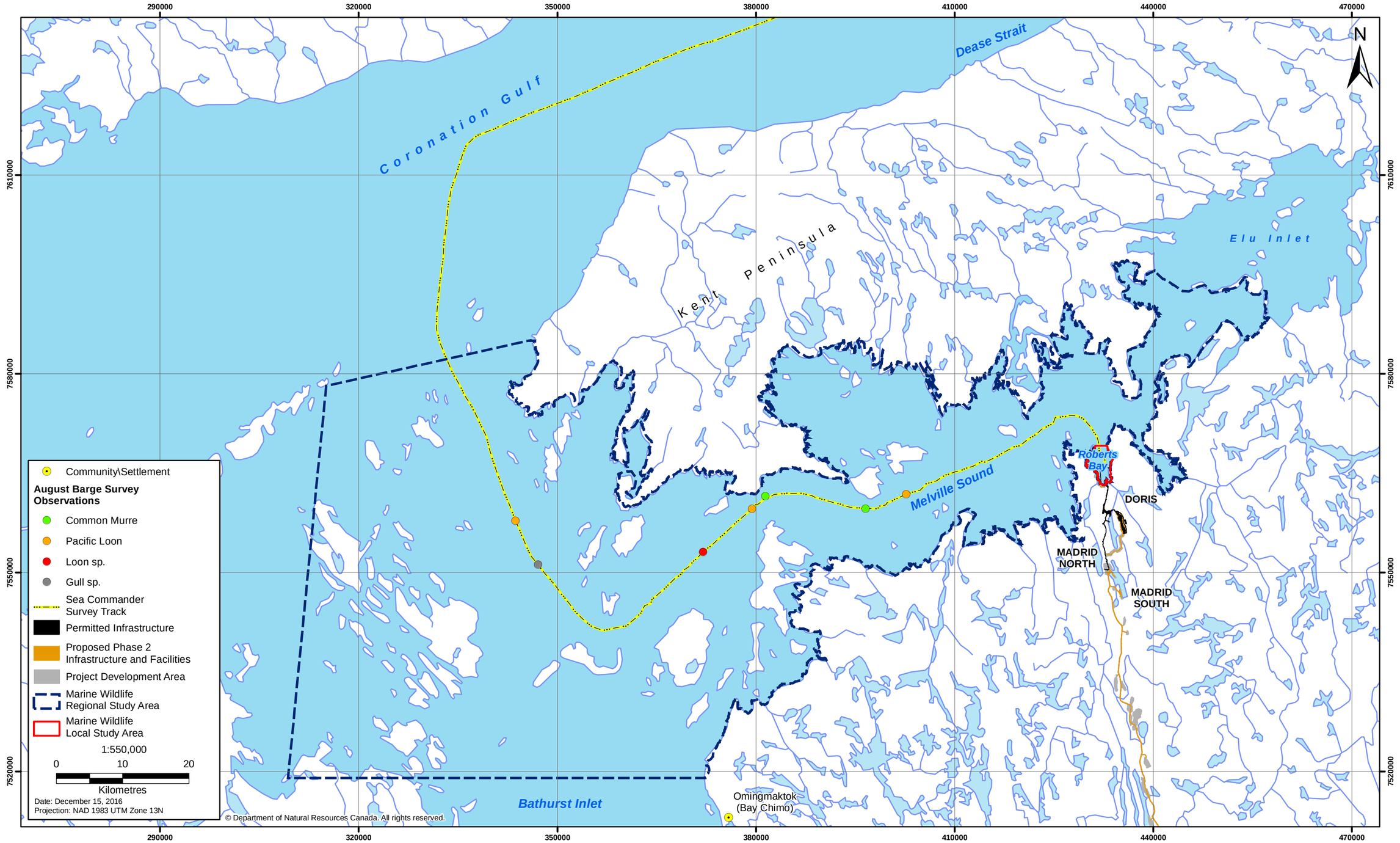
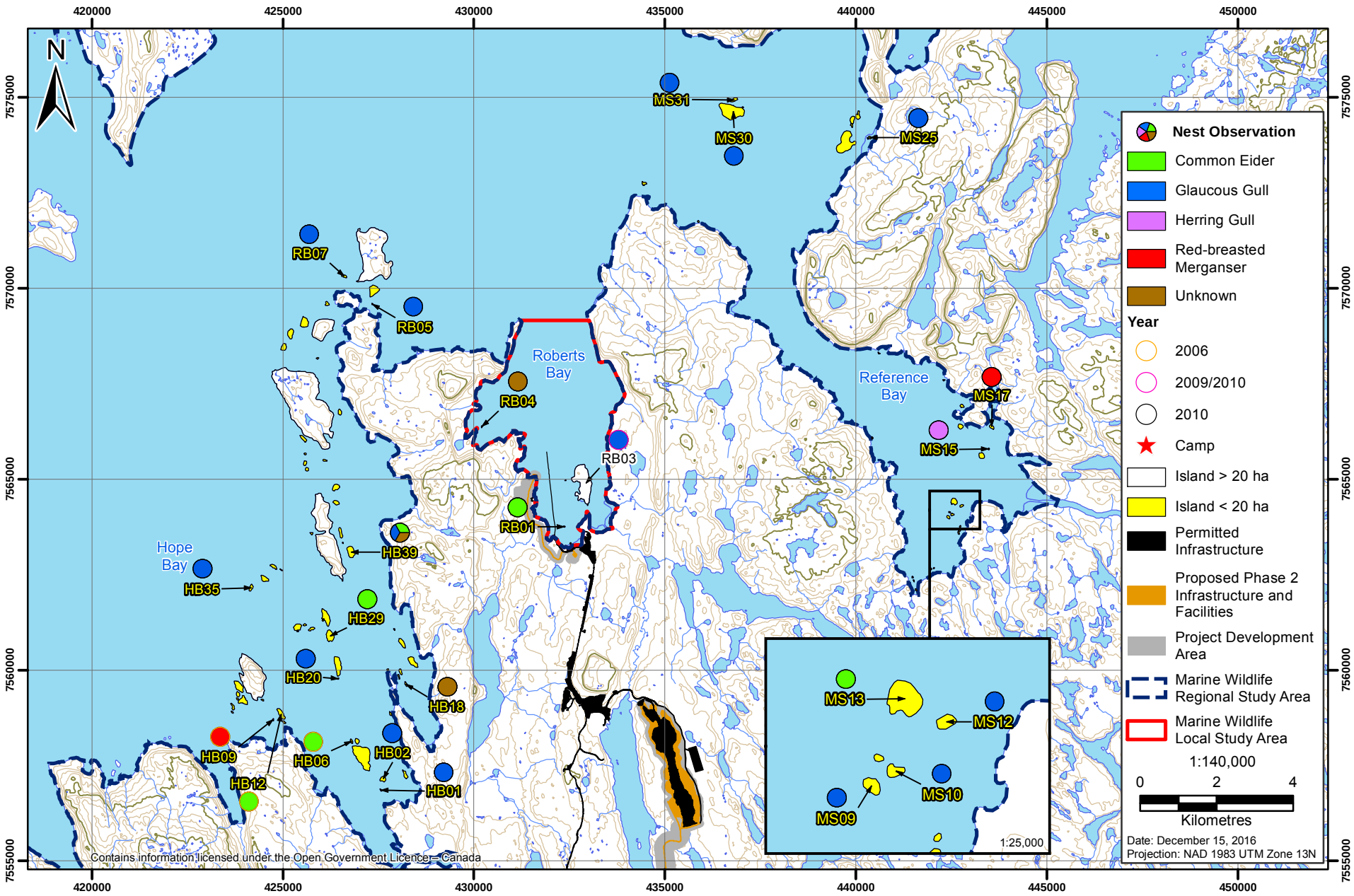


Figure 11.2-11

Island with Nests of Seabirds Observed during Nest Search Surveys, 2006, 2009, and 2010



In July 2006, searches of 13 islands in Hope Bay and Roberts Bay yielded three seabird nests were found (Golder 2007). All nests were located in Hope Bay. Two common eider nests were found on island HB24 (Figure 11.2-11) with clutch sizes of six and three, respectively, while the red-breasted merganser nest had a clutch size of seven. Despite the low nest count, common eiders were often seen in the area while red-breasted merganser sightings were less frequent (Golder 2007).

In 2009, of the 41 islands surveyed in the RSA, only two glaucous gull nests were found on island RB03 (Figure 11.2-11), each with a clutch size of three eggs. However, many old, empty nests in moss or grass depressions were found on several islands (likely old gull nests) and occasional aggregations of sticks on the shorelines were probably old red-breasted merganser nests. There was no evidence of recent nest building, occupation or predation of any seabird nests, nor were any down-lined depressions found. On only one occasion were birds flushed from the near-shore habitat during the walking surveys, in this case a male and female common eider. No nesting activity was found at the point of flushing. From the air, mixed groups of common eiders and red-breasted mergansers were observed on island beaches, but reconnaissance of these areas after landing revealed no nesting activity. The absence of seabird nests in 2009 was attributed to the poor weather, late spring, and amount of ice coverage in mid-July.

In July 2010, of the 87 islands surveyed in the RSA, twenty-eight active nests were found including, five belonging to seabirds: 4 common eider, and 1 red-breasted merganser. Twenty-two glaucous gull nests were found and one herring gull nest. Many seabirds, including common eider and red-breasted merganser were recorded near the surveyed islands during the nest search surveys (Rescan 2011a).

11.2.7.3 Doris Project

Between 1996 and 2004, exploration occurred in the Hope Bay Belt. In 2005, the FEIS for the Doris Project was submitted and a certificate for a two year underground mine was issued in 2006 (Miramar 2005). Construction of the Doris Project began in 2009, but was put into care and maintenance following changes in market conditions in 2010, and was re-opened for additional construction and resource exploration in 2015. To date, the Roberts Bay laydown has disturbed an area of marine beach of approximately 100 m in length, through the use of the area as a barge and boat landing.

The Wildlife Mitigation and Monitoring Plan (WMMP) for the Doris Project included monitoring of seabirds for possible disturbance resulting in avoidance of the Doris Project site, and for potential incidents and mortality.

Disturbance

The potential for sensory disturbance to result in waterbird species (both terrestrial waterbirds and marine birds) avoiding the Doris Project site was evaluated through the ongoing WMMP. Aerial survey have been collected as described in Section 11.2.5 since 1996. In 2016, a comprehensive analysis was conducted of these data and described in detail in the terrestrial wildlife assessment (Volume 4, Section 9.2.11.3). This analysis reported no avoidance of the Doris Project by waterbirds (including marine birds). It was therefore concluded that to date there has been no effect of sensory disturbance on waterbirds and marine birds due to the Doris Project.

Direct Mortality

Any mortality of wildlife, including marine birds observed by onsite personnel is required to be reported immediately to the ESR Department and the annual WMMP report. Mortality of VECs or larger fauna, or mortality resulting from potential interaction with Project activity is reported directly to GN DOE, Environment Canada, and KIA, as necessary.

