World Class Kitimat Project: New and Modified Fixed Aids

Environmental Management Plan

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An Environmental Management Plan (EMP) has been prepared by Stantec Consulting Ltd. (Stantec) on behalf of CCG. The EMP includes management practices applicable to the Project overall, as well as specific mitigation measures for individual Fixed Aid sites. The purpose of the EMP is to avoid or mitigate potential environmental impacts associated with the Project and to support regulatory environmental permit applications. Additionally, this EMP will allow Fixed Aid changes to be conducted in an environmentally responsible manner while avoiding "serious harm to fish" as defined by Fisheries and Oceans Canada (DFO), and complying with regulatory requirements.

The project area ranges from the eastern side of Dundas Island, south through Stephens Island, Porcher Island and Principe Channel to the northern side of Princess Royal Island, extending inshore through Whale Channel and Wright Sound towards Kitimat Arm and east through Gardner Canal. The project area is in North Coast Fjords and Hecate Strait Ecosections of the Queen Charlotte Basin Ecounit.

The proposed work for the Project is composed of alterations and refurbishments to existing Fixed Aids and construction of new Fixed Aids, comprised of both concrete-based Fixed Aids on hard substrates (e.g., bedrock) and pile-based Fixed Aids on softer substrates (e.g., sand).

Without the implementation of mitigation measures, construction activities associated with the Project have the potential to directly and indirectly affect fish and fish habitat and cause adverse environmental effects. The EMP describes mitigation measures intended to limit or reduce the likelihood of project activities affecting valued environmental components (e.g., water quality, sensitive habitat, species at risk, etc.). Mitigation measures designed to avoid and address environmental effects associated with Fixed Aid activities are based on Best Management Practices (BMP) and industry procedures.

The EMP provides mitigation measures specific to:

- General construction
- Pile driving and associated activities
- Concrete work
- Concrete base abandonment
- Waste control
- Spill prevention, control and response

In addition to the overall mitigation measures captured under the above components, the EMP provides specific management recommendations for each project site. These site specific environmental plans highlight key valued ecosystem components and relevant mitigation measures and make recommendations for environmental monitoring at sensitive sites.

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

The World Class Kitimat Project is related to the World-Class Prevention, Preparedness and Response Regime for Oil Spills from Ships initiative. To support the initiative, the Canadian Coast Guard (CCG) proposes to install, upgrade and/or remove (collectively called changes) navigational lights, buoys and radar transponders (collectively called Fixed Aids) which are used to mark navigational hazards, preferred channels and safe passages in dangerous waterways. These changes to the Fixed Aids are proposed to occur between 2015 and 2017, with approximately one third of the Fixed Aids to be completed during each of those years. CCG refers to this Project overall as the "World Class Kitimat Project".

The proposed changes at the existing and new Fixed Aid sites differ from site to site and include, but are not limited to:

- Removal of existing concrete bases
- Installation of new pour-in-place concrete bases
- Encapsulation of existing concrete bases
- Removal and installation of towers atop new and existing concrete bases
- Installation of pile-based Fixed Aids on subtidal soft substrates
- Installation of ladder rungs on the bedrock shoreline

Stantec Consulting Ltd. (Stantec) has prepared this Environmental Management Plan (EMP) on behalf of CCG. This EMP has been prepared for the World Class Kitimat Project (the Project) and will be used throughout the Project's life. Each year, this EMP will be updated to include information specific to the sites that will have active work on them during that year. This site specific information will be included as an appendix to this EMP and will include a description of the proposed work, valued ecosystem components (VECs), site specific mitigation measures and site specific recommendations.

1.2 PURPOSE OF THE ENVIRONMENTAL MANAGEMENT PLAN

The overall purpose of this EMP is to avoid or mitigate potential environmental effects associated with the Project and to support regulatory permit applications. In addition, this EMP will allow Fixed Aid changes to be conducted in an environmentally responsible manner while avoiding "serious harm to fish" as defined by Fisheries and Oceans Canada (DFO). This will be achieved through careful planning, employing best management practices and mitigation measures, and by using experienced field staff including an environmental monitor (EM) at sites where an EM is deemed necessary.

All onsite personnel must work in accordance with applicable permits (e.g., DFO, British Columbia Parks) and engineering specifications. In addition, personnel must comply with the site-specific mitigation measures identified in this EMP and/or provide suitable alternative approaches, which have been pre-approved by CCG and/or the EM. Furthermore, onsite CCG crews and staff will be introduced to this EMP and required to implement it properly as part of standard operating procedures.

This EMP is a "living" document that will be reviewed and updated prior to and during construction. The mitigation measures and monitoring requirements outlined in this EMP may be re-evaluated during the course of construction, if onsite teams identify deficiencies and/or improve construction methods or environmental protection measures. Site specific information will be included as an appendix and updated every fiscal year or on an as-needed basis.

The development of this EMP was intended to demonstrate CCG's commitment to protecting the environment and VECs.

All project personnel have an inherent responsibility to protect environmental, heritage and socio-economic values in their work.

1.3 PROJECT SETTING

The project area ranges from Porcher Island, south through Principe Channel to Campania Island, extending inshore through Wright Sound and Whale Channel to Kitimat Arm and east through Gardner Canal (Figure 1 in Appendix A). The project area is in the North Coast Fjords Ecosection of the Queen Charlotte Basin Ecounit.

The proposed Fixed Aid locations are above and below the higher high water large tide (HHWLT) line. Fixed Aids are constructed on a variety of substrates in the terrestrial and marine environments, such as rock, cobblestone, sand, and mudflats. Strictly terrestrial areas may also be characterized by the presence of soils or organic overburden.

Typically, concrete-based Fixed Aids are built in the intertidal zone or on land, with rocky substrates as the preferred locations for these structures. In intertidal zones with soft substrates, small piles may be combined with the concrete structure to provide extra anchorage.

Pile-based Fixed Aids may be constructed in both fresh and marine aquatic areas on any type of substrate, from hard rock to soft mud. Construction methods and the pile depth may vary to compensate for the particular substrate characteristics in an area.

1.4 DESCRIPTION OF CONSTRUCTION WORK

The Project includes alterations and refurbishments to existing Fixed Aids, decommissioning (i.e., demolition) of existing Fixed Aids and the construction of new Fixed Aids. Fixed Aids are typically of two types:

- Concrete-based Fixed Aids: These Fixed Aids are typically built upon hard substrates and involve pouring new concrete bases to which towers are attached.
- Pile-based Fixed Aids: These Fixed Aids are typically built upon subtidal softer substrates and involve driving piles upon which a platform and tower are attached.

Most of the Fixed Aid components (e.g., towers, dayboards) will be pre-fabricated offsite at the CCG construction yards in Victoria and Prince Rupert, British Columbia and will be transported to site by vessel, barge or helicopter.

Typically, the work is conducted in two areas: the material staging location and the Fixed Aid site. The Project is expected to use tug and barge contractors during the construction period and these barges will serve as the material staging area.

Generally, one barge will be used for all construction activities and will be securely moored at strategic locations, often located as close as possible to the Fixed Aid site. Materials and equipment are prepared at the staging area before they are transported to the Fixed Aid site by support vessel, barge or slung from the barge by helicopter.

The Fixed Aid site is where the construction, operation, and decommissioning activities occur. A variety of equipment may work from this barge, including but not limited to: operations crane, forklift, volumetric concrete truck and crew shack. This construction barge will follow the crew from site to site to support construction activities.

The crew will be housed in either a vessel or a floating barge camp and will be located at strategic locations. The crew will mainly consist of CCG staff (e.g., carpenters, labourers, vessel operators, engineering technicians, lamp technicians) with potential occasional site visits from a variety of staff and interested parties, such as First Nations, CCG project managers, EMs and land surveyors.

The modifications to existing Fixed Aids, construction of new builds and decommissioning of concrete-based and pile-based Fixed Aids each take from approximately one day to one week to complete.

The following subsections (1.4.1 and 1.4.2) provide information of the typical life cycle of a Fixed Aid from construction to decommissioning.

1.4.1 Concrete-Based Fixed Aids

Construction of concrete-based Fixed Aids typically occurs above the lower low water large tide (LLWLT) line or on land above the HHWLT line. Concrete pours are planned to occur during falling tides to capture the longest period of bedrock exposure and to limit in-water pours. No in-water (wet) concrete pours are planned to occur as part of this Project. Depending on the location, materials may be transported by helicopter, motor vehicle, or vessel to the material staging area barge or construction barge.

Site preparation methods will vary depending on site specific requirements. Aquatic areas with exposed rock may involve power-washing or scraping the Fixed Aid footprint to remove marine growth. Prior to power-washing or scraping, the EM will inspect the footprint of the Fixed Aid site, and document organisms to be removed to confirm no species at risk are being harmed. In upland areas, vegetation removal (e.g., brushing or falling) may be required in the event that hazard trees are encountered or visibility of the Fixed Aid is compromised.

Once site preparation is complete, 12 holes will be drilled approximately 0.3 m into the dry bedrock, followed by the installation of reinforcing steel that is then grouted to secure the concrete. At sites that require more structural strength (i.e., taller Fixed Aids with larger concrete bases), approximately 12 rock anchors will be drilled at a minimum of 1.5 m deep into the dry bedrock using either an air compressor connected to a 60 lb rock drill or a hydraulic drill rig that accesses the site from the construction barge. Wood or metal forms will be built, additional reinforcing steel installed, and concrete poured. The method used for concrete pouring will depend on the transportation method used to access the site and will include:

- Helicopter slung hoppers
- Barge based crane-lifted hoppers

A volumetric concrete truck will be on the barge where concrete mixing will occur. Freshwater stored in a reservoir of the volumetric concrete truck will be cooled using a closed heat exchange system. This will be conducted by having a small intake placed approximately 1 ft below the ocean's surface. The intake will be connected to the volumetric concrete truck where seawater will be withdrawn and released at an approximate flow rate of 1.5 L/s. The seawater will not be in contact with concrete materials and freshwater as this is a closed system. The heat exchange system will be used during short periods of time (about one to three hours a day at a Fixed Aid site) at sites that require concrete pours.

Once the concrete base is poured and allowed to set to acceptable levels, a platform, tower, and/or other equipment will be installed using a barge-mounted crane or slung by helicopter.

Concrete-based Fixed Aids typically, but not always, have the following characteristics:

- Top elevation built 1.5 m above the HHWLT line (called the freeboard)
- Concrete bases are 1.8 x 1.8 m (various heights)

- Require a platform and ladder (aluminum or other suitable material)
- Require a mast/tower (aluminum, fiberglass-reinforced plastic, or other suitable material)
- Require a daymark (aluminum or other suitable material)
- Require electronic equipment (items include: light, solar panels, batteries, etc.)

If a concrete-based Fixed Aid is decommissioned, it is typically completed by first removing the Fixed Aid marks and supporting structures. The removal of the concrete base involves either removing it in one piece or breaking it apart with a jackhammer or a small explosive charge. The concrete pieces are taken offsite for disposal in a landfill or other suitable location. Areas affected by structure removal are left in a state which will support natural restoration. Abandonment of the concrete base occurs if the base creates no significant effect to navigability or aesthetics when left in place.

1.4.2 Pile-Based Fixed Aids

Pile-based structures are typically built in aquatic environments with softer substrates; a barge is required for construction of this type of Fixed Aid. Specific construction methods used will vary according to substrate characteristics at each site.

Pile-based Fixed Aid construction consists of driving a pile into soft substrates with a hammer or drilling a pile into hard substrates. The piles may be constructed of steel or treated timber. Equipment such as conventional cranes, spud scows, support barges and other water borne equipment support the drills and hammers.

Once the piles are installed, the platform, tower, and other equipment are then installed typically using a barge-mounted crane.

Pile-based Fixed Aids typically, but not always, have the following characteristics:

- Built on land, within foreshore, or in water
- Require wood or steel piles
- Require a platform and ladder (aluminum or other suitable material)
- Require a daymark (aluminum or other suitable material)
- Require electronic equipment (items include: light, solar panels, batteries, etc.)

If a pile-based Fixed Aid is decommissioned, it is typically completed using barge-mounted cranes. Once navigational markers and supporting structures are removed from the piles, cranes are used to remove the piles from the substrate. All materials are taken offsite for disposal at an approved location. Pile-based structures are seldom abandoned because of their potential hazard to navigation; however, in some cases abandonment may be deemed appropriate if the location is remote and poses no navigational hazard.

1.5 SITE SPECIFIC ENVIRONMENTAL PLANS

Fixed Aid Site Specific Environmental Plans (SSEPs) will be included as Appendix A to this EMP and will be updated each fiscal year, or as needed. These SSEPs include the location of the Fixed Aid site, site specific summaries of the proposed work, key VECs, site specific mitigation measures and site specific recommendations.

2.0 REGULATORY BACKGROUND

The following provides a summary of the key federal and provincial environmental legislation relevant to the Project.

2.1 FEDERAL

2.1.1 Canadian *Environmental Assessment Act*

Projects subject to environmental assessment under the *Canadian Environmental Assessment Act* (CEAA 2012) are projects which propose physical activities designated in CEAA's Regulations Designating Physical Activities (the Regulations). The proposed World Class Kitimat Project does not include physical activities designated in the Regulations, and therefore does not meet the definition of a "designated project" under CEAA 2012.

However, under Sections 66 and 67 of CEAA, projects that are not "designated projects", but which include a physical activity that is carried out on federal lands in relation to a physical work that is not a designated project, require that federal authorities must ensure that carrying out the Project is not likely to cause significant adverse environmental effects. In such cases, CEAA applies to projects which require a Federal Authority to make a decision or take an action that enables a project to proceed (e.g., issuance of a permit or licence). The appropriate Federal Authority ("Responsible Authority") is then required to ensure that an environmental assessment of the Project is carried out prior to making its decision or taking any action. With respect to the World Class Kitimat Project, CCG is considered to be a Responsible Authority, based on the following:

- CCG is the project Proponent
- CCG is providing financial assistance in order to enable the Project to proceed
- CCG may need to issue a regulatory approval in order to enable the Project to proceed

As the Responsible Authority, CCG must determine whether, after applying mitigation measures, the Project may result in significant adverse environmental effects. This determination must be completed before carrying out the Project or exercising a power or performing a duty or function.

Within DFO, projects of greater complexity that may involve interaction with the environment and could result in significant adverse environmental effects are required to undergo a Project Effects Determination (PED). The World Class Kitimat Project is not considered to be a complex project, and will have minimal interaction with the environment. The project residual effects are not likely to be significant (Section 3.3.7). The residual environmental effects associated with project activities are well understood, and adverse effects can be reduced by the routine application of effective and established mitigation measures, resulting in little or no residual effect. It is Stantec's professional opinion, therefore, that a PED is not required for the Project.

This EMP presents the mitigation measures designed to limit adverse residual environmental effects associated with the Project. The mitigation measures presented in this EMP are based in part on the measures presented in the *Fixed Aids to Navigation Replacement Class Screening Report* (CCG 2006). That document was prepared under CEAA 2004, but it is understood that the activities identified in the document are accurate when considering mitigation requirements under CEAA 2012. A "replacement class screening" is a single report that "defines the class of projects and describes the associated environmental effects, design standards and mitigation measures for project associated within the report" (CCG 2006). The replacement class screening includes a conclusion of significance of environmental effects for all projects assessed by the replacement class screening.

2.1.2 Fisheries Act

The *Fisheries Act* contains two key provisions that are aimed at conserving and protecting fish and fish habitat essential to commercial, recreational and Aboriginal (CRA) fisheries:

1. Section 35(1) of the *Fisheries Act* focuses on protecting the productivity and sustainability of CRA fisheries by requiring projects to avoid causing "serious harm to fish" unless authorized by DFO. This applies to work being conducted in or near water that support CRA fisheries, such as the Pacific Ocean. "Serious harm to fish" is defined as "*the death of fish or any permanent alteration to, or destruction of fish habitat*". Section 35 (1)of the *Fisheries Act* prohibits work from causing serious harm to fish that are part of a CRA fishery, or to fish that support such a fishery. When work cannot avoid or mitigate "serious harm to fish", projects require an authorization under Section 35(2) of the *Fisheries Act* in order for the Project to proceed without contravening the *Act*.
2. Section 36 (3) of the *Fisheries Act* is an important pollution prevention provision, which prohibits the deposition of deleterious substances into waters frequented by fish. The *Fisheries Act* defines deleterious substance as, "*any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.*"

This Project is subject to a DFO Request for Review to allow DFO to review the project activities and determine if the Project, as described by this document, associated Marine Habitat and Archaeological Assessment (Stantec 2016 Draft) and the Request for Review Application, can be completed without causing "serious harm to fish". It is Stantec's professional opinion that the work described in this document, the highly experienced field personnel implementing the work, and the best management practices and mitigation measures provided, will assist this Project in being conducted in an environmentally responsible manner, avoiding serious harm to fish and the deposition of deleterious substances to water. This Project is not expected to require a *Fisheries Act* authorization under Section 35 (2).

2.1.3 *Navigation Protection Act*

The *Navigation Protection Act* (NPA) is administered by Transport Canada and prohibits the construction of certain projects on marine and navigable freshwater without approval. Projects that affect navigable waters may require approval under the NPA. It is expected the proposed Project will require a Notice to the Minister, in the form of a "Notice of Works" as CCG proposed to construct, place, alter, repair, rebuild, remove or decommission a work in a waterway on the List of Scheduled Waters (e.g., Pacific Ocean), and the work does not meet the Minor Works Order.

2.1.4 *Canada Shipping Act*

CCG is planning to upgrade Fixed Aids in the north coast of British Columbia. In order to complete these upgrades, project personnel (typically up to 20 people) require temporary lodgings in the area. Floating barge camp(s) have been identified as the most feasible lodgings.

If CCG decides to discharge wastewater while underway from the floating barge camp, the Vessel Pollution and Dangerous Chemicals Regulation under the *Canada Shipping Act* apply. This regulation identifies the effluent quality and distance from shore wastewater can be discharged while underway. An assessment of wastewater disposal options for accommodation barges was prepared for CCG and is included in Appendix B.

This regulation is unlikely to apply to the Project as the current plan is to store and haul wastewater for appropriate disposal offsite (e.g., discharge into a municipal system).

2.1.5 *Migratory Birds Convention Act*

Migratory birds are protected federally under the *Migratory Birds Convention Act*. "Migratory birds" are defined by Article I of the *Migratory Birds Convention Act* which lists the families and subfamilies of protected birds, and provides some clarification of the species included. It is illegal to harass or kill migratory birds, or to destroy or disturb their nests or eggs. It is also an offence to deposit any substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or areas frequented by migratory birds. In general, birds not falling under federal jurisdiction within Canada include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, kingfishers, and some species of blackbirds, however may be protected by other jurisdictions.

2.1.6 *Species at Risk Act*

The Committee on the Status of Endangered Wildlife (COSEWIC) in Canada rank species federally. COSEWIC ranks species as follows: extinct, endangered, extirpated, threatened, special concern, not at risk and data deficient. Species that are ranked as endangered, extirpated, threatened or special concern are "at risk" as defined by COSEWIC. COSEWIC rankings are recommendations to the federal government, following which the government

then decides on whether or not the species will be listed under the *Species at Risk Act* (SARA). Species in Schedule 1 of SARA are officially wildlife species at risk in Canada and are protected under SARA. Schedule 2 and 3 species are not officially protected under SARA.