In the nine years that personnel have been at the Doris Project site (2007-2016), there have been no reports of any waterbird mortality due to vehicle or aircraft strikes (Rescan 2010, 2011a, 2011b, 2013c; ERM Rescan 2014; ERM 2015b, 2016). During this time period, there has been one report of a non-vehicle/aircraft related mortality; one gull was discovered dead from unknown causes in November, 2011 (Rescan 2011c). One loon was caught in a fishing net on Reference Bay but was rescued and set free (Rescan 2011c). The very low frequency of marine bird mortality at the Doris Project indicates that there has been no effect of direct mortality on marine birds.

11.3 VALUED COMPONENTS

11.3.1 Potential Valued Components and Scoping

Potential marine wildlife Valued Ecosystem Components (VECs) were identified through a scoping process to identify those with potential interactions with the Phase 2 Project. The candidate marine wildlife VECs were identified based on:

- The potential interactions with the Phase 2 Project and issues or concerns raised during consultation activities and the input of regulators, Inuit and other stakeholder groups, scientific knowledge, past experience on other northern projects (particularly in Nunavut) and professional judgment.
- Legislative or regulatory requirement or government management priority.
- The availability of data and analytical tools to measure effects on marine wildlife VECs.
- Practicality of measuring and monitoring.

11.3.1.1 The Scoping Process and Identification of Marine Wildlife VECs

The scoping of marine wildlife VECs followed the process outlined in the Assessment Methodology (Volume 2, Section 4). The EIS guidelines (NIRB 2012b) propose the following marine wildlife VECs to be considered for inclusion in the marine wildlife effects assessment (Section 8.1.14, Marine Wildlife):

- marine wildlife (which includes species such as whales and seals);
- associated habitat; and
- marine Species at Risk.

The EIS guidelines (Section 8.1.12, Birds and Bird Habitat) identify the following VECs:

- marine birds; and
- their associated habitat.

For purposes of this document, marine birds reported will include species using marine habitat for such purposes as nesting and moulting. Therefore, there will be overlap between species reported in this section and waterbird species reported in Volume 4, Section 9.

The identified marine wildlife VECs represent an appropriate starting point to guide the identification and scoping of VECs (NIRB 2012b). The selection of marine wildlife VECs began with those proposed in the EIS guidelines and was further informed through consultation with communities, regulatory agencies, available TK, professional expertise, the CRI reports, and the NIRB's final scoping report (Appendix B of the EIS Guidelines).

For an interaction to occur there must be spatial and temporal overlap between a marine wildlife VEC and Project component and/or activities. The determination of VECs and potential effects for inclusion in this effects assessment considered and was informed by:

- and the Kitikmeot Inuit Association (KIA) TK Report (Banci and Spicker 2012);
- marine wildlife baseline studies conducted for the Phase 2 Project;
- ongoing wildlife effects monitoring of the Doris Project;
- consultation and engagement with local and regional Inuit groups (for example, the KIA);
- the Environmental Impact Statement (EIS) guidelines and appendices (NIRB 2012b);
- the public, during public consultation and open house meetings held in the Kitikmeot communities in May, 2016 (see Volume 2, Section 3, Public Consultation and Engagement);
- review of the marine wildlife sections of recently completed Nunavut EAs (e.g., Back River, Meliadine); and
- the Draft Nunavut Land Use Plan (NPC 2014), the NIRB reference and guidance documents (NIRB 2013a, 2013b, 2013c), topics discussed during community meetings, focus groups, interviews, and other meetings with the KIA and relevant government bodies were integrated within specific VECs for further examination in the assessment process.

11.3.1.2 NIRB Scoping Sessions

Scoping sessions hosted by NIRB (NIRB 2012c) with key stakeholders and local community members (i.e., the public) focused on identifying the wildlife species and habitats that are important to local residents, as related to the Phase 2 Project. Comments made during these sessions were compiled and analysed as part of VEC scoping.

11.3.1.3 TMAC Consultation and Engagement Informing VEC Selection

Community meetings for the Phase 2 Project were conducted in each of the five Kitikmeot communities as described in Section 3 of Volume 2. The meetings are a central component of engagement with the public and an opportunity to share information and seek public feedback. Overall, the community meetings were well attended. Public feedback (questions, comments, and concerns) about the proposed Project was obtained through open dialogue during Project presentations, through discussions that arose during the presentation of Project materials and comments provided in feedback forms.

11.3.2 Valued Components Included in the Assessment

The marine wildlife VECs selected to guide the assessment of the potential effects of the Phase 2 Project on marine wildlife are those:

- that have potential to interact with the activities and components of the Phase 2 Project;
- identified as important by local communities, Inuit organizations, governments, regulators, and other stakeholders during consultation and engagement;
- informed by Inuit TK (Volume 2, Section 2) and professional judgement;
- species at risk or of conservation concern;
- species or focal groups requiring enhanced consideration under the mandates of regulatory agencies such as the Government of Nunavut Department of Environment, or the Canadian Wildlife Service;

- species or populations identified for assessment in the NIRB Guidelines (NIRB 2012); and/or
- species identified as having a strong biological importance for the functioning of the ecosystem in the Phase 2 Project area, including importance as keystone, indicator, and/or umbrella species.

Table 11.3-1 summarizes the marine wildlife VECs included in the marine wildlife and habitat assessment.

Table 11.3-1. Wildlife Valued Ecosystem Components Included in the Marine Wildlife Assessment

Species or Group	Identified by			Rationale for Inclusion
	TK	NIRB Guidelines	Regulation/ Regulators	
Ringed Seal (represents Marine Mammals)	X	X	X	Ringed seals were chosen as the representative species for marine mammals as they are regularly observed and are more abundant relative to bearded seal in the assessment area. TK identified ringed seals as a key component of the environment for Inuit historically, currently, and for the future (KIA 2015). Marine mammals were identified as a candidate VEC in the NIRB guidelines for the Phase II development (NIRB 2012).
Marine Birds	X	X	X	Marine birds were identified as a candidate VEC in the NIRB guidelines for the Phase II development (NIRB 2012). Waterbirds are identified by Inuit TK as an important food source (KIA 2015).

11.3.3 Valued Components Excluded from the Assessment

This section lists the candidate marine wildlife VECs that have been excluded from the assessment. Marine mammals were excluded because their range does not overlap with the Phase 2 Project RSA (Table 11.3-2).

Table 11.3-2. Wildlife Valued Ecosystem Components Excluded from the Marine Wildlife Assessment

Species or Group	Identified by			Rationale for Exclusion
	TK	NIRB Guidelines	Regulation/ Regulators	
Polar bear	X	X	X	Polar bear were identified as a candidate VEC in the NIRB guidelines for the Phase II development (NIRB 2012a). TK information indicates that polar bear have been observed rarely in the northern islands of Bathurst Inlet during winter. However, the current range of polar bear does not appear to overlap the Phase 2 Project marine regional study area (MRSA). No polar bears have been observed in the MRSA during the 10 years of construction and care and maintenance of the Doris North Project. Both Inuit TK and baseline studies indicate that polar bear are not present on the southern shore of Melville Sound. Moreover, all Project shipping will be occurring in the open water season, when TK and baseline studies indicate that polar bears are not present in the MRSA. As a consequence, is was determined that there is no potential overlap between the landward components of the Phase 2 Project or with the marine components of the Phase 2 Project (shipping) and polar bears were excluded from the assessment.

Species or Group	Identified by			Rationale for Exclusion
	TK	NIRB Guidelines	Regulation/ Regulators	
Other marine mammals	X	X		Whales were identified as a candidate VEC in the NIRB guidelines for the Phase II Development (NIRB 2012a). TK information indicates that whales occur rarely in the MRSA.

11.4 SPATIAL AND TEMPORAL BOUNDARIES

The spatial and temporal boundaries for the Phase 2 Project are common to all marine wildlife VECs, with a Project Development Area (PDA), Local Study Area (LSA), and Regional Study Area (Figure 11.4-1). Temporal boundaries are set by Project phases.

11.4.1 Project Overview

Through a staged approach, the Hope Bay Project is scheduled to achieve mine operations in the Hope Bay Greenstone Belt through mining at Doris, a bulk sample followed by commercial mining at Madrid North and South, and mining of the Boston deposit. To structure the assessment, the Hope Bay Project is broadly divided into: 1) the Approved Project, and 2) the Phase 2 Project (this application).

11.4.1.1 The Approved Project

The Approved Projects include:

1. the Doris Project (NIRB Project Certificate 003, NWB Type A Water Licence 2AM-DOH1323);
2. the Hope Bay Regional Exploration Project (NWB Type B Water Licence 2BE-HOP1222);
3. the Boston Advanced Exploration Project (NWB Type B Water Licence 2BB-BOS1217) ; and
4. the Madrid Advanced Exploration Program (NWB Type B Water Licence under Review).