Under Section 32 of the SARA, it is an offence to:

- Kill, harm, harass, capture or take an individual of a listed species that is extirpated, endangered or threatened
- Possess, collect, buy, sell or trade an individual of a listed species that is extirpated, endangered or threatened, or its part or derivative

Under Section 33 of the SARA, it is an offence to:

- Damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction into the wild in Canada

Northern abalone shells have been observed in the vicinity of some of the Fixed Aid sites; however, no animals have been observed (Stantec 2015, 2016 Draft). Project activities are not expected to adversely affect northern abalone or any other Schedule 1 SARA listed species. A SARA permit must be obtained prior to any interaction (e.g., salvage and relocation) with a Schedule 1 SARA listed species, such as northern abalone.

2.2 PROVINCIAL

2.2.1 *Environmental Management Act*

The Municipal Sewage Regulation under the *Environmental Management Act* regulates the discharge of municipal effluent into the receiving environment (e.g., ground, marine, freshwater). If CCG discharges wastewater into the ocean from a stationary floating barge camp, then the provincial Municipal Sewage Regulation under the *Environmental Management Act* apply rather than the Vessel Pollution and Dangerous Chemicals Regulation. An assessment of wastewater disposal options for accommodation barges was prepared for CCG and is included in Appendix B.

This regulation is unlikely to apply to the Project as the current plan is to store and haul wastewater for appropriate disposal offsite (e.g., discharge into a municipal system).

2.2.2 *Heritage Conservation Act*

Heritage objects and archaeological sites on provincial Crown Land and private land in British Columbia that predate 1846 are protected by the Ministry of Forests, Lands and Natural Resource Operations under the *Heritage Conservation Act* (HCA). These objects and sites are protected through designation as "provincial heritage sites" (Section 9) or through automatic

protection by virtue of being of particular historic or archaeological value (Section 13). Protected archaeological sites may not be altered without permit issued by the Ministry. Heritage Inspection and Heritage Investigation Permits under Section 14 of the HCA Site alteration permits are issued under Section 12 of the HCA when the Ministry has reviewed and approved an Application for Alteration Permit. This permit authorizes the removal of residual archaeological deposits once an inspection and investigation are completed.

It should be noted that archaeological sites within Federal Land are not protected under the HCA and a permit from the Archaeology Branch is not required to alter an archaeological site, should one be identified within the subject property. However, given the sensitive and non-renewable nature of archaeological sites, Stantec recommends that archaeological standards and practices in place for private and Crown Lands also be applied to Federal Lands. Evidence of what is thought to be a heritage resource may include, but not limited to the following:

- Artefacts of stone or other material
- Shell deposits
- Rock paintings
- Old-looking pits in the ground (large or small, circular or rectangular)
- Cabins and other old-looking structures
- Mature western red cedar or lodgepole pine with well-defined bark scars
- Human Remains

2.2.3 *Land Act*

The British Columbia *Land Act*, administered by the Crown Land Tenures Branch (Ministry of Forests, Lands and Natural Resource Operations), is the primary legislation governing the disposition of provincial Crown land in British Columbia. Tenure for the use of provincial Crown land is issued under the *Land Act*.

Crown land is land or land covered by water that is owned by the provincial government. Under the *Land Act*, provincial Crown land is available for a range of purposes. The Crown land base and values associated with it are a public asset, and the Province has a responsibility to make sure that these lands are managed so as to maximize and sustain economic, social and environmental benefits. When an individual or organization wishes to use Crown land for specific purposes, the Province may agree to enter into a tenure agreement to rent the land for a certain purpose over a set period of time.

A withdrawal from disposition pursuant to Section 16 of the *Land Act* is the standard means to reserve land for provincial and federal government users that require Crown Land for communication purposes. The Minister can authorize a government body to place, construct, maintain or operate any works, structures or other improvements on the land withdrawn.

It is expected that new Fixed Aid sites that are on Crown Land (excluding BC Park land) will require a Section 16 withdrawal from disposition prior to construction.

2.2.4 *Park Act*

British Columbia Parks have established coastal provincial parks, conservancies and ecological reserves to preserve representative and special natural ecosystems, plant and animal species, features and phenomena. A provincial park and conservancy are Crown land designated under the *Park Act* or by the *Protected Areas of British Columbia Act*, whose management and development is constrained by the *Park Act*. Conservancies are areas protecting biological diversity, natural environments and recreational values, and preserving and maintaining First Nation ceremonial, cultural and social uses. An ecological reserve is Crown land reserved for ecological purposes and is protected under the *Ecological Reserve Act* or by the *Protected Areas of British Columbia Act*. An ecological reserve is an area considered to be the most highly protected and least subject to human influence and includes areas suitable for research and education.

Many of the existing and new Fixed Aid sites are within British Columbia Park land, such as provincial parks and conservancies. In order to construct a Fixed Aid within British Columbia Park land, a Park Use Permit (PUP) is required for each provincial region (e.g., Skeena), meaning, if multiple Fixed Aid sites are within the Skeena District, then only one PUP is required that will encapsulate all Fixed Aids sites applied for in that region. If the Fixed Aid sites are within a provincial region that CCG has an existing PUP, then a PUP *Amendment* will need to be obtained to add these additional sites to the permit.

A PUP (and Amendment) authorizes an individual, group or organization to carry out a specific activity and outlines the specific conditions under which the proposed activity may occur. PUPs help to manage activities within the protected areas system, reduce any impacts by requiring permit holders to follow conditions and limit activities to appropriate times and places within the park system as guided by Park Management Plans (BC Parks 2015). Once an application is submitted it is subject to review under the BC Parks Impact Assessment Process. Project related activities (e.g., construction, anchoring of barges/tugs and accommodation vessels/barges) are not permitted in British Columbia Park land without a PUP.

2.2.5 *Wildlife Act*

The British Columbia *Wildlife Act* was put into force to protect the diversity and abundance of wildlife populations by managing wildlife resources and minimizing impacts of human activities to their populations and habitat. The *Wildlife Act* protects virtually all vertebrate animals from direct harm, except as allowed by regulation (e.g., hunting or trapping).

2.2.5.1 Listed Species

The province of British Columbia rank species at risk by colour under the provincial conservation Status Rank for consideration under the British Columbia *Wildlife Act*. Provincially, the red list includes indigenous species that are extirpated, endangered, or threatened in British Columbia. The blue list includes indigenous species that are of special concern in British Columbia. The

yellow list includes uncommon, common, declining and increasing species, therefore all species not included on the red or blue lists. Red-listed species may be legally designated as, or may be considered candidates for legal designation as Extirpated, Endangered or Threatened under the *Wildlife Act* under the *Wildlife Act*.

British Columbia has no stand-alone endangered species act. Legal designation may confer special protection for specific red- and blue- listed species, their residence or their critical habitat. Legal designation as endangered or threatened under the *Wildlife Act* can increase the penalty for harming a species. Currently there are four species that are provincially legally designated:

1. Vancouver Island Marmot (Endangered)
2. American White Pelican (Endangered)
3. Burrowing Owl (Endangered)
4. Sea Otter (Threatened)

2.2.5.2 Birds

Birds are protected under Section 34 of the British Columbia *Wildlife Act,* where it is an offence to (except as provided by regulation) possess, take, injure, molest or destroy:

- A bird or its egg
- The nest of an eagle, Peregrine Falcon, Gyrafalcon, Osprey, heron or Burrowing Owl (even when unoccupied)
- The nest of a bird not described above, when it is occupied by a bird or its nest

Construction activities are not expected to interfere with birds, their nests or eggs. Permits through the province are required if project related activities (i.e., tree falling, rock drilling) will contravene Section 34 of the *Wildlife Act*.

3.0 PROJECT ASSESSMENT

The proposed World Class Kitimat Project involves making changes to Fixed Aids in remote locations along the north coast of British Columbia. The proposed Fixed Aid changes will have both unique and similar construction requirements and methods between the sites.

The project assessment involves identifying what specific project components have the potential to result in adverse environmental effects, followed by a description of what these potential effects may be.

3.1 VALUED ECOSYSTEM COMPONENTS

VECs have been identified by assessing parts of the ecosystem that may be affected as a result of project activities. The CCG *Replacement Class Screening Report* (RCSR 2006) summarizes VECs into three categories: anthropogenic, ecological and physical-chemical, each containing several ecosystem components. Examples of the ecosystem components are provided below:

Table 3-1 Valued Ecosystem Components

VEC Category	Ecosystem Components
Anthropogenic	• Health and Safety • Social and Economic Stability
Ecological	• Species and Populations • Habitat and Communities
Physical—Chemical	• Water Quality • Land Resources • Atmospheric Quality

3.2 PROJECT COMPONENTS WITH POTENTIAL TO CAUSE ENVIRONMENTAL IMPACTS

The Project is located in the nearshore marine environment and marine riparian, with work being conducted in intertidal, subtidal and supralittoral (splash zone) environments.

The following project components have the potential to cause direct and indirect impacts to the marine environment at the Fixed Aid sites and surrounding area:

- **Equipment accidents and malfunctions**: These incidents could potentially indirectly affect water and sediment quality, or cause direct physical impacts to flora and fauna. Sources of impacts may include spills/leaks (e.g., hydrocarbon, concrete washwater, sewage, etc.), debris from collisions, scour from accidental groundings and similar incidents. Any spills

associated with this Project are anticipated to be small as they are limited by the volume of the containment reservoirs of the equipment and machines.

- **Deposition of wastes:** Waste deposition has the potential to indirectly affect water and sediment quality as well as directly smothering or physically affecting marine organisms. Waste can include construction waste, formwork, food waste, cured concrete, washwater, sewage, cigarette butts and similar.
- **Spudding and anchoring:** Spudding and anchoring can physically damage flora and fauna, particularly to sensitive habitats such as eelgrass, surfgrass and kelp beds.
- **Barge landing:** Barge landing, including lowering ramps/platforms to allow site access can physically damage flora and fauna, particularly to sensitive habitats such as eelgrass, surfgrass and kelp beds
- **Excavation in upland areas and/or clearing of marine riparian vegetation**: Ground disturbance in upland areas and/or removal of marine riparian can impact the marine environment by reducing slope stability and introducing fine sediments to the water column. In addition, marine riparian vegetation provides valuable habitat for wildlife such as seabirds, so removing it has the potential to destroy habitat. Some upland areas may provide habitat for wildlife and/or rare vegetation and may have archaeological sites such as culturally modified trees (CMTs).
- **Rock drilling**: Rock drilling has the potential to introduce fine sediments into the water column which could negatively affect water quality, as well as smother biota on drying nearby substrates. In addition, rock drilling produces excessive noise which could disturb wildlife, such as birds during nesting, incubating and fledging.
- **Concrete work**: Uncured concrete has the potential to impact the environment in two ways: (1) if concrete spills beyond the intended pour site it can smother and kill flora and fauna; (2) uncured concrete is laden with fine sediments and has a high pH which can negatively affect water quality. In addition, concrete work can damage archaeological and heritage resources if the site is not inspected prior to a pour. A closed-loop heat exchanger may be used to cool the freshwater used to make the concrete slurry. The seawater intake of the heat exchanger has the potential to impinge and/or entrain fish if mitigation measures are not put in place to protect serious harm to fish. The sea water released from the heat exchange system is not expected to have a detectable temperature change from the ocean. The impacts associated with the release of seawater from the heat exchange system are expected to be negligible.
- **Removal of marine flora and fauna (e.g., power washing/scraping)**: Power washing/scraping will cause a temporary loss of flora and fauna in the footprint of the new Fixed Aid. These impacts are considered negligible as the concrete footing of the new aids will be colonized rapidly by similar flora and fauna.
- **Concrete base removal:** Removal of concrete bases has the potential to create excessive noise which could disturb wildlife (e.g., birds) over long periods of time. In addition, concrete base removal has the potential to inadvertently deposit concrete fragments and dust into the marine environment which could negatively affect water quality and/or smother flora and fauna on the seabed.

- **Pile driving, drilling and removal:** Pile driving and associated activities have the potential to produce excessive noise both in and out of the water, which, depending on the method, can injure or kill fish and marine mammals and disturb wildlife (e.g., birds). In addition, pile driving and associated activities can disturb the seabed causing sediments to become suspended and negatively affect water quality. Although localized in area, pile driving and associated activities have the potential to negatively impact sensitive habitats (e.g., eelgrass, surfgrass and kelp) and/or injure or benthic infauna. Use of treated piles (*e.g.,* piles coated with creosote) can introduce harmful chemicals, such as polycyclic aromatic hydrocarbons (PAHs) to the marine environment.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

Without the implementation of mitigation measures described in this document, the Project has the potential to adversely affect fish and fish habitat. When considering potential environmental effects, CCG has employed project boundaries, a 200 m radius around the Fixed Aid site and material staging areas. For the purposes of this assessment, this 200 m radius has been used when assessing potential environmental effects.

Key potential environmental effects are described in the subsections below.

3.3.1 Changes in Marine Water Quality

Shoreline and seabed changes from construction, operation and decommissioning activities have the potential to affect marine water quality. These activities include, but are not limited to: barge spudding, excavation, rock drilling, and installation/removal of piles, and pour in place concrete work. Fine sediments, foreign materials and organic debris may enter the marine environment due to project activities. The introduction of sediment-laden water and concrete washwater to the marine environment, suspending sediments in the water column and inadvertent hydrocarbon spills are examples of localized environmental effects that may have impacts on water quality. These environmental effects are expected to last as long as construction, operation, and decommissioning phases are engaged (about one day to one week).

3.3.1.1 Increased Sedimentation

Construction activities have the potential to increase sedimentation in the marine environment by temporarily suspending sediments in the water column and introducing sediment-laden waters into the marine environment. Sediment suspension and introduction of sediment-laden water to the marine environment may occur during barge spudding, pile driving and associated activities, upland ground disturbance and machinery operation, and subsequent migration of the exposed soils. These activities may also lead to upland soil erosion, compaction and settling, and changes in stability. Rock drilling and excavation physically change the substrate structure in a small, localized manner where fines, foreign materials, and organic debris may enter the marine environments.

Increased sedimentation may elevate turbidity and total suspended solids (TSS) locally in the water column depending on the substrate. Elevated sedimentation can increase water temperature and decrease dissolved oxygen levels, which can potentially stress marine fauna. Increased sedimentation can potentially smother benthic invertebrates, clog and abrade respiratory surfaces of invertebrates and fish and interfere with food intake for filter-feeding organisms. Behavioural impacts to fish include impacts to migration and movement, and reduced feeding (Caux et al. 1997). In addition, higher turbidity, caused by an increase in suspended solids, can reduce the amount of light penetrating the water which can reduce photosynthesis and the production of oxygen.

Suspended sediments can be considered a deleterious substance under the *Fisheries Act*. Increased sedimentation associated with the Project will be avoided as much as possible and will only continue while project activities are occurring and therefore would be of limited duration. Measures during construction to avoid and/or mitigate the suspension of sediments into the water column will be employed (Section 6.1.1).

3.3.1.2 Elevated Underwater Noise and Sound Pressure Waves

Pile driving, pile removal and underwater drilling have the potential to generate noise/sound pressure levels that can disturb or harm fish, marine mammals and wildlife, such as birds. Noise and sound pressures from pile driving, pile removal and underwater drilling typically depend on the size of the pile, the material of the pile and the type of equipment being used (e.g., vibratory hammer, diesel hammer; Hastings and Popper 2005). Elevated levels have the potential to interfere with marine mammal communication and cause hearing loss or impairment. Elevated noise and sound pressure can also disrupt foraging activities of fish, as well as cause physical harm by rupturing swim bladders. Noise associated with these activities may also disturb nearby wildlife, such as birds, particularly during nesting, incubating and fledging.

Measures to avoid and/or mitigate noise effects on fish, marine mammals and wildlife will be employed during construction (Section 6.1.2)

3.3.1.3 Uncured Concrete Contact

Potential environmental effects associated with pour in place concrete activities in marine environments, include, but are not limited to, the marine environment contacting uncured concrete, the release of concrete washwater into the marine environment and smothering of flora and fauna. Examples of potential environment effects to the marine environment include elevated pH, TSS and turbidity in the water column and injury or death of flora and fauna. Concrete washwater is high in pH and is composed of fine sediments which can negatively affect fish and their habitat.

Small changes in pH can significantly alter the chemistry of marine and estuarine waters as a unit change in pH corresponds to a tenfold change in the hydrogen ion concentration. The pH of the marine environment is typically quite stable due to the buffering ability of dissolved salts

(CCME 1999a; MOE 1991). The Ministry of Environment's database at the time of writing the pH Technical Appendix (MOE 1991) identified an average pH of 7.8 in the marine environment, with a minimum of 7.1 and maximum of 8.6 (MOE 1991). The provincial pH marine guideline is based on the narrow pH tolerance of marine molluscs and is designed to protect all aquatic life in a wide range of water quality conditions. The pH criterion for marine waters is 7.0 to 8.7 with unrestricted change within this range (MOE 1991).

Uncured concrete and concrete washwater is caustic and can have a pH up to 12. A concrete spill or release of washwater to the marine environment may be considered a release of a deleterious substance under the *Fisheries Act*. The effects of high pH on aquatic life may include death, abrasion to the outer surface of gills, eyes and skin, as well as an inability to dispose of metabolic waste. A pH level greater than 10 can kill salmonids within minutes (ESPI 1993) and greater than 11 is rapidly lethal to all species of fish (MOE 1991). Concrete washwater consists of fine particles in the water (suspended solids) that can clog and tear gills; reducing the amount of oxygen the fish receives. Suspended solids can also smother habitat and non-motile benthic invertebrates, and impair feeding ability. Elevated pH can affect vegetation by inhibiting growth and damaging soils and plants. Filtering concrete washwater or allowing it to settle will not treat the elevated pH as the components that cause high pH remain present in the dissolved form.

The average turbidity and suspended solids of concrete washwater is 27,000 NTU and 79,000 ppm respectively (CWS 2006).

3.3.1.4 Elevated Seawater Temperature

Water temperature is an important environmental factor to marine and freshwater systems and plays an important role on organism development, growth and reproduction (Oliver and Fidler 2001). Typically, water temperature fluctuations vary daily and seasonally at a marine site. In addition, seawater temperature can vary by location, depth, freshwater inputs, extent of ice formation, upwelling and currents (CCME 1999b). Marine water temperature along the coast of British Columbia typically varies between 5 and 15°C (Thomson 1981).

A marine water temperature guideline (CCME 1999b) for the protection of aquatic life has been established as many biological processes that occur in marine and estuarine waters are sensitive to temperature changes.

This guideline states that "Human activities should not cause changes in ambient temperature of marine and estuarine waters to exceed ± 1°C at any time, location or depth. The natural temperature cycle should not be altered in amplitude or frequency by human activities. The maximum rate of any human induced temperature change should not exceed 0.5°C per hour" (CCME 1996).