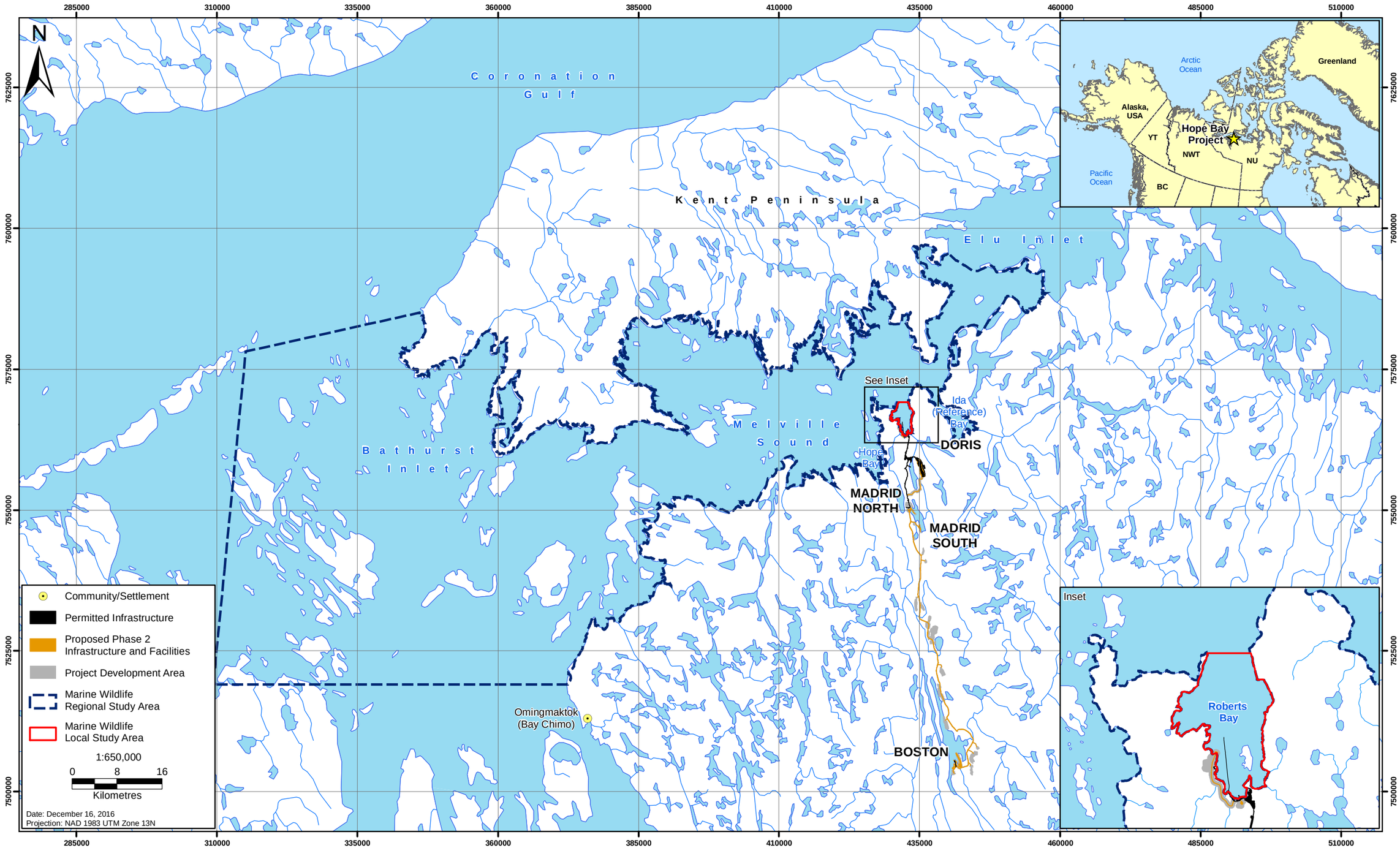
<u>The Doris Project</u>

Following acquisition of the Hope Bay Project by TMAC in March of 2013, planning and permitting, advanced exploration and construction activities have focused on bringing Doris into gold production in early 2017. In 2016, the Nunavut Impact Review Board and Nunavut Water Board (NWB) granted an amendment to the Doris Project Certificate and Doris Type A Water Licence respectively, to expand mine operations to six years and mine the full Doris deposit. Mining and milling rates were increased to a nominal 1,000 tpd to 2,000 tpd.

The Doris Project includes the following:

- The Doris Site: 280-person camp, laydown area, service complex (e.g., workshop, wash bay), quarries, fuel tank farm/transfer station, potable water treatment, waste water treatment, incinerators, explosives storage, and diesel power plant;
- Doris Mine works and processing: underground portal, temporary waste rock pile, ore stockpile, and processing plant;
- Water use for domestic, drilling and industrial uses, and groundwater inflows to underground development;
- Tailings Impoundment Area (TIA): Schedule 2 designation of Tail Lake with two dams (North and South dams), roads, pump house, and quarry;

Figure 11.4-1
Project Development Area and Local Study Area and Regional Study Area for Marine Wildlife VECs



- All-weather roads and airstrip, winter airstrip, and helicopter pads; and
- water discharge from the TIA will be directed to the outfall in Roberts Bay.

Hope Bay Regional Exploration Project

The Hope Bay Regional Exploration Project has been ongoing since the 1990s. Much of the previous work for the program was based out of the Windy Lake (closed in 2008) and Boston sites (put into care and maintenance in 2011). All exploration activities are currently based from the Doris Site with plans for some future exploration at the Boston Site. Components and activities for the Hope Bay Regional Exploration Project include:

- staging of drilling activities out of Doris or Boston sites; and
- operation of exploration drills in the Hope Bay Belt area, which are supported by helicopter.

Boston Advanced Exploration

The Boston Advanced Exploration Project, which operates under a Type B Water Licence, includes:

- the Boston exploration camp, sewage and greywater treatment plant, fuel storage and transfer station, landfarm, and a heli-pad;
- mine works consisting of underground development for exploration drilling and bulk sampling, temporary waste rock pile, and ore stockpile;
- potable water and industrial water taken from Aimaokatalok Lake; and
- treated sewage and greywater discharged to the tundra.

Since the construction of Boston will require the reconfiguration of the entire site, construction and operation of all aspects of the Boston Site will be considered as part of the Phase 2 Project for the purposes of the assessment.

Madrid Advanced Exploration

In 2014, TMAC applied for an advanced exploration permit to conduct a bulk sample at the Madrid North and Madrid South sites, which are approximately 4 km south of the Doris Site. The program includes extraction of a 50,000 tonne bulk sample, which will be trucked to the mill at the Doris Site for processing and placement of tailings in the TIA. All personnel will be housed at the Doris Site.

The Water Licence application is currently before the NWB and includes constructing and operating of the following at each of the sites:

- Madrid North and Madrid South: workshop and office, laydown area, diesel generator, emergency shelter, fuel storage facility/transfer station, contact water pond, and quarry;
- Madrid North and Madrid South mine works: underground portal and works, waste rock pad, ore stockpile, compressor building, brine mixing facility, saline storage tank, air heating facility, and four vent raises; and
- A road from the Doris Site to Madrid with branches to Madrid North, Madrid North vent raise, and the Madrid South portal.

11.4.1.2 The Phase 2 Project

The Phase 2 Project includes the construction and operation of commercial mining at the Madrid (North and South) and Boston sites, the continued operation of Roberts Bay and the Doris Site to support mining at Madrid and Boston, and the Reclamation and Closure and Post-closure phases of all sites. Excluded from the Phase 2 Project, for the purposes of the assessment, are the reclamation and closure and Post-closure components of the Doris Project as currently permitted and approved.

Construction

Phase 2 construction will use the infrastructure associated with Approved Projects.

Additional infrastructure to be constructed for the proposed Phase 2 Project includes:

- expansion of the Doris TIA (raising of the South Dam, construction of West Dam, and development of a west road to facilitate access);
- construction of an off-loading cargo dock at Roberts Bay (including a fuel pipeline, expansion of the fuel tank farm and laydown area);
- construction of infrastructure at Madrid North and Madrid South to accommodate mining;
- complete development of the Madrid North and Madrid South mine workings;
- construction of a process plant, fuel storage, power plant, and laydown at Madrid North;
- all weather access road (AWR) and tailings line from Madrid North to the south end of the TIA;
- AWR linking Madrid to Boston with associated quarries;
- all infrastructure necessary to support mining activities at Boston including construction of a new 200-person camp at Boston and associated support facilities, additional fuel storage, laydown area, ore pad, waste rock pad, process plant, airstrip, diesel power plant, and dry-stack tailings management area (TMA) at Boston; and
- infrastructure necessary to support ongoing exploration activities at both Madrid and Boston.

Operation

The Phase 2 Project represents the staged development of the Hope Bay Belt beyond the Doris Project (Phase 1). Phase 2 operations includes:

- mining of the Madrid North, Madrid South, and Boston deposits;
- transportation of ore from Madrid North, Madrid South and Boston to Doris for processing, and transportation of concentrate from process plants at Madrid North and Boston to Doris for final gold refining once the process plants at Madrid North and Boston are constructed;
- use of Roberts Bay and Doris facilities, including processing at Doris and maintaining and operating the Robert's Bay outfall for discharge of water from the TIA;
- operation of a process plant at Madrid North to concentrate ore, and disposal of tailings at the Doris TIA;
- operation of a process plant at Boston to concentrate ore, and disposal of tailings to the Boston TMA; and
- ongoing use and maintenance of transportation infrastructure (cargo dock, jetty, roads, and quarries).

Reclamation and Closure

At Reclamation and Closure, all sites will be deactivated and reclaimed in the following manner (see Volume 3, Section 5.5):

- Camps and associated infrastructure, laydown areas and quarries, buildings and physical structures will be decommissioned. All foundations will be re-graded to ensure physical and geotechnical stability and promote free-drainage, and any obstructed drainage patterns will be re-established.
- Using non-hazardous landfill, facilities will receive a final quarry rock cover which will ensure physical and geotechnical stability.
- Mine waste rock will be used as structural mine backfill.
- The Doris TIA surface will be covered waste rock. Once the water quality in the reclaim pond has reached the required discharge criteria, the North Dam will be breached and the flow returned to Doris Creek.
- The Madrid to Boston All-Weather Road and Boston Airstrip will remain in place after reclamation and closure. Peripheral equipment will be removed. Where rock drains, culverts, or bridges have been installed, the roadway or airstrip will be breached and the element removed. The breached opening will be sloped and armoured with rock to ensure that natural drainage can pass without the need for long-term maintenance.
- A low permeability cover, including a geomembrane, will be placed over the Boston TMA. The contact water containment berms will be breached. The balance of the berms will be left in place to prevent localised permafrost degradation.

11.4.2 Spatial Boundaries

11.4.2.1 Project Development Area

The Project Development Area (PDA) is shown in Figure 11.4-1 and is defined as the area which has the potential for infrastructure to be developed. The PDA includes engineering buffers around the footprints of structures. These buffers allow for refinement in the final placement of a structure through detailed design and necessary in-filed modifications during construction phase. Areas with buildings and other infrastructure in close proximity are defined as pads with buffers whereas roads are defined as linear corridors with buffers. The buffers for pads varied depending on the local physiography and other buffered features such as sensitive environments or riparian areas. The average engineering buffer for roads is 100 m on either side.

The buffers for pads varied depending on the local physiography and other buffered features such as sensitive environments or riparian areas. The average engineering buffer for pads was 250 m surrounding infrastructure and 100 m surrounding roads. Since the infrastructure for the Doris Project is in place, the PDA exactly follows the footprints of these features. In all cases, the PDA does not include the Project design buffers applied to potentially environmentally sensitive features. These are detailed in Volume 3, Section 2 (Project Description).

11.4.2.2 Local Study Area

The boundary of the marine local study area (LSA) for marine wildlife was set to encompass Roberts Bay and is bounded by the shoreline around Roberts Bay (Figure 11.4-1). The marine LSA is 1,459 ha and includes the marine shoreline area where Project infrastructure is proposed in the south end of

Roberts Bay. The marine LSA was designed to reflect the scale at which direct, immediate, and localized disturbances to marine wildlife species typically occur.

11.4.2.3 Regional Study Area

The marine regional study area (MRSA) for marine wildlife encompasses the marine wildlife LSA, and is bounded by the shoreline encompassing Melville Sound to the mouth of Elu Inlet, at the chain of islands on the west side of Elu Inlet, and extends into the northern portion of Bathurst Inlet including the islands at the mouth of Bathurst Inlet on the eastern side (Figure 11.4-1). The marine wildlife MRSA is 551,000 ha. The MRSA includes wildlife with larger home range sizes that could potentially come into contact with, or may be affected by the workings at the Project Development Area.