Anthropogenic activities that typically affect seawater temperature are associated with the release of waste heat from chemical, petrochemical, pulp and paper mills, municipal sewage and thermal generating stations (CCME 1999). The physical alteration of a waterbody can also

affect seawater temperature, such as water withdrawals, installation of retaining walls, jetties, breakwaters and causeways.

A closed-loop heat exchanger may be used to cool the freshwater used to make the concrete slurry. The seawater released from the heat exchange system is not expected to have a detectable temperature change from the ambient seawater temperature at the site.

3.3.2 Accidents, Malfunctions and Inadvertent Spills

Accidents and malfunctions can occur during marine construction, and may result in inadvertent spills to the marine environment. These types of occurrences could result in the introduction of contaminants to marine and terrestrial habitats. Typical risks include hydrocarbon leaks (hydraulic lines on equipment), fuel spills (fuelling skiffs/vessels, equipment, improper storage), vehicle collisions, structural failures, spills or leaks of other contaminants (e.g., paint, chemicals, concrete) into the marine or terrestrial environment.

The likelihood of accidents or malfunctions occurring and causing negative environmental effects due to project activities and physical works is low; Fixed Aid projects are routine and their effects are predictable and, therefore, mitigatable. Potential accidents and malfunctions may occur at the material staging area and during construction at the Fixed Aid site.

Project activities that could result in accidents and malfunctions largely relate to the operation and maintenance of heavy machinery, vehicles, and hand machinery. Structural failures, vehicle collisions, spills, and leaks would likely be attributed to human error. Spills resulting from improperly stored materials may also occur.

3.3.3 Atmospheric Degradation

The primary atmospheric effects associated with project activities are related to noise, dust, and fumes. The application of paint during the operation phase will result in the small scale release of fumes. The duration of these effects is equal to project activity duration (about one day to a week).

3.3.4 Habitat and Species Effects

Project activities, such as spudding, anchoring, and power washing have the potential to affect sensitive habitats, such as eelgrass, surfgrass and kelp beds. In addition, species at risk (e.g., northern abalone) have the potential to be displaced, injured or killed if appropriate mitigation measures are not employed. When spuds are not practical or may cause detrimental impacts to sensitive habitats, a flat deck barge (i.e., not a spud barge) may be used. Typically when a flat deck barge is used, a tug positions itself at the stern of the barge to keep it in position. This may result in localized scraping of the bedrock, causing temporary loss of marine flora and/or fauna in that footprint.

In addition, water withdrawal has the potential to impinge and entrain fish if seawater intakes are not appropriately screened.

Birds are especially vulnerable during sensitive life stages, such as nesting, incubating and breeding. Excessive noise and disturbance in an area can cause birds to abandon a nest and cause added stress to the animal. Falling trees and brushing activities have the potential to destroy or disrupt wildlife habitat, such as bird nests and dens.

Marine and terrestrial species and populations may experience short term localized disturbance from project activities. Small scale habitat alteration will result from construction activities. At the community and habitat level, the environmental effects resulting from project activities are negligible. Project activities, and the environmental effects associated with them, are minor and short term and therefore too small to affect the community and habitat level.

3.3.5 Anthropogenic Effects

Project crews are vulnerable to health risks from exposure to fumes from machinery, dust from concrete works, and contaminated soils. Safety risks may result from machinery operation, accidental falls, and site access. Project activities positively affect economic stability by creating employment at the individual and community level.

3.3.6 Archaeological and Heritage Resource Effects

British Columbia is rich in archaeological and heritage resources, including but not limited to, shell middens, CMTs, burial sites, lithic scatters, pictographs, petroglyphs and fish weirs.

The changes to the Fixed Aids have the potential to impact archaeological and heritage resources through a variety of project activities, such as tree falling, concrete pour in place and barge landing. These project activities can destroy and/or smother archaeological and heritage resources if mitigation measures are not properly employed.

3.3.7 Residual Effects

CCG defines residual effects as, "*those environmental effects that remain after the application of design standards and the implementation of mitigation measures*" (CCG 2006).

The CCG RCSR (2006) identified the magnitude (e.g., negligible, minor, major) of residual effects VECs may encounter from project activities. The residual effects associated with the project activities included in the RCSR were found to be not significant. Residual effects are considered not significant when the activities have minor or negligible levels of disturbance and/or damage and when the effects last less than a week, and are contained within the project boundaries following the application of mitigation measures.

3.3.8 Cumulative Effects

CCG defines cumulative effects as, "changes to the environment that are caused by an action in combination with other past, present and future human activities" (CCG 2006). CCG RCSR considered cumulative effects associated with Fixed Aid projects and determined that environmental effects were negligible and limited to the immediate project boundary. It was determined that Fixed Aid projects are not likely to interact with each other and are not likely to contribute to cumulative effects.

When considering cumulative effects, the RCSR reviewed the interactions between Fixed Aid projects and other activities inside the project boundaries. These activities include fishing, shipping and recreation in marine environments, and industrial, recreational and residential activities within the terrestrial environment. Due to the limited size of project boundaries, it is unlikely that other projects will occur when Fixed Aids projects are occurring. It was determined that given the limited area of potential disturbance associated with Fixed Aid projects, it is unlikely that these projects will interact with other activities inside the project boundaries and contribute to cumulative effects.

In addition, cumulative effects were considered when reviewing the interactions between Fixed Aid projects and other activities occurring outside of project boundaries. These activities include fishing, shipping, recreation and residential. The combination of these activities with Fixed Aid projects and the remoteness of the projects are unlikely to pose significant environmental effects. It was determined that outside of the immediate project boundary, potential adverse cumulative effects are insignificant.

3.4 EFFECTS THAT CANNOT BE AVOIDED

No unavoidable or immitigable effects are anticipated as part of this Project.

4.0 ENVIRONMENTAL MANAGEMENT STRUCTURE

The roles and responsibilities of the project team, which includes, CCG, contractors and the environmental monitor (EM) are described in the following subsections.

All personnel have an inherent responsibility to protect environmental, heritage and socio-economic values in their work and at camp.

The following subsections describe the environmental management responsibility of the project team.

Table 4-1 Roles and Responsibilities

Role	Name	Responsibilities
Project Manager, CCG	Clinton Hoffman, P.Eng.	• Responsible for overall environmental management and performance of the Project • Administering contracts and assessing the Contractor(s)' ability to comply with this EMP as part of the tender evaluation • Providing the Contractors and EM with project-specific details, such as background information, habitat assessment, permits and this EMP • Promoting regulatory permits/notifications compliance as mandated by legislation • Authorizing stop work authority to project personnel (e.g., EM) for non-compliance with this EMP and contravention of regulatory permits • Allowing them to have the ability to suspend project activities that are at risk of causing or potentially causing serious harm to fish, as defined by DFO • Notifying regulatory agencies or authorizing notification on their behalf of environmental non-compliance or environmental incidences • Reviewing environmental monitoring reports prepared by the environmental monitor
Site Manager	Steve James, A.Sc.T.	• Coordinating construction and environmental inspections to check compliance with permits and this EMP • Verifying that appropriate mitigations are implemented during construction • Notifying Environmental Representative without due cause if any spills or non-conformances of the EMP occur, and assist in addressing and reporting them • Monitoring Contractor(s) compliance with the Contract Documents • Communicating environmental responsibilities and requirements of this EMP to Contractors' crews and subcontractors, and recording that communication • Providing sufficient supplies on site to administer this EMP • Communicating regularly with EM(s) in order to adjust work plans to maintain compliance with this EMP and permits
Contractors and CCG Field Personnel	Barge and tug contractors, floating accommodation suppliers/operators, equipment operators, CCG field personnel and other field personnel.	• Constructs all works according to approved designs and standards, and this EMP • Know all environmental commitments and upholding them. These include: – The contents of this EMP – Recommendations from the Environmental Management Team or consultant, the EM(s), and all applicable regulatory agencies • Notifies Site Manager or EM(s) of any observed or potential non-compliances with this EMP • Reports incidents to the Site Manager or EM(s) without undue delay, and initiates an appropriate response • Oversees environmental training of all members of crews and subcontractors

Table 4-1 Roles and Responsibilities

Role	Name	Responsibilities
		• Corrects deficiencies and any non-compliance upon direction from the Site Manager, EM(s) and/or Environmental Representative
Environmental Representative/ Environmental Monitor, Stantec	TBD	• Coordinates work of and advises EM(s) as required • Liaises/reports back to Project Manager on status of work and any environmental issues • Liaise with regulatory agencies, as necessary
Environmental Monitor, Stantec	TBD	• Will be a Qualified Professional (QP) • Completing and recording environmental pre-job/tailboard meetings with the Contractor(s) • Communicates requirements of this EMP to the Site Manager and Contractor(s) • Completes and records environmental orientation with the Site Manager and Contractor(s) • Audits compliance with this EMP, advises the Environmental Representative of non-compliance and of any emerging environmental issues and assists in addressing them • Provides corrective advice to the Contractor where appropriate; such as when non-compliances are observed or imminent • Has the authority to issue a Stop Work order where activities are affecting, or will affect, water/sediment quality, fish/fish habitat and other VECs, such as birds and marine mammals • Maintains records of inspections and makes regular reports to Environmental Representative • Measures and monitors water and/or sediment quality as determined by this EMP, or regulatory requirements • Assists the ER as required

5.0 BEST MANAGEMENT PRACTICES

Mitigation measures that avoid environmental effects and address the environmental effects associated with Fixed Aid activities are based on BMPs and industry procedures. These documents are from various levels of government, industry BMPs and internal CCG protocols. The mitigation measures included in these documents have been synthesized, modified, and enhanced for the purposes of this report.

The mitigation measures presented in this EMP are derived from the RCSR (CCG 2006), BMPs and industry standards. The mitigation measures in the RCSR were enhanced to better protect VECs with use of the following CCG BMPS and protocol documents:

- *BMP for Concrete Pouring Programs at DFO-CCG Sites* (CCG 2000)
- *BMP for Undertaking Maintenance Cleaning/Painting of CCG Lightstations* (CCG 1999)
- *BMP for Brushing Activities at CCG Sites* (CCG 2009)
- *CCG Protocol for On-site Visits to Navigations Aids in Sensitive Bird Nesting Sites* (CCG 2005)

Additional BMPs, industry standards and other documents used when identifying mitigation measures for this EMP include, but are not limited to:

- *BC Marine Pile Driving Contractors Association – BMP for Pile Driving and Related Operations* (BC MPDCA 2003)
- *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (Province of BC 2014)
- *Guidelines to Avoid Disturbance to Seabird and Waterbird Colonies in Canada (EC 2013)*
- *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (Manning, Cooper and Associates 2013)
- *Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region* (Hutton and Samis 2000)
- *Land Development Guidelines for the Protection of Aquatic Habitat* (DFO 1992, updated 1993)
- *Standards and Best Practices for Instream Works* (MWLAP 2004)

6.0 ENVIRONMENTAL PROTECTION MEASURES

Without the implementation of mitigation measures, construction activities associated with the Project have the potential to directly and indirectly affect fish and fish habitat and cause adverse environmental effects. Through the use of mitigation measures, potential effects associated with the Project can be limited.

The following environmental protection measures were developed so that proposed works meet recommendations made in the CCG RCSR and the BMPs described in Section 5.0.

6.1.1 General Mitigation Measures

Many environmental mitigation measures are common to all phases of construction activities with the Project. Table 6-1 provides general environmental mitigation measures applicable to all project activities. Mitigation measures specific to pile driving and associated activities, concrete work and base abandonment, waste control and spill prevention, control and response are provided in the following sections.

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Permits	1. Copies of all issued permits, such as DFO, Transport Canada and British Columbia Parks must be on site (at minimum the construction barge and accommodation barge/vessel)) and readily available.
	2. Construction-related restrictions, conditions or mitigations that are part of the regulatory permits shall be communicated to the field crew.
	3. Contractors or subcontractors that have received project related regulatory permits must have them on site and readily available.
EMP	4. A copy of this EMP must be on site (at minimum the construction barge and accommodation barge/vessel) and readily available.
Timing	5. Marine construction as part of the Project is expected to occur outside of the DFO least-risk work window for Areas 5 and 6, November 30 to February 15. As such, the mitigation measures recommended in this EMP reflect the necessary protocols for avoiding and/or mitigating serious harm to fish when work falls outside of this least risk window. Regulatory permits, such as through DFO, may include construction timing restrictions. Refer to regulatory permits to see if construction timing is restricted.
	6. Construction as part of the Project is expected to occur during nesting periods for raptors, migratory birds and/or seabirds. This combined nesting period is from early-February to late-October. As such, the mitigation measures recommended in this EMP reflect the necessary protocols for avoiding and/or mitigating adverse impacts to birds, nests and fledglings. Regulatory permits, such as Park Use Permits may identify construction timing restrictions. Refer to regulatory permits to see if construction timing is restricted. **Where possible, in areas with nests, conduct construction as late as possible in the nesting period after young have fledged the nest.**

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Training	7. Personnel involved with activities will be adequately trained and will utilize appropriate personal protective equipment.
Tailgate Meetings	8. The EMP, environmental regulatory permit requirements and Site Specific Environmental Plans will be reviewed by the Site Manager, followed by a briefing to crews. Prior to construction at a Fixed Aid site, the Site Specific Environmental Plans will be reviewed by the crews, Site Manager and the EM.
Stop Work	9. CCG will stop work and contact the EM for assistance prior to commencing or continuing any activities that may pose any environmental or archaeological risk not addressed in this document.
	10. The EM will have authority to issue a Stop Work order where activities are adversely affecting, or will adversely affect, the environment or archaeological resources. The EM will also make recommendations in the field for avoiding and mitigating effects.
Public Notice	11. Proper notice should be given to transportation authorities to warn of potential disruptions to navigation during works.
Site Cleanliness	12. Sites should be kept tidy during activities and left in a good condition at the end of the Project.
Wastewater	13. Sewage from portable toilets will be disposed of in an approved sewage disposal facility on an as-needed basis.
	14. Wastewater from floating barge camps will be disposed of according to applicable regulations (Appendix B).
Floating Barge Camps	15. Floating barge camps must comply with all mitigation measures outlined in this EMP; special attention must be paid to spudding/grounding, waste/sewage management, spill prevention, control and response and measures identified within project regulatory permits (e.g., Park Use Permits).
Contractors / Subcontractors	16. Contractors and subcontractors must comply with all mitigation measures outlined in this EMP and measures identified within project regulatory permits.
Noise and Air Quality	17. Machinery must be operated efficiently, to ensure that noise and air quality issues are short-term and local.
	18. Painting activities should be completed in such a way as to minimise the amount of fumes that may enter the environment.
Paint	19. The amount of paint used should be limited and unused containers must be covered.
Material Safety Data Sheets	20. Chemical products must have their applicable Material Safety Data Sheets onsite and readily available.
Stock Piles/Laydown Areas	21. Stockpiling of material will be conducted in accordance with BMPs and limited to material staging areas and barges, where possible.
	22. Upland or intertidal temporary stockpiling areas will be approved by the EM and materials will be removed prior to inundation by the tide.
Soils	23. Care should be taken to prevent soils from being exposed and mobilized into the marine environment.
Deleterious substance	24. Deleterious substances (*e.g.,* fine sediments, hydrocarbons, contaminants) will not be deposited into fish habitat.

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
	25. Work will be conducted such that no contaminated water or other effluent potentially harmful to aquatic life enters the marine environment. Contaminated water or effluent may include silt laden water, concrete washwater, site run off, oil/fuel spills, sewage, etc.
Sediment	26. Activities should be completed in such a way as to limit the amount of fines and organic debris that may enter nearby aquatic environments.
	27. Intertidal work should be conducted at low tide and in the dry.
	28. Prop wash will be limited in shallow areas where possible.
	29. Where necessary, sediment control measures (e.g., silt curtain) will be used to effectively limit the dispersal of sediments and sediment-laden waters beyond the immediate work area.
Power Washing	30. Power washing should be isolated to the immediate Fixed Aid footprint.
Spudding/ Anchoring	31. Spudding and anchoring will be prohibited in sensitive habitats including surfgrass, eelgrass and kelp beds. In the event that sensitive habitats cannot be avoided, the EM must approve the location of the spudding/anchoring to CCG and limit the disturbance.
	32. Where possible, CCG will position their barges and vessels in a manner that will limit damage to sensitive habitat (e.g., surfgrass, eelgrass and kelp beds) and alternative methods will be employed (*e.g.,* use of anchors instead of spuds, flat deck barge rather than spud barge).
Grounding	33. Barge grounding is not permitted.
Rock Drilling / Anchor Installation	34. Rock drilling must be conducted conservatively so that physical changes to rock remain small and localized.
	35. Rock drilling is to be done in the dry (i.e., not in-water).
	36. Dust and fines entering the water must be avoided (e.g., vacuum / collect fines/dust).
Blasting	37. Any blasting will follow the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998).
Water Quality: Turbidity (MOE 2015)	38. Before allowing water to leave the work site, CCG will verify that the following water quality criteria are achieved: – Change from background of 8 NTU at any one time for a duration of 24 h in all waters during clear flows or in clear waters – Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters – Change from background of 5 NTU at any time when background is 8–50 NTU during high flows or in turbid waters – Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters
Water Quality: pH (MOE 2015)	39. Before allowing water to leave the work site, CCG will verify that water is within the pH range of 7.0–8.7 pH units unless it can be demonstrated that such a pH is a result of natural processes.
Water Quality: Oil and Grease	40. Before allowing water to leave the work site, CCG will verify that water does not have detectable oil and grease (detectable by sight or smell).

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Water Quality: Water Temperature	41. Seawater that will be released from the heat exchange system is not expected to have a detectable temperature difference from the ambient marine environment. The water temperature of the released seawater from the heat exchange system will be monitored and recorded.
	42. The temperature of the ocean at the discharge location will be monitored under the following guideline: – Cannot exceed ± 1 degree Celsius change from natural ambient background – Cannot exceed ± 0.5°C per hour from natural ambient background
Kelp beds, Eelgrass and Surfgrass	43. Prop-wash and scouring will be avoided within 30 m of kelp, eelgrass or surfgrass beds, where practical.
	44. Contractors will position their water borne equipment in a manner that will limit damage to identified sensitive habitat (e.g., eelgrass, surfgrass, kelp). Where possible, alternative methods will be employed (*e.g.,* use of anchors instead of spuds).
	45. If herring spawn in the worksite or on any of the equipment (e.g., vessels, barges, sediment control measures), work may have to be postponed or stopped until the eggs hatch (typically 2 to 3 weeks after spawn). If herring spawn occurs during marine construction or in the vicinity of the Project, the EM must be notified immediately.
	46. If herring spawn occurs in the area, but not at the work site, the EM must be contacted in order to discuss if work proceeds.
Flora and Fauna	47. Feeding of wildlife is not permitted.
	48. If dead, sick or injured animals are observed, report to the EM immediately.
	49. Site access routes should consider resident flora and fauna, especially during times of the year when they are most sensitive.
	50. Foot traffic on foreshore areas will be limited to prevent trampling flora and fauna.
	51. All activities should be completed in such a way as to reduce stress and disturbance to resident flora and fauna.
	52. Project activities should only be conducted where entirely necessary. This will reduce effects to nearby soils, vegetation, and resident species. Respect should be given to the natural environment to limit the footprint of the Project.
	53. The project footprint should be clearly defined by CCG. Equipment presence within the intertidal will be restricted to the immediate work area. The establishment of approved work areas will reduce disturbance and the potential to alter, damage, and/or destroy fish habitat.
	54. Locations of where project activities may occur (*e.g.,* Fixed Aid footprint, barge landing, laydown areas) should be inspected for sensitive habitats and species at risk prior to and during work.
	55. Tide pools that may be impacted by project activities should be inspected for fish. Fish will be relocated to a tide pool of similar tidal height where possible.
	56. If intakes are used to withdraw water from the marine environment, they will be appropriately screened to prevent the entrainment and impingement of fish. Intake screens will be monitored every half hour while in use for fish entrainment and impingement.
	57. Any instances of fish kill must be reported to the EM without undue delay.