11.4.3 Temporal Boundaries

The Project represents a significant development in the mining of the Hope Bay Greenstone Belt. Even though this Project spans the conventional Construction, Operation, Reclamation and Closure, and Post-closure phases of a mine project, Phase 2 is a continuation of development currently underway. Phase 2 has four separate operational sites: Roberts Bay, Doris, Madrid (North and South), and Boston and three mine sites: Madrid North, Madrid South and Boston. Development, operation and closure of the Phase 2 Project will overlap mining and post-mining activities at the existing Doris mine. As such, the temporal boundaries of this Project overlap with a number of Existing and Approved Authorizations (EAAs) for the Hope Bay Project and the extension of activities during Phase 2.

Distinct phases of the Phase 2 Project are defined (Table 11.4-1). Construction, operation, and closure activities will overlap among sites; this is outlined in Table 11.4-1 and further described in Volume 3, Section 2 (Project Description).

The assessment also considers a temporary closure phase should there be a suspension of Phase 2 activities during periods when the Phase 2 Project becomes uneconomical due to market conditions. During this phase, the Phase 2 Project would be under care and maintenance. This could occur in any year of construction or operation with an indeterminate length (one to two year duration would be typical).

11.5 PROJECT-RELATED EFFECTS ASSESSMENT

11.5.1 Methodology Overview

This assessment was informed by a methodology used to identify and assess the potential environmental effects of the Phase 2 Project and is consistent with the requirements of Section 12.5.2 of the Nunavut Agreement and the EIS Guidelines. The effects assessment evaluates the potential direct and indirect effects of the Phase 2 Project on the environment and follows the general methodology provided in Volume 2, Section 4 (Effects Assessment Methodology). It comprises a number of steps that collectively assess the manner in which the Phase 2 Project will interact with VECs defined for the assessment (Section 11.3).

Table 11.4-1. Temporal Boundaries for the Effects Assessment for Marine Wildlife

Phase	Project Year	Calendar Year	Length of Phase (Years)	Description of Activities
Construction	1 - 4	2019 - 2022	4	• **Roberts Bay:** construction of marine dock and additional fuel facilities (Year 1 – Year 2); • **Doris**: expansion of the Doris TIA and accommodations site (Year 1); • **Madrid North:** construction of process plant and road to Doris TIA (Year 1); • **All-weather Road**: construction (Year 1 – Year 3); • **Boston**: site preparation and installation of all infrastructures including process plant (Year 2 – Year 5).
Operation	5 - 14	2023 - 2032	10	• **Roberts Bay**: shipping operations (Year 1 – Year 14); • **Doris**: mining (Year 1 - 4); milling and infrastructure use (Year 1 – Year 14); • **Madrid North:** mining (Year 1 – 13); ore transport to Doris mill (Year 1 -13); ore processing and concentrate transport to Doris mill (Year 2 – Year 13); • **Madrid South:** mining (Year 11 – Year 14); ore transport to Doris mill (Year 11 – Year 14); • **All-weather Road**: operational (Year 4 – Year 14); • **Boston**: winter access road operating (Year 1 – Year 3); mining (Year 4 – Year 13); ore transport to Doris mill (Year 4 – Year 5); processing ore (Year 6 – Year 13); and concentrate transport to Doris mill (Year 6 – Year 13).
Reclamation and Closure	15 - 17	2033 - 2035	3	• **Roberts Bay**: facilities will be operational during closure (Year 15 – Year 17); • **Doris**: accommodations site and facilities will be operational during closure (Year 15 – Year 17); mining, milling, and TIA decommissioning (Year 15 – Year 17); • **Madrid North:** all components decommissioned (Year 15 – Year 17); • **Madrid South:** all components decommissioned (Year 15 – Year 17); • **All-weather Road**: road will be operational (Year 15 – Year 16); decommissioning (Year 17); • **Boston**: all components decommissioned (Year 15 – Year 17).
Post-Closure	18 - 22	2036 - 2040	5	• **All Sites:** Post-closure monitoring.
Temporary Closure	NA	NA	NA	• **All Sites:** Care and maintenance activities, generally consisting of closing down operations, securing infrastructure, removing surplus equipment and supplies, and implementing on-going monitoring and site maintenance activities.

To provide a comprehensive understanding of the potential effects for the Hope Bay Development, the Phase 2 components and activities are assessed on their own as well as in the context of the Approved Projects (Doris and exploration) within the Hope Bay Greenstone Belt. The effects assessment process is summarized as follows:

1. Identify potential interactions between the Phase 2 Project and the VECs or VSECs;
2. Identify the resulting potential effects of those interactions;
3. Identify mitigation or management measures to eliminate or reduce the potential effects;
4. Identify residual effects (potential effects that would remain after mitigation and management measures have been applied) for Phase 2 in isolation;
5. Identify residual effects of Phase 2 in combination with the residual effects of Approved Projects; and
6. Determine the significance of combined residual effects.

11.5.2 Identification of Potential Effects

Potential effects were identified by Inuit TK, through scoping meetings conducted by TMAC with community members, scoping meetings conducted by the NIRB and the subsequent NIRB guidelines (NIRB 2012a), a review of scientific literature of the effects of developments on marine wildlife, review of similar mining projects in Nunavut, the Northwest Territories and the Arctic, and professional judgement.

Potential effects and the efficacy of mitigation and management practices at the Phase 2 Project site have been monitored at the existing Doris Project (Rescan 2010, 2011a, 2011b, 2013c; ERM Rescan 2014; ERM 2015b, 2016) . The effects of mining developments in the Arctic have also been documented through monitoring programs at the Baffinland project (Baffinland Iron Ore Corporation 2012).

These scoping processes identified seven potential effects on marine wildlife:

1. habitat loss and alteration;
2. disturbance;
3. disruption of movement;
4. attraction to the Phase 2 Project;
5. direct mortality;
6. increased access and harvest; and
7. changes in environmental media quality.

Some areas of marine wildlife habitat may be lost and altered through the construction of the Phase 2 Project footprint. Expansion of the Roberts Bay facility may result in loss of some beach habitat used by ringed seals and marine birds. The potential effect of **habitat loss** was evaluated in this assessment.

Disturbances in Roberts Bay, including visual and auditory stimuli, could cause marine wildlife to alter their regular behavioural patterns, avoiding the disturbance and resulting in indirect habitat loss. Shipping may also result in disturbance to marine wildlife. Infrequent Project ship traffic including tankers and bulk carriers will report to Roberts Bay within the Construction, Operations, and

potentially Reclamation and Closure phase. Therefore, the potential effect of **disturbance** is included in this assessment.

It is not expected that shipping or the Roberts Bay facility will result in **disruption of movement** or attraction to the Phase 2 Project site for marine wildlife because shipping will be infrequent and the moving vessels are unlikely to form a barrier to movement.

Marine wildlife could interact with the Phase 2 Project and suffer mortality or injury from shipping vessel strikes, entanglement, or other factors. While the rate of wildlife mortality at many projects is very low, the potential effect of **direct mortality** was evaluated for the Phase 2 Project.

It is not anticipated that **increased access** to the site will result in increased hunting of marine mammals. TK indicates that there are better places to hunt both ringed seals and marine birds elsewhere in the MRSA therefore an increase in human immigration and hunting is unlikely in the MRSA. The Phase 2 Project is not expected to cause in increase in marine wildlife mortality due to facilitation of hunter access and thus the effect is not evaluated for the Phase 2 Project.

It is not anticipated that Phase 2 or the Hope Bay Project will result in changes in media quality (i.e., water quality) in the marine environment. Fuels and hazardous chemicals will be strictly managed and any spills will be addressed immediately as described in the Oil Pollution Prevention Plan (OPPP)/Oil Pollution Emergency Plan (OPEP; Volume 8, Annex 3); and the Hope Bay Project Spill Contingency Plan (SCP; Volume 8, Annex 4).

As part of Phase 2 and the Hope Bay Project, water from the TIA will be treated and discharged into Roberts Bay. Potential effects of Phase 2 and the Hope Bay Project on marine water quality are discussed in detail in the Marine Water Quality Assessment (Volume 5, Section 8) which concluded that change in marine water quality will be Not Significant. Therefore, **no change to environmental media quality** is therefore expected due to the Phase 2 Project and is not considered further for marine mammals or marine birds.

The NIRB guidelines for the Phase 2 Project (NIRB 2012) identified a variety of potential effects to be evaluated. These guidelines and the corresponding potential effect evaluated in this assessment are listed in Table 11.5-1.

Table 11.5-1. NIRB Guidelines for Marine Wildlife and Identified Potential Effects for the Assessment

NIRB Guidelines	Potential Effect
Potential loss to or deterioration in the habitat of marine wildlife VECs due to shipping route(s). Special consideration should be given to Species at Risk listed on Schedule 1 of the federal SARA, species with designations by the COSEWIC, species having significant ecological functions, and/or of importance for Inuit life and culture.	Habitat loss
Potential direct and indirect impacts to marine wildlife, marine fish, and marine habitat from marine shipping activities including increased noise levels.	Disturbance
Potential spills, malfunctions and other accidents associated with shipping operations and any resulting impacts to marine wildlife, marine habitat, and marine fish.	Changes in environmental media quality
Risk assessment of the potential introduction of non-native aquatic species due to ballast water discharge, ship wash and hull fouling.	Habitat loss. Addressed in Marine Fish Section (Volume 5, Section 10)

NIRB Guidelines	Potential Effect
Potential interactions, accidental injuries and mortality of marine wildlife directly or indirectly from proposed shipping (open water and potential ice breaking during break-up in the spring and following freeze-up in the fall) activities, in particular those marine wildlife which congregate in areas where the shipping routes would pass through.	Direct mortality
Potential direct and indirect effects on marine wildlife behaviour, distribution, abundance, migration patterns, species health and reproduction from marine shipping activities.	Habitat Loss, Disturbance, Disruption of Movement
Evaluation of the potential for contaminants to be released to the environment and taken up by VECs as a result of the Phase 2 Project.	Changes in environmental media quality
Assessment of potential residual and cumulative effects on marine wildlife VECs resulting from escalated marine traffic in the RSA over the mining lifecycle (and including the potentially extended mine operation period). Consideration should be given to the possible significant increase of marine vessel traffic along shipping routes.	Habitat loss, Disturbance, Disruption of Movement, Direct mortality, Increased hunting and access, attraction, Changes in environmental media and quality

The Phase 2 Project will include discharge of water as part of the Roberts Bay Discharge System. The water quality of this discharge and Roberts Bay has been modeled and is not expected to change compared to the water quality present as part of the Approved Project. Effects on the marine environment are assessed in the Marine Water Quality Assessment (Volume 5, Section 8), the Marine Sediment Quality Assessment (Volume 5, Section 9) and the Marine Fish Assessment (Volume 5, Section 10), all of which have determine no significant effect of the Phase 2 Project or the Hope Bay Development. Therefore, potential effects due to water discharge are not considered further for marine mammals or marine birds. Marine water quality and sediment quality will be monitoring through the Aquatic Effects Monitoring Plan (Volume 8, Annex 21).

11.5.2.1 Ringed Seal

Potential Phase 2 Project-related effects on ringed seals were considered for the locations where they may interact with ringed seals - shipping within the MRSA and activities at the Roberts Bay facility. Potential effects on ringed seal and its habitat were included based on Traditional Knowledge, community concerns, professional judgement, experience at other similar projects in Nunavut and the scientific literature.

The potential effects on ringed seals were also evaluated temporally over project phases (construction, operation and reclamation/closure) and within the year (e.g., open water vs. sea-ice periods). Interactions of ringed seals with Project components were evaluated to determine which of the following potential effects may occur (Table 11.5-2):

- habitat loss;
- disturbance;
- disruption of movement;
- attraction to the Phase 2 Project;
- direct mortality;
- increased access and harvest; and
- changes in environmental media quality.

Expansion of the Roberts Bay facility may result in some loss of beach habitat used by ringed seals for hauling-out or foraging, as well as disturbance of seals. Construction of the new dock structure at Roberts Bay will involve sheet pile vibratory driving and quarry blasts near the marine environment.

Table 11.5-2. Potential Project-related Effects to Ringed Seal

Project Component	Habitat Loss and Alteration	Disturbance	Disruption Movement	Attraction to the Project Site	Direct Mortality	Increased Access and Harvest	Changes in Media Quality
Construction							
Expansion of Roberts Bay facility	X	X					
Expansion of Doris footprint	X	X					
Fuel Handling and Storage							X
Equipment Operation at Roberts Bay facility		X					
Vessel Traffic		X			X		
Operations and Closure							
Operation of Roberts Bay facility		X					
Fuel Handling and Storage							X
Equipment Operation in Roberts Bay facility		X					
Vessel Traffic		X			X		

Operation of on-site roads at and the handling of equipment in the laydown area at Roberts Bay may result in some disturbance due to noise from vehicles and heavy equipment. The potential for fuel storage to result in changes in media quality in soil and water was also evaluated due to fuel handling and storage.

The Doris Project was permitted for six to eight vessels per year. The Phase 2 and Hope Bay Project will be using six to seven vessels per year, which will report to Roberts Bay each year during the construction and operation phases, and potentially for a short duration during reclamation and closure. This represents the same amount of shipping between the Doris and Phase 2 Projects. However, as part of the Phase 2 Project, vessel traffic will extend beyond the six-year lifespan of the Approved Project for an additional 11 years. Vessels will originate in Vancouver, Montreal, or the Mackenzie River and transit either the eastern or western commercial shipping routes. The ships will carry cargo and diesel fuel to Roberts Bay and will remove non-combustible and hazardous waste.

Vessel traffic for the Hope Bay Project will be conducted by tankers, bulk carriers, or barges strengthened to Type B to CAC 2 Ice Class. Vessel cruising speed will be approximately 13.5 knots (25 km/h) in the commercial shipping route and considerably slower in Melville Sound and Roberts Bay. Vessel traffic will occur during the open-water period and there will be no ice-breaking, except during emergency situations.

It is not expected that shipping or the Roberts Bay facility will result in disruption of movement for ringed seals because shipping will be infrequent and the moving vessels are unlikely to form a barrier to movement.

It is not expected that increased access to the site will result in increased hunting of ringed seals at the Phase 2 Project site. TK indicates that good hunting locations for seals and other marine mammals are concentrated elsewhere in the MRSA. The socio-economic assessment concluded that an increase in human immigration and hunting is unlikely in the wildlife MRSA and no seal hunting by Project personnel or visitors to the site has been reported at the Doris Site. In addition, hunting will not be permitted by Project employees while on site. Thus, the Phase 2 Project is not expected to cause an increase in ringed seal mortality due to facilitation of hunter access.

11.5.2.2 Marine Birds

Potential Project-related effects on marine birds were considered for the locations where they may interact with marine birds - shipping within the MRSA and activities at the Roberts Bay facility. Potential effects on marine birds and their habitat were included based on Traditional Knowledge, community concerns, professional judgement, experience at other similar projects in Nunavut and the scientific literature.

The potential effects on marine birds were also evaluated temporally over project phases (construction, operation and reclamation/closure) and within the year (e.g., open water vs. sea-ice periods). Interactions of marine birds with Project components were evaluated to determine which of the following potential effects may occur (Table 11.5-3):

- habitat loss;
- disturbance;
- disruption of movement;
- attraction to the Phase 2 Project;
- direct mortality;
- increased access and harvest; and
- changes in environmental media quality

Table 11.5-3. Potential Project-related Effects to Marine Birds

Project Component	Habitat Loss and Alteration	Disturbance	Disruption Movement	Attraction to the Project Site	Direct Mortality	Increased Access and Harvest	Changes in Media Quality
Construction							
Expansion of Roberts Bay facility	X	X					
Expansion of Doris footprint	X	X					
Fuel Handling and Storage							X
Equipment Operation at Roberts Bay facility		X					
Vessel Traffic		X			X		
Operations and Closure							
Operation of Roberts Bay facility		X					
Fuel Handling and Storage							X
Equipment Operation in Roberts Bay facility		X					
Vessel Traffic		X			X		

Expansion of the Roberts Bay facility may result in some loss of beach habitat used marine birds, as well as disturbance of marine birds. This habitat loss would occur during construction and continue during operations and into post-closure.

Operation of on-site roads at and the handling of equipment in the laydown area at Roberts Bay may result in some disturbance due to noise from vehicles and heavy equipment. Construction of the new dock structure at Roberts Bay will involve sheet pile driving and blasting of quarries near the ocean. Construction noise will occur during the construction phase. Vehicle-based noise will occur during the construction, operations and closure phases within the Roberts Bay site.

The Doris Project was permitted for six to eight vessels per year. The Phase 2 and Hope Bay Project will be using six to seven vessels per year, which will report to Roberts Bay each year during the construction and operation phases, and potentially for a short duration during reclamation and closure. This represents the same amount of shipping between the Doris and Phase 2 Projects. However, as part of the Phase 2 Project, vessel traffic will extend beyond the six-year lifespan of the Approved Project for an additional 11 years. Vessels will originate in Vancouver, Montreal, or the Mackenzie River and transit either the eastern or western commercial shipping routes. The ships will carry cargo and diesel fuel to Roberts Bay and will remove non-combustible and hazardous waste.

The potential for shipping to result in disturbance to marine birds was evaluated, as was the potential effect of direct mortality due to vessel strikes. Noise due to shipping will occur during both the construction and operations phases and to a lesser degree during the closure phase.

It is not expected that shipping or the Roberts Bay facility will result in disruption of movement for marine birds because shipping will be infrequent and the moving vessels are unlikely to form a barrier to movement.

It is not expected that increased access to the site will result in increased hunting of marine birds. TK indicates marine birds are predominantly harvested at seabird colonies, which do not occur in the marine LSA. In addition, hunting will not be permitted by Project employees while on site. Thus, the Phase 2 Project is not expected to cause an increase in marine bird mortality due to facilitation of hunter access.

11.5.3 Mitigation for Marine Wildlife VECs

Mitigation and management measures were identified through a review of best management practices from similar mining projects in the Arctic, comments from community members during scoping meetings, formal review by the KIA and GN DOE of the existing Doris Project management plan (the Wildlife Mitigation and Monitoring Plan [WMMP]), scientific literature and professional experience.

Mitigation and management measures are in place to minimize potential effects to air quality, the noise environment, and marine water/sediment quality and described in the following plans in Volume 8 of the EIS:

- Annex 19 - Air Quality Management Plan;
- Annex 20 - Hope Bay Project Noise Abatement Plan; and
- Annex 21 - Hope Bay Project Phase 2 Aquatic Effects Monitoring Plan.

Management plans to control non-hazardous, hazardous and food wastes in Volume 8 of the EIS:

- Annex 13 - Hope Bay Project Interim Non-hazardous Waste Management Plan;
- Annex 15 - Hope Bay Project Hazardous Waste Management Plan; and
- Annex 16 - Incinerator Management Plan.

Management plans to manage water quality at each site and ensure that water quality objectives are met in Volume 8 of the EIS:

- Annex 5 - Doris Project Domestic Wastewater Treatment Management Plan;
- Annex 6 - Hope Bay Project Groundwater Management Plan;
- Annex 7 - Water Management Plan: Madrid Advanced Exploration Program, North and South Bulk Samples;
- Annex 8 - Water Management Plan, Hope Bay Project;
- Annex 9 - Water and Ore/Waste Rock Management Plan; and
- Annex 10 - Sewage Treatment Plan Operation and Maintenance Plan.

Spill management plans to protect the environment should a spill occur are located in Volume 8 of the EIS:

- Annex 3 - Oil Pollution Prevention Plan (OPPP)/Oil Pollution Emergency Plan (OPEP); and
- Annex 4 - Hope Bay Project Spill Contingency Plan.

The closure and reclamation plan to minimize long-term effects on wildlife habitat is located in Volume 8 of the EIS:

- Annex 27 - Hope Bay Project, Phase 2 Conceptual Closure and Reclamation Plan.

Mitigation by Project Design

The Phase 2 Project design includes mitigation for potential effects of the Phase 2 Project on marine wildlife. The most important mitigation included in the Phase 2 Project design is to conduct shipping activities during the open-water season - outside of the sensitive periods for ringed seals and Dolphin and Union (island) caribou. Design mitigation includes:

1. Open-water season shipping only (no ice-breaking).
2. Infrastructure designed to minimize the Phase 2 Project footprint in marine habitat.
3. Project infrastructure designed to avoid, where possible, identified wildlife sensitive areas, such as marine mammal haul-outs and marine bird rookeries.
4. Accommodation barges will not be used.

Best Management Practices

The WMMP (Volume 8, Annex 22) includes best management practices intended to address specific potential effects on wildlife, including habitat alteration and mortality or disturbance in the marine environment. These management actions include the following policies applicable to all employees:

- a no feeding of wildlife policy;
- a no littering policy;
- a no hunting policy for all Project staff and contractors while on site; and
- all Project roads will be closed to the public.

The following best management practices will be carried out to minimize potential effects on marine wildlife:

- Ships will avoid the large marine bird colony on Prince Leopold Island by 25 km, except where the safety of the ship dictates otherwise.
- Ships will avoid groups of marine mammals and aggregations of marine birds.
- Aircraft (helicopters) will avoid marine bird colonies by given setback distances.
- Airstrips monitored prior to take-off and landings to ensure marine birds are not present on the landing strip.
- A speed limit will be set and enforced on all Project roads, including the Roberts Bay facility.
- Wildlife given the right-of-way on all roads at all times.
- Wastes will be managed such that they are not introduced into the marine environment.
- Protocols for human-wildlife interactions will be developed to protect both sit personnel and marine wildlife in cases where wildlife may come in contact with Personnel.
- Best management practices will be used to manage fuels, hazardous materials to prevent spills, and to contain and clean up any spills that may occur in the marine environment, including:
- The Hope Bay Spill Contingency Plan is designed to protect worker and public safety and minimize any effects of a spill of fuel, soluble solids, liquids like solvents or paint, flammable gases and other hazardous substances on the environment.
- Oil Pollution Prevention Plan (OPPP)/Oil Pollution Emergency Plan (OPEP) describes the responses to oil spill scenarios at the Roberts Bay facility and is a requirement of the *Canada Shipping Act* (2001).
- The Shipboard Oil Pollution Emergency Plan (SOPEP) describes the equipment, training and procedures that the ship must have on board in order to manage and address any fuel spills during shipment or unloading to minimize any effects on the environment and is a requirement of the International Maritime Organization (IMO) for all ships transporting fuel.