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Northern abalone	58. The Fixed Aid footprints and barge landing areas will be inspected by the EM or other project designate for northern abalone prior to construction. If northern abalone are present at a proposed barge landing site, a new landing site will be selected and inspected by the EM or project designate prior to landing. After confirmation that the landing site does not have northern abalone, landing will be permitted. If northern abalone are present within the proposed Fixed Aid footprint, work will stop at this site and the Project Manager and/or Site Manager will be contacted to determine the next course of action (e.g., move the location of the Fixed Aid or obtain a SARA permit). It is illegal to harm, harass, kill, capture or take a species at risk or any part of it (e.g., shell).
Birds—Vessel Traffic	59. When travelling near seabird colonies, travel parallel to shore rather than approach the colony directly.
	60. Avoid travelling through areas where concentrations of seabirds are observed on water.
Birds—Noise	61. Avoid sharp loud noises, blowing whistles or horns, and maintain constant engine noise levels when within 300 m of seabird colonies.
Brushing/ Falling	62. No falling will occur without the EM's prior knowledge and approval and must follow applicable regulations.
	63. Prior to brushing and falling, the area will be inspected for bird nests, wildlife dens and CMTs. Trees containing these features will not be removed without approval from the EM and under appropriate permits, if applicable. a. Prior to brushing/falling, the EM will monitor trees and understory vegetation within 30 m of the Fixed Aid site for nesting activity. The EM should monitor the active trees/branches identified for brushing/falling, including the path for falling, for a minimum of 15 minutes (or longer, if necessary) to assess nesting activity. i. If an active raptor, migratory bird, or seabird nest or cavity is identified directly at a Fixed Aid site (i.e., at or within 10 m of the site), brushing/falling activities should be suspended and the EM should consult with a wildlife biologist. ii. If an active raptor, migratory bird, or seabird nest or cavity is identified in the vicinity of the Fixed Aid site, the EM should initiate monitoring activities (described below) for the duration of construction at those sites. iii. If an inactive active raptor, migratory bird, or seabird nest or cavity is identified at a Fixed Aid site, brushing/falling activities can be completed as scheduled. iv. If an inactive eagle, Peregrine Falcon, Gyrafalcon, Osprey, heron or burrowing Owl nest is present in a tree that is proposed to be fallen or within the pathway for falling the EM will contact the wildlife biologist to determine how to proceed as unoccupied nests of these birds are protected year round.
	64. Physical injury to tree roots, bark, trunk and crown (*e.g.,* from machinery) will be avoided.
	65. Use discretion when deciding whether to remove cut debris or leave it on site. In remote sites, cut or brushed debris may be left above highest high water to decompose. Remove debris in sites that are not remote or when there is a copious amount of debris.
	66. Do not leave cut vegetation debris in the marine environment.

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Birds —Fixed Aid Site	67. Since work is expected to occur during the nesting window for raptors, migratory birds and seabirds, work must be conducted as efficiently as possible and not disturb birds, nests and their fledglings. Walk with care as nests/ juveniles can be camouflaged on the ground.
Birds—Fixed Aid Site	68. If breeding birds, seabird colonies or nests are encountered at the Fixed Aid site contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, under applicable regulatory permits.
	69. If the EM has deemed that construction work is not disturbing birds and/or their nests/fledglings, work will be conducted quickly and efficiently to limit stress on the birds.
Birds—Buffers	70. If an active raptor nest is observed at, or within 300 m of a Fixed Aid, a 300 m minimum no-disturbance buffer is recommended from the active raptor nest during construction. **If this is not possible (i.e., the Fixed Aid is within 300 m of the active nest),** construction must not proceed at this site until the EM has been contacted and determined if additional mitigation measures are needed (e.g., temporary stop work to allow bird to incubate for a period) or if a wildlife monitor is needed for that specific site. Options to manage these conditions include: a. If an active raptor nest is identified within 300 m of a Fixed Aid, the EM must be present for the duration of construction activities at that site (including brushing and rock anchor drilling). Bald eagles will incubate eggs continuously (with the male and female switching positions on the nest every one to four hours), and are generally tolerant of human activities in the vicinity of active nests. However, disruption of the incubation cycle can lead to nest abandonment and failure. b. The EM will continuously monitor the nest for signs of disturbance (i.e., both incubating adults leaving the nest). If adults are observed to have been absent from the nest for more than 30 minutes, construction activities will be suspended until an incubating adult is able to return to the nest and resume incubation activities for minimum 30 minutes. The EM will continue to monitor for nest disturbance for the duration of construction at that site; construction activities will continue to be suspended, as necessary, to facilitate incubation activities. c. Construction activities can proceed on site without interruption if the EM does not observe disturbance behaviour at active raptor nests.
	71. If an active migratory bird nest or cavity is observed at, or within 30 m of a Fixed Aid site, and the duration of loud construction activity (e.g., brushing/falling, rock anchoring) will be less than 60 minutes, work can proceed. Where loud activity will be longer than 60 minutes in duration, contact the EM to determine whether time limitations are required (how long can work take place before allowing for a 'quiet' period), if required; disturbance responses differ between species. The EM may decide to suspend activities if nesting migratory birds are demonstrating disturbance behaviour within 30 m of the Fixed Aid site.

Table 6-1 General Mitigation Measures

Category	Mitigation Measure
Birds—Buffers	72. Seabirds may use a variety of marine habitats for breeding, including cliffs, rocky ledges, open rock, islands and islets, beaches, boulders or rock crevices, or underground burrows. Seabirds may nest individually (e.g., oystercatchers), or in loose or concentrated colonies (occasionally with several species present at the same location). Colonial seabirds can include gulls, terns, kittiwakes, herons, cormorants, guillemots, and auklets. At active seabird breeding locations, a minimum 300 m buffer is recommended from seabird nests and colonies, including vessel traffic. During high-disturbance construction activities, such as rock drilling (anchoring) or pile driving, maintain a buffer of at least 1 km from seabird nests and colonies. **If these buffers cannot be maintained**, then construction must not proceed without consultation from the EM as a regulatory permit may be required. a. If an active seabird nest or colony is identified within 1 km of a Fixed Aid, the EM must be present for the duration of construction at this site. Most individually or colonial nesting seabirds incubate eggs continuously, and are expected to demonstrate varying degrees of sensitivity to human presence and disturbance. Disruption of the incubation cycle can lead to nest abandonment and failure. b. If the Fixed Aid site is located within 300 m of an active colony, construction activities should be suspended and the EM should consult with a wildlife biologist. c. If the Fixed Aid site is located within 301 m to 1 km of an active nest site or colony, the EM will continuously monitor for signs of disturbance (i.e., birds that appear to harass construction personnel, circle the construction site, position themselves in nearshore waters). If adults are observed to be absent from the nest for more than 30 minutes, construction will be suspended until incubating adults are able to return to the nest and resume incubation activities for minimum 30 minutes. At active colonies, the EM may observe regular and continuous disturbance due to the presence of construction personnel. In this case, construction should be suspended at this site. The EM will continue to monitor for nest disturbance for the duration of construction; construction will continue to be suspended, as necessary, to facilitate incubation. d. Construction activities can proceed on site without interruption if the EM does not observe disturbance behaviour at active seabird nesting sites.
Archaeology	73. Archaeological sites in remote locations are not likely to have been previously identified. Care should be taken to avoid archaeological deposits while work is being completed.
	74. Inspect the proposed Fixed Aid footprint and barge landing area for archaeological evidence (e.g., rock art pictographs and petroglyphs) before construction activities (e.g., power washing, rock drilling, concrete pour). If project activities will impact an archaeological site, stop work and contact the EM. Trees should be inspected for cultural modification prior to falling.
	75. If an archaeological or heritage resource is encountered during construction, the work should be stopped in the vicinity of the find and the work crew review Stantec's Chance Find Protocol—Archaeological Sites in British Columbia's Coastal Region provided in Appendix C.