Several general methods are available to mitigate the effects of pile driving noise in the marine environment. These range from engineering controls to Project monitoring activities. All mitigation measures included below are designed to provide protection from impacts to fish mortality (Volume 5, Section 10) and marine mammal temporary hearing.

- Marine Mammal Observer Program – have wildlife monitors survey for seals and birds and cease pile driving if wildlife are within a 200 m buffer safety zone.
- Use of vibratory pile driving instead of impact pile driving.
- Acoustic monitoring of pile driving activity.
- Establish underwater noise thresholds within 25 m of piling activities, which trigger additional mitigation measures.

- Soft Start Procedures – Prior to initiating any noise generating activity mechanical operations should undergo a "*soft start*" procedure. Where bubble curtains are to be used, this entails generation of a bubble curtain for at least 10 minutes prior to initiation of activity. Noise generating equipment such as the vibratory hammer will then slowly ramped to a maximum to allow marine wildlife to avoid the area.
- Stop work - When sound levels breach the newly recommended maximum threshold of 22.4 kPa (207 dB re: 1 µPa) or a maximum of 3.2 kPa (190 dB re: 1 µPa) for marine mammals outside of the 200 m exclusion zone this should be reported to the contractor for implementation of any additional mitigation measures.
- Additional mitigation - Should thresholds presented above be exceeded, the implementation of an attenuation device (e.g., bubble curtain) will be considered when pile driving is occurring to reduce peak underwater noise. Bubble curtains can reduce underwater noise impacts up to 20 dB through attenuation of sound energy using air bubbles suspended in the water column (Vagle 2003). Bubble curtains will be installed to completely surround each site of pile driving activity for entire duration of noise generation. Alternatively, the size of the safety zone may be expanded from 200 m to a greater distance where the noise levels drop below guidelines.

Proposed Monitoring Plans and Adaptive Management

The Phase 2 Project will conduct marine wildlife monitoring to evaluate the effectiveness of mitigation and test the predictions of the EIS. Potential effects on marine wildlife will be adaptively managed, and plans will be reviewed periodically to meet current standards, in response to unexpected monitoring results, in response to scientific findings, or due to a significant change in the Phase 2 Project activities.

Marine water quality and sediment quality will be monitored as part of the Aquatics Effects Monitoring Plan (Volume 8, Annex 21).

The following monitoring will be conducted at Phase 2 Project facilities to evaluate management actions:

- footprint monitoring to monitor habitat loss;
- noise monitoring;
- recording any hunters using the Phase 2 Project site;
- waste management monitoring;
- recording any collisions between vehicles and wildlife; and
- recording incidental marine wildlife observations to help identify unexpected interactions with marine wildlife.

Monitoring will also be conducted for marine wildlife VECs to evaluate the predictions of the EIS, including:

- continued monitoring of waterbirds and marine birds through helicopter-based surveys;
- observations by ship's crew of marine mammals and marine birds; and
- monitoring for pile driving will include the best practice measures described in Section 11.6.4.2, and prior to the start of any activity, a marine mammal observer will be stationed to identify any marine mammals and birds within the minimum marine mammal exclusion zone of 200 m.

The following activities are also proposed:

- Hydroacoustic monitoring – During use of the vibratory hammer and any other activities having the potential to create sound energy, sub-surface hydroacoustic monitoring with a hydrophone will be conducted to confirm predictions of sound generation and detect mean and maximum sound energy; and
- Observations for fish kills or impairment throughout the period of sound generation.

11.5.4 Characterization of Potential Effects

11.5.4.1 Ringed Seals

The following sections evaluate the potential effects of habitat loss, disturbance due to noise, and direct mortality on ringed seals.

Habitat Loss

The expansion of the Roberts Bay facility will include the construction of a cargo dock on a rocky section of shoreline. The potential for this cargo dock to result in habitat loss for ringed seals is evaluated in this section.

Preliminary design criteria for the dock facilities include the geometry and load capacity required to support the design vessel(s) and estimated equipment loads. Design environmental criteria include site geotechnical characteristics and loads associated with ice, surge, and wave interaction. Details of the design criteria are presented in Appendix V3-3B. The planned dock will also include mooring points established on shore with rock anchors or large blocks, to fix the temporary containment boom to shore. A dock will be constructed at the Roberts Bay facility to accommodate unloading of supplies directly from ships, rather than through the use of lightering barges. Fuel ships will anchor offshore and unload via a fixed hose.

The Roberts Bay cargo dock will be T-shaped, with a 70 m long causeway and a 110 × 40 m dock at right angles to the causeway. The dock will meet the shore on exposed bedrock and will alter approximately 50 m of bare rock shoreline.

The cargo dock facility will be constructed by vibrating sheet piles into the sediment, filling the resulting box structure with clean quarry material, and a compacting a rock cap. The sheet pile box structure will be surrounded by an embankment of armour rock designed to protect the sheet pile structure from ice scour except on the front face where ships will moor. The amount, angle, and wetted surface area of the armor rock will be designed to largely offset the loss of fish, marine bird, and marine mammal habitat due to the construction of the dock.

A natural beach landing sufficient to land a 5 to 8 m work boat is also required. This can be a natural beach area or run of quarry (ROQ; greater than 1 m) placed in shallow water to create an artificial work boat landing site. Adjacent to the beach landing will be a gravel pad (approximately 30 × 30 m) for vehicle turn-around and spill container storage. Infrastructure will also include a shore manifold with a reel with enough floating hose (approximately 300 m) of six inch diameter for connecting to the tanker.

Baseline surveys indicated that there are no ringed seal haul-outs during the summer in Roberts Bay and the winter density of ice holes for breathing is lower inshore and in Roberts Bay and adjoining Melville Sound than in Bathurst Inlet. This is likely because ringed seals prefer to avoid land-based predators such as grizzly bears and wolverine. Ringed seals typically have their breathing holes and

maternal lairs in or along pressure ridges and cracks in the sea ice. The sea ice in Roberts Bay is land-fast, and largely devoid of these features. During the spring seal survey in 2010, seals and breathing holes were more frequently observed in upper Bathurst Inlet and Coronation Gulf in comparison to areas within Melville Sound (Appendix V5-11A).

No high-quality habitat will be lost for marine mammals because seals do not use the exposed rock at the cargo dock site as a haul out. The area of rock that the dock will cover is approximately 0.55 ha, which is 0.1% of Roberts Bay and <0.0001% of the MRSA). The marine fisheries effects assessment concluded that this loss of habitat did not result in a residual effect on fish habitat, and fish are the main prey of ringed seal (Volume 5, Section 10). In summary, Roberts Bay is not considered high quality habitat for ringed seals, very little area will be affected by the cargo dock structure, and effects are not expected on fish, the main food of ringed seals. Hence, habitat loss for ringed seals was **not rated as a residual effect**.

Infrastructure for the Doris Project (part of the Existing and Approved projects) in Roberts Bay includes a 30 m wide and 65 m long jetty. This jetty is used as a landing site for the lightering barges that currently bring equipment and fuel from ships anchored offshore to the Roberts Bay facility. This area is considered lost due to the Existing and Approved projects. As a consequence, the potential effects of habitat loss will go from the current loss of 30 m of shoreline to a total of 100 m of shoreline during Phase 2. This total area is small (0.1%) of Roberts Bay. Hence the combined habitat loss for the Hope Bay Project is **not rated as a residual effect** for ringed seals and not considered further in the assessment.

Disturbance

The potential for ringed seals to be disturbed by underwater noise from the construction of the Roberts Bay cargo dock and shipping was evaluated.

Construction Activities

Construction of the Roberts Bay Cargo Dock — The construction of the Roberts Bay cargo dock will include vibratory pile driving, which could disturb ringed seals and result in seals avoiding the cargo dock area during construction. This effect would occur during the construction period of Phase 2.

Sheet piles will be driven into the sea floor during the construction of the new cargo dock in Roberts Bay. Marine mammals generally do not suffer mortality events from underwater noise (Popper et al., 2014); however, data show that temporary hearing impacts can occur at noise levels above 1.0 kPa (180 dB re: 1 µPa).

The United States National Marine Fishery Services (NMFS) recommends that acoustic safety zones be established at 180 dB re: 1 µPa for the protection of temporary hearing injury to whales, porpoises, and dolphins (Vagle 2003; NOAA 2013).This value is more conservative than the threshold for seals and sea lions of 3.2 kPa (190 dB re: 1 µPa) used by NMFS (Vagle 2003). The proposed Project safety zone for the sheet pile driving during construction of the Roberts Bay jetty is 200 m. This safety zone is consistent with that at other industrial projects in the Arctic that have in-water works such as Baffinland.

Trained marine mammal observers (MMO) will survey the safety zone for marine mammals and work will be stopped if/when mammals are observed within the 200 m safety zone.

Noise levels will be monitored with hydrophones will ensure that noise guidelines are being met within the safety zone. Should monitoring indicate that noise is exceeding guidelines, additional mitigation will be applied to reduce noise or the safety zone will be expanded accordingly. With monitoring for marine mammals, work stoppages when marine mammals are observed in the safety zone, noise

monitoring and additional noise suppression if required, **no residual effects on marine mammals are expected from sheet pile driving**.

Blasting at Roberts Bay Quarries — As part of the construction of the cargo dock, on-shore blasting is planned in two quarries for borrow material to build laydown pads and the access road. One quarry is located adjacent to the cargo dock and stretches approximately 30 to 500 m from the shoreline. The second quarry is located adjacent to the existing jetty and extends approximately 30 to 250 m from the shoreline. Noise from on-shore blasting was evaluated for potential effects on marine mammals, marine birds (Section 11.5.4), and fish (Volume 5, Section 10).

Mitigation for on-shore quarry blasts will follow that for sheet pile driving, using marine mammal observers to determine if marine mammals are present within a 200 m safety zone of the blast. If marine mammals are within this area, then blasting will cease until the marine mammals move beyond the exclusion zone. Underwater acoustic monitoring will ensure that the blasting noise is meeting noise guidelines within the safety zone. If noise does not meet guidelines, then additional mitigation will be implemented or the safety zone will be expanded accordingly. With these mitigations in-place, **no residual effects on marine mammals are expected from blasting in the Roberts Bay quarries**.