6.1.2 Pile Driving and Associated Activities Mitigation Measures

Table 6-2 identifies environmental mitigation measures to be implemented to avoid or mitigate against potential environmental effects during pile driving, drilling and removal:

Table 6-2 Pile Driving and Associated Activities Mitigation Measures

Category	Mitigation Measure
BMP	1. Where possible, the *Best Management Practice for Pile Driving and Related Operations* (BC MPDCA 2003) should be followed.
General	2. Where practical, a vibratory hammer should be used rather than an impact hammer to reduce noise impacts.
Environmental Monitor	3. An EM is recommended to be on site during pile driving, removal and drilling activities.
Sediment Control	4. Silt curtains may be required during pile driving, removal and drilling operations, at the discretion of the EM.
Visual Monitoring	5. During pile driving operations, the water should be visually monitored to identify impacts (*e.g.*, stress, kill) to fish.
Hydrophone	6. If acoustic sound pressure is expected to encroach or exceed 30 kPa, then a hydrophone should be deployed during pile driving to monitor sound pressure. If pressure exceeds 30 kPa, work will stop and measures will be implemented to reduce sound pressure.
	7. Once sound pressure are confirmed to be below 30 kPa (e.g., based on methods, pile diameter/type, substrate, etc), continued hydrophone monitoring is not expected to be required.
Bubble Curtain	8. If fish stress or kills are observed, install bubble curtains to reduce the impacts of shock waves. This is recommended when driving piles with a diameter greater than 24". To be effective, bubble curtains must be deployed over the entire wetted length of the pile.
	9. Vibratory hammers are not expected to create sound pressure levels in excess of 30 kPa; however, bubble curtains may be required when seating the pile into the seabed with an impact/drop hammer. This will be determined by the EM.
Fish Kill	10. In the unlikely event that pile installation activities cause fish kill, work must cease without undue delay and contractors will be responsible for introducing effective means of reducing the level of shock waves or introduce measures that will protect fish from entering the potentially harmful shock wave area.
	11. If preventative measures to reduce sound pressure prove ineffective (e.g., sound over 30 kPa or fish kill), then work will stop without undue delay and the methods reviewed and corrected.
	12. Any instances of fish kill must be reported to the EM without undue delay.
Marine Mammals	13. Prior to impact/drop hammer pile driving, establish an exclusion zone radius around the work area for marine mammals as directed by the EM prior to pile driving. This exclusion zone may be refined during work.

Table 6-2 Pile Driving and Associated Activities Mitigation Measures

Category	Mitigation Measure
Marine Mammals	14. Prior to impact/drop hammer pile driving, the EM should conduct visual observations of the surrounding area to determine if marine mammals are within the exclusion zone. If a marine mammal is present in the exclusion zone prior to the start of pile driving, that activity will be delayed until the marine mammal has left the exclusion zone.
	15. Use a soft start technique, where equipment allows, to slowly build up power to give adequate time for marine mammals to leave the vicinity before exposed to maximum sound pressure. This should be conducted when marine mammals are suspected or known to be present outside of the exclusion zone.
	16. If a marine mammal enters the exclusion zone during impact/drop hammer pile driving, work will stop until the marine mammal leaves the exclusion zone or a minimum of 15 minutes has elapsed since it was last sighted in the exclusion zone.
	17. Impact/drop hammer pile driving should not resume until the marine mammal is outside the exclusion zone.
	18. Impact/drop hammer pile driving should be restricted to daylight hours and wind conditions below 25 knots in order to monitor for marine mammals.
	19. If any observable impacts to marine mammals are observed during pile driving, work will stop and procedural changes and/or additional mitigation measures (e.g., bubble curtain) will be required.
Treated Piles	20. Use of treated piles (*e.g.,* piles coated with creosote) can introduce harmful chemicals, such as polycyclic aromatic hydrocarbons (PAHs) to the marine environment, therefore use of treated wood is not recommended.
	21. Where possible, new timber piles will comply with the BMP for the use of treated wood in aquatic environments as developed by the Canadian Institute of Treated Wood and the Western Wood Preservers Institute.
	22. Where the BMP pilings are not available, creosote piling will stand for a minimum of 45 days prior to installation. These requirements are for new pilings only and will not restrict the use of re-used timber pilings. Reused pilings will not be subject to any additional treatments.
	23. Absorbent booms must be deployed around the perimeter of the work area and maintained during installation of all structures using oil-borne wood treatments. These booms should remain in place and operational until such time as visible evidence of wood-treatment chemicals on the water surface is no longer apparent.
	24. All cutting and boring of treated wood should take place at the material staging area or on the barge; all waste materials must be kept out of the marine environment and be properly disposed of offsite. Such work that must be done in situ is to be fully contained so that no waste materials are deposited into water or intertidal sediments.
	25. Any treated cut wood, chips or sawdust that enters the marine environment is to be promptly collected, contained and later disposed of properly offsite.
	26. In situ application of wood-treatment chemicals is generally not acceptable. In the event that minor application of wood-treatment chemicals is required after construction of a treated wood structure, all application areas must be contained or underlain with tarpaulins so that no chemicals are deposited into the water or onto marine sediments.

Table 6-2 Pile Driving and Associated Activities Mitigation Measures

Category	Mitigation Measure
Steel Pipe Piles less than 24 " diameter	27. In the unlikely event that fish distress or kill occur during pile driving of 24" diameter steel piles, work will stop and: a) mitigation measures to reduce shock waves must be employed (e.g., bubble curtain, vibratory hammer rather than impact) b) introduce measures to prevent fish from entering the potentially harmful shock wave area
Steel Pipe Piles greater than 24" in diameter	28. During impact and hydraulic hammering, hydrophone and visual monitoring of the effects of shock waves on fish may be required.
	29. Pile driving of steel piles ≥ 24" diameter has the potential to harm fish. Effective means to reduce sound pressure may be required (e.g., bubble curtain). Acoustic sound pressure monitoring with a hydrophone may be required for steel piles ≥ 24" in diameter if sound pressure is expected to exceed the 30 kPa threshold.
Pipe Cleaning	30. Sediment contained in the pipe will be pumped to the surface and processed through an approved containment system and disposed of at an approved land-based facility.
	31. Sediment that may be toxic will be tested and disposed of offsite at an appropriate land based facility.
Pile Removal General	32. Where practical, pile removal should be conducted during low tide and at slack water to reduce turbidity in the water column.
	33. A floating surface boom shall be installed to capture floating debris where practical.
	34. Where practical, remove piles with a vibratory hammer rather than direct pull.
	35. Remove the pile slowly to reduce turbidity in the water column.
	36. Use methods to reduce turbidity and recovery of blocks of sediment (e.g., "wake up" the pile by vibrating it to break its bond with the seabed sediment).
	37. A containment area (e.g., sediment control hay bales, silt fences, geotextile fabric, plastic sheeting) for recovered piles and adhering sediment shall be included on the work surface (e.g., barge deck).
	38. Sediment blocks attached the pile will not be returned to the marine environment. Instead, it will be collected, contained and disposed of appropriately offsite.
	39. All demolition operations should be monitored in order to control and contain the construction debris.
Pile Removal: Treated Pile	40. Extraction equipment (e.g., bucket, cable, vibratory hammer) should be kept out of the water to avoid a creosote release (i.e., avoid pinching the creosote pile below the water line)
	41. Avoid intentionally breaking the pile by twisting and bending as this can cause a creosote release into the water column.
	42. Avoid breaking the pile at the mudline or below.
Underwater Drilling	43. Depending on soil conditions and the potential for turbidity, drill cuttings will be deposited adjacent to the operation, contained on the sea bed or pumped to the surface for deposit into containment skiffs or scows for land disposal when it is determined that the drill cuttings are unsuitable for return to the environment.

6.1.3 Concrete Work Mitigation Measures

Table 6-3 identifies environmental mitigation measures to be implemented to avoid or mitigate against potential environmental effects during concrete works:

Table 6-3 Concrete Control Mitigation Measures

Category	Mitigation Measure
Concrete Pour Timing	1. If at all possible, work that occurs below the high tide mark and that involves pouring concrete should be scheduled to occur during periods of low tide, when the site is exposed. Operators should be familiar with spill response procedures, including standard containment methods, in case of an environmental emergency to help minimize any deleterious impact on the surrounding environment.
	2. Once pouring has ceased forms should be wrapped in plastic for two tidal cycles, or until cured, to isolate the wet/setting concrete from weather (*e.g.,* rain and snow).
Concrete Pour	3. When pouring concrete, spills of fresh concrete must be prevented. If concrete is discharged from the transit mixer directly to the form work or placed by wheelbarrow, proper sealed chutes must be constructed to avoid spillage. If the concrete is being placed with a concrete pump, hose and pipe connections must be sealed and locked properly to so that the lines will not leak or uncouple.
	4. Crews will not fill concrete forms to overflowing.
Concrete Forms	5. Concrete forms will be constructed and sealed in a manner which will prevent fresh concrete or cement laden water from leaking into the surrounding water.
	6. The integrity of the form work should be routinely inspected prior to, during and immediately after the pour. Any deficiencies should be addressed immediately.
Onsite Concrete Tests	7. Onsite concrete tests (e.g., slump tests) will be conducted in a contained area (*e.g.,* a leak proof tray) to prevent the deposition of deleterious substances into the marine environment.
Runoff	8. If freshwater is used to cure the concrete, the runoff must be contained. Turbidity and pH of the runoff must meet the water quality guidelines described in General Measures prior to discharge into the marine environment.
	9. Prevent any water (*e.g.,* rain/snow) that contacts deleterious uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering the marine environment.
Tools/ Equipment Cleaning	10. The cleaning of concrete and cement laden materials (*e.g.,* tools and equipment) must be conducted in a contained area to prevent the release of deleterious substances (*e.g.,* washwater) into the marine environment.
	11. At no time is it permitted to rinse concrete and cement laden materials in the marine environment.
Washwater	12. Tools, pumps, pipes, hoses and trucks used for finishing, placing or transporting fresh concrete must be washed off in such a way as to prevent the wash off water from entering the marine environment.
	13. Sealed, leak-proof containment facilities for washwater from concrete delivery trucks, concrete pumping equipment, and other tools and equipment must be provided to prevent the release of deleterious substances into the receiving environment.

Table 6-3 Concrete Control Mitigation Measures

Category	Mitigation Measure
Washwater	14. Concrete washwater will be contained and removed offsite to a designated facility or at the manufacturer's place of business. In the event that the washwater