The construction period for the Roberts Bay cargo dock is restricted to a short period during the construction phase. The construction location is in Roberts Bay, which will contain noise from pile driving. Baseline studies have indicated that there are no haul-outs for ringed seals or other marine mammals in Roberts Bay and the density or winter breathing holes in the bay are low compared to Melville Sound. Traditional knowledge indicates that ringed seals are not harvested in Roberts Bay (Banci and Spicker 2016). Therefore, construction activities at Roberts Bay are not anticipated to disturb ringed seals and **no residual effect is anticipated**.

Disturbance to ringed seals due to the existing Roberts Bay laydown, which is part of the Doris Project, is limited to the operation of a lightering barge from ships to the shore and on-shore activities in the Roberts Bay laydown site. The combination of existing and Phase 2 activities is not likely to have an effect on ringed seals because the existing use of the lightering barges and the lightering barge landing site will be discontinued and replaced with the Phase 2 dock. The Phase 2 jetty has already been assessed as **not a residual effect** and is not assessed further.

Vessel Traffic

Between six and seven vessels will report annually to the Roberts Bay facility during construction and operations and potentially during closure. This is the same level of vessel traffic per year compared to the Approved Project. As part of the Phase 2 Project, vessel traffic will be extend beyond the six-year lifespan of the Approved Project for an additional 11 years. Average vessel cruising speed is estimated at 13.5 knots (25 km/h), but slower in Roberts Bay.

Commercial vessels cruising in open water emit low-frequency underwater noise from 10 to 100 Hz (NRC 2003; Hildebrand 2009; McKenna et al. 2012). Open-water shipping during the construction and operations phases were used to assess the effects of disturbance to ringed seals because these are the phases with the most shipping activity.

Seals do not appear to respond strongly to ships and, in some areas, are commonly observed close to vessels (Harris, Miller, and Richardson 2001; Miller and Davis 2002; Miller and Moulton 2003). Some seals are likely to avoid approaching vessels by a few metres to tens of metres, whereas some curious seals are likely to swim toward vessels.

Hearing limits for seal species have been estimated to be 75 Hz to 30 kHz in air and 75 Hz to 75 kHz in water which has minimal overlap with the range produced by ships (75 to 100 Hz) (Mohl 1968; Terhune and Ronald 1971, 1972; Kastak and Schusterman 1999; Reichmuth 2008; Kastelein et al. 2009). Data on the hearing of ringed seals was supplemented by data on harbour seals (Richardson et al. 1995) because these species are close relatives (Árnason et al. 1995).

No minimum exposure criteria for underwater noise levels exist for the protection of marine mammals in Canada. Continuous sounds with noise sensation levels between 80 dB re: 1 µPa and 100 dB re: 1 µPa cause an avoidance response in seals (Davis and Malme 1997). Some seals are assumed to exhibit minor behavioural responses (e.g., changes in swim speed) at 70 dB re: 1 µPa sensation levels. Avoidance responses are anticipated to be temporary, returning to normal conditions with the cessation of the noise source.

Noise modelling conducted for the Mary River Project (Baffinland Iron Ore Corporation 2012) reported that noise would attenuate to 70 dB within approximately 200 m from the vessel. For a large vessel of 190 m x 30 m, the area where noise would exceed 70 dB would be approximately 0.21 km^2. Using an estimated ship speed of 25 km/h, a seal that does not move away from the ship would be exposed to noise above 70 dB for approximately 1.4 minutes, which would be the incremental increase in noise disturbance due to the single additional ship associated with the Phase 2 development.

Any disturbance to ringed seals along the shipping route would be transitory. Given the estimated source levels, infrequency of traffic, and seal distributions, the disturbance will be minor or brief, lasting less than 20 minutes per year on the shipping route and affecting only those seals within 250 m of the ship. As ringed seal density is anticipated to be low in the marine wildlife MRSA during the summer when shipping will occur, seals are generally anticipated to avoid ships, and the area and duration of disturbance to ringed seals is both small and short. Therefore the effect of disturbance on ringed seal for both the Phase 2 and Hope Bay Project is not expected to adversely affect seals and **no residual effect is anticipated**.

Direct Mortality

The potential for ship strikes to result in direct mortality of ringed seals was evaluated. The majority of mortality and injury due to vessel strikes are reported for large whales (Jensen, Silber, and Calambokidis 2003), although evidence of vessel strikes have recently been reported for seals in the UK (Thompson et al. 2010).

Management to prevent direct mortality on ringed seals (and other marine mammals) includes avoiding known haul-outs and rookeries in the MRSA and along the shipping route by greater than 5 km, and avoiding marine mammals whenever they are observed.

In general, incidences of vessel strikes on seals are rare. There has been some evidence from the UK and Atlantic Canada that mortalities can occur due to ducted propellers, which are common on tugs, self-propelled barges, and offshore support vessels, but uncommon on commercial shipping vessels (Thompson et al. 2010). The Phase 2 and Hope Bay Project represent the same level of shipping as the Approved Project and there are few ringed seals in Roberts Bay and Melville Sound in general. Given the short duration of noise disturbance for seals that may occur along the vessels path and with mitigation and management, the potential for mortality due to shipping for seals from the Phase 2 and Hope Bay Project is **not anticipated to result in a residual effect.**

11.5.4.2 Marine Birds

The potential effects of habitat loss, disturbance, and direct mortality were evaluated for marine birds.

Habitat Loss

The potential for habitat loss and alteration due to the expansion of the Roberts Bay facility was evaluated for marine birds.

Baseline surveys searched for seabird colonies in the MRSA and evaluated the locations and relative densities of seabird nesting within Melville Sound and Roberts Bay. Within Melville Sound and Roberts Bay, there were no seabird colonies, but seabirds were found nesting on the beach and ground surface at low densities. The greatest density of seabird nests in Melville Sound and Roberts Bay were on small islands (< 20 ha), presumably to avoid predation during the nesting period by terrestrial predators such as foxes, wolverines, and weasels. Surveys indicated that the density of nests on the shore of the mainland was extremely low, presumably due to predation risk.

The closest seabird colonies to the Phase 2 Project are on small islands and bays in northern Bathurst Inlet and in Elu Inlet at the east end of Melville Sound. Bathurst Inlet, Melville Sound, and Elu Inlet are designated as a key bird habitat site by the Draft Nunavut Land Use Plan (Environment Canada 2014). In addition, there is a conservation area, the Queen Maud Gulf Migratory Bird Sanctuary, approximately 50 km east of Roberts Bay by air and over 300 km by water. Melville Sound is isolated from the Queen Maud Gulf by the Kent Peninsula.

There were no marine staging areas for marine birds observed during marine baseline surveys or ongoing waterfowl monitoring for the Doris Project. The shipping route in the northern MRSA does transit through a portion of a Key Marine Habitat Sites (KMHS) for Pacific common eider (Bathurst Inlet/Elu Inlet KMHS). Some eider using these island chains within the MRSA for breeding may also use adjacent marine habitats for moulting and staging from mid-July through early October. However, Parry Bay and Melville Sound within Elu Inlet, well to the northeast of the MRSA, appears to be the principle moulting and staging area for male and female eiders breeding in northern Bathurst Inlet and Elu Inlet (Dickson 2012b).

The proposed T-shaped dock in Roberts Bay will measure 70 × 110 m, and with the expanded laydown area, has the potential to alter approximately a 70 m of exposed bedrock shoreline on the western shoreline of the bay. This exposed rock habitat is considered low quality habitat for marine birds.

The loss and alteration of habitat for seabirds was calculated by comparing the area of potential nesting habitat lost due to the new Roberts Bay Project Development Area (PDA) to the shoreline area available for nesting in the LSA and RSA.

The planned Phase 2 Roberts Bay infrastructure is surrounded by an averaged buffer of 250 m. This footprint plus buffered area (the PDA) is 96.7 ha. The area of the Phase 2 Project PDA within 100 m of the shoreline that could serve as nesting habitat for seabirds is 0.6 ha. This accounts for approximately 0.014% of the 4,287 ha of shoreline habitat in Roberts Bay (the marine LSA), and accounts for approximately 0.0023% of the nesting habitat in the MRSA (i.e., 23,500 ha of habitat within 100 m of the coastline).

The existing infrastructure in the Roberts Bay laydown that is within 100 m of the shoreline is 4.3 ha. The total infrastructure for the Hope Bay Development is therefore 4.9 ha within 100 m of the shoreline, which is 0.11% of the marine LSA and 0.021% of the shoreline habitat in the MRSA.

This assumes that all shoreline habitat in the MRSA is of equal quality as nesting habitat. TK and aerial surveys indicate that seabirds predominantly nest on islands of lower than 20 ha to lower predation risk (Dickson 2012b). Therefore the habitat removed for the Roberts Bay laydown can be considered poor

quality habitat since it is on the mainland. The alteration of habitat is therefore considered negligible compared to the area available for use and given its poor habitat quality.

Baseline surveys and ongoing compliance monitoring for the Doris Project (the WMMP) did not identify any seabird staging areas in Roberts Bay. Baseline surveys did not identify any staging or moulting areas in Melville Sound. Areas used by seabirds for colony nesting and moulting do occur in Elu Inlet, but that area is outside of the marine shipping route.

As a consequence of the low amount of nesting habitat that will be removed due to Roberts Bay PDA, the very low densities of seabirds that use the mainland coast in Roberts Bay and the lack of migratory staging areas in Roberts Bay, the potential effect of habitat loss and alteration is **not considered a residual effect for the Phase 2 Project**.

For the Hope Bay Development, the existing Roberts Bay facility is comprised of the laydown area, landing area for a lightering barge, and fuel tank farm, and as removed 7.1 ha of near-shore habitat that could be used by marine birds for nesting. The existing and planned Phase 2 PDA areas total 103.8 ha. As discussed above, the small size of these facilities, low density of seabirds nesting on the mainland shore, and lack of marine staging areas result in this combined habitat loss is **not considered a residual effect on marine birds**.

Disturbance

The potential for disturbance of seabirds due to the construction and operation of the Roberts Bay cargo dock and expansion of the laydown area was evaluated for Phase 2. The potential for disturbance due to noise from ships was also evaluated. Phase 2 does not include the use of seaplanes, so aircraft noise was not considered.

Construction of the Roberts Bay Cargo Dock

The construction of the Roberts Bay cargo dock will require driving of sheet piles, which has the potential to disturb marine birds and result in birds avoiding the cargo dock area during construction. This effect would occur during the construction phase of Phase 2. Studies report that marine birds typically react to project-related noise within a generally localized area (Larsen and Laubek 2005; Ronconi and St. Clair 2006; Schwemmer et al. 2011).

The construction period for the cargo dock is restricted to a short period during the construction phase. The construction location is in Roberts Bay, which will contain noise from pile driving. Baseline studies have indicated that the nearest congregation of nesting areas for marine birds are approximately 800 m away on the islands in the middle of Roberts Bay and the nearest colony nesting areas for birds are in Elu Inlet (more than 25 km away) and northern Bathurst Inlet (approximately 100 km away).

Management to reduce the potential for disturbance on marine birds due to pile driving for the cargo dock will include monitoring of a 200 m safety zone by a MMO and halting pile driving if large aggregations of marine birds occur in the safety zone (Section 11.5.3). These standard mitigation measures will be in place to protect marine mammals (Section 11.5.3) and will likewise protect marine birds. Monitoring using hydrophones will ensure that noise guidelines for marine mammals are met within the safety zone. Should noise levels not meet guidelines, then additional mitigation will be applied (e.g., bubble nets) or the safety zone will be expanded. These measures will also protect marine birds. Therefore, construction activities at the Roberts Bay are not anticipated to disturb marine birds and **no residual effect** is anticipated.

Disturbance to marine birds due to the existing Roberts Bay laydown, which is part of the Doris Project, is limited to the operation of a lightering barge from ships to the shore and on-shore activities in the Roberts Bay laydown site. The combination of existing and Phase 2 activities is not likely to have an effect on marine birds because the existing use of the lightering barges and the lightering barge landing site will be discontinued and replaced with the Phase 2 dock. The Phase 2 dock has already been assessed as **not a residual effect** and is not assessed further. With no significant effects of disturbance on marine birds predicted, there is no potential effect on population health or reproduction.

Vessel Traffic

This section evaluates the potential for seabirds to be disturbed by vessel traffic. Some studies report that seabirds can respond to marine vessels with alert reactions or temporary avoidance of habitats (Brown 1990; Frimer 1994; Ward, Stehn, and Derksen 1994; Mosbech and Boertmann 1999; Schwemmer et al. 2011). Six to seven vessels will report to the Roberts Bay facility per year during the construction and operations phases, and a lower number during the closure phase. Shipping will occur during the open-water season.

Studies in shipping lanes in Norway report that common eider have a median flushing distance of 300 m (Schwemmer et al. 2011), with other species having a longer flushing distance, such as long-tailed duck, white-winged scoter, and black scoter. Large flocks were found to flush at greater distances than smaller flocks. Species capable of sustaining long dives (e.g., scoters, eiders) also commonly dove in response to ship traffic.

A similar study in Denmark reported that wintering seaducks (common eider and black scoter) responded to high speed ferries by flushing or diving when ferries were within 100 to 200 m (Larsen and Laubek 2005). Most birds did not react when ferries were 400 m or further from flocks. Seabirds replace flight feathers during the moulting period and are flightless for up to four weeks. Flightless birds may expend more energy avoiding ships.

Ships from the Phase 2 Project will not transit near any known large colonies of seabirds, or through any known or designated moulting areas. Note that the nearest moulting areas are associated with the small islands and bays in northern Bathurst Inlet and in Elu Inlet at the eastern end of Melville Sound (Nunavut Planning Commission 2016). In general, aggregations of seabirds on the water during moulting and staging will occur near land and near colony nesting areas.

Mitigation and management for shipping includes 500 m buffers between ships and any identified seabird colonies, moulting areas and any observed aggregations of seabirds. Ships will also avoid the large colony breeding area on Prince Leopold Island by 25 km, as long as it is safe to do so.

As a consequence, it is not expected that the additional years of vessel traffic due to the Phase 2 and Hope Bay Project will disturb and adversely affect marine birds and the potential effect is **not rated as a residual effect**.

Direct Mortality

The potential for shipping to result in direct mortality of seabirds was assessed. Most seabirds will flush (fly away) or dive to avoid disturbances, such as passing ships (Frimer 1994; Larsen and Laubek 2005; Schwemmer et al. 2011). These responses will protect marine birds from the potential for mortality through ship strikes.

As noted above, seabirds replace flight feathers during the moulting period and are flightless for up to four weeks. Mitigation and management for shipping includes buffers between any identified seabird colonies, moulting areas and any observed aggregations of seabirds by 500 m both in the MRSA and the commercial shipping route, and avoidance of Prince Leopold Island by 25 km when safe to do so. As a consequence, ships from the Phase 2 Project will not transit near any known large colonies of seabirds or moulting areas. Note that the nearest moulting areas are associated with the small islands and bays in northern Bathurst Inlet and in Elu Inlet at the east end of Melville Sound (Nunavut Planning Commission 2016).

It is therefore not expected that shipping from either the Phase 2 or the Hope Bay Development will result in direct mortality for marine birds and the potential effect is **not a residual effect**.

11.5.5 Characterization of Residual Effects

11.5.5.1 Characterization of Residual Effect for Ringed Seal

No residual effects for ringed seal are anticipated due to Project-related activities. Consequently, no potential residual effects were evaluated for significance or carried forward to a cumulative effects assessment. Potential effects of the Phase 2 Project and Hope Bay Development on ringed seals are expected to be Not Significant.

11.5.5.2 Characterization of Residual Effect for Marine Birds

No residual effects for marine birds are anticipated as a result of Project-related activities. Consequently, no potential residual effects were evaluated for significance or carried forward to a cumulative effects assessment. Potential effects of Phase 2 Project and Hope Bay Development on marine birds are expected to be Not Significant.

11.6 CUMULATIVE EFFECTS ASSESSMENT

With the conclusion that there are no residual effects of the Phase 2 Project, or the Hope Bay Development on ringed seals, no cumulative effects assessment is required.

With the conclusion that there are no residual effects of the Phase 2 Project, or the Hope Bay Development on marine birds, no cumulative effects assessment is required.

11.7 IMPACT STATEMENT

11.7.1 Marine Mammals

Marine mammals were included as a marine wildlife VEC based on the NIRB guidelines and because TK identifies marine mammals as a group of species important to the Inuit. Traditional knowledge, species distribution maps and baseline studies indicated that the most common marine mammal in Roberts Bay and Melville Sound is the ringed seal. Other marine mammals such as narwhal, bowhead whale, and polar bear are either not present in the marine RSA, present but rare with only one or two observations, or are not present during the seasons when Phase 2 is active.

A review of potential Phase 2 interactions with ringed seal identified three potential effects: habitat loss, disturbance, and direct mortality. The assessment described the mitigation and management activities planned to reduce or eliminate potential effects on ringed seal, outlined in the WMMP (Volume 8, Annex 22). Fuels and hazardous chemicals will be strictly managed and any spills will be addressed immediately as described in the Oil Pollution Prevention Plan (OPPP)/Oil Pollution

Emergency Plan (OPEP; Volume 8, Annex 3); and the Hope Bay Project Spill Contingency Plan (SCP; Volume 8, Annex 4).

Habitat loss was evaluated using TK and baseline studies to determine potential effects of the construction of the cargo dock. Ringed seals, or any other marine mammal, do not have haul-outs or rookeries in Roberts Bay, including the planned cargo dock site. TK indicated that Roberts Bay is not a preferred hunting site for ringed seals, and baseline surveys indicated that the density of winter breathing holes is low in Roberts Bay, compared to the higher densities in northern Bathurst Inlet. With mitigation to minimize the footprint of the cargo dock, habitat loss was not rated as a residual effect.

Scientific studies report that seals are not disturbed by shipping, except when vessels are very close by, and seal populations have remained robust in areas with shipping. Calculations of the period of disturbance indicated that shipping for the Project had the potential to disturb ringed seals within 200 m of the shipping route for approximately 20 minutes per year. Therefore, disturbance was not considered as a residual effect for ringed seal.

Scientific studies report that direct mortality of seals due to collisions with vessels is rare, and unlikely to affect local populations of seals. Therefore, direct mortality was not rated as a residual effect for ringed seals.

With no residual effects identified, a cumulative effects assessment was not required. No potential effects of the Project were rated as residual effects on ringed seal for either Phase 2 or the Hope Bay Belt. Therefore, potential effects of the Phase 2 and Hope Bay Projects on ringed seals, used as an indicator for the larger marine mammals community, are rated as **Not Significant**.

11.7.2 Marine Birds

Marine birds were included as a marine wildlife VEC based on the NIRB guidelines and because TK identifies marine birds as a group of species traditionally important to the Inuit for harvest. Traditional knowledge, distribution maps and baseline studies indicated there are important areas for marine birds in Elu Inlet and colonies of marine birds in northern Bathurst Inlet. However, Roberts Bay and the portion of Melville Sound along the shipping route does not support colonies of marine birds. Baseline studies indicate that some marine birds nest on the small islands in Roberts Bay, likely to avoid fox and wolverine predation, but few nest on the mainland shoreline of the bay for this reason.

In many cases, the species of marine birds considered are the same as those assessed as waterbirds in the Terrestrial Wildlife assessment (Volume 4, Section 9), but the marine assessment evaluates potential effects in the marine environment and the marine RSA, rather than the terrestrial RSA. A review of potential Phase 2 interactions with marine birds identified three potential effects: habitat loss, disturbance, and direct mortality.

The assessment described the mitigation and management activities planned to reduce or eliminate potential effects on marine birds, outlined in the WMMP (Volume 8, Annex 22). Fuels and hazardous chemicals will be strictly managed and any spills will be addressed immediately as described in the Oil Pollution Prevention Plan (OPPP)/Oil Pollution Emergency Plan (OPEP; Volume 8, Annex 3); and the Hope Bay Project Spill Contingency Plan (SCP; Volume 8, Annex 4).

Habitat loss was evaluated using TK and baseline studies to determine potential effects of the construction of the cargo dock on marine birds. Marine birds do nest in Roberts Bay, but predominantly on small islands in the bay. Walking surveys of the islands and mainland shore indicated that the mainland shoreline is rarely used as a nesting site. Ground clearing for construction of the cargo dock

will occur outside of the nesting period, and pre-construction surveys and setbacks from nests will be used if construction must occur in summer. Given that the cargo dock site is unlikely to be used as a nesting site and with mitigation to minimize the footprint of the cargo dock and manage risk to active nests, habitat loss was not rated as a residual effect for marine birds.

Scientific studies report that marine birds are not disturbed by shipping, except when vessels are close by, and will flush (fly away) or dive to avoid vessels. To minimize potential disturbance and mortality to marine birds, Project vessels will be avoiding the large marine bird colony on Prince Leopold Island by 25 km and following the guidance in the 2016 draft Nunavut Land Use Plan, and avoiding other identified colonies by 500 m, including the breeding locations for common eiders in Melville Sound and northern Bathurst Inlet and other identified breeding locations along the shipping route. The bridge crew of vessels will also survey for marine birds and avoid groups of marine birds rafted on the ocean surface. With this mitigation in place, both disturbance and direct mortality were not considered as a residual effects for marine birds.

With no residual effects identified, a cumulative effects assessment was not required. No potential effects of the Project were rated as residual effects on marine birds for either Phase 2 or the Hope Bay Belt. Therefore, potential effects of the Phase 2 and Hope Bay Projects on marine birds are rated as **Not Significant**.

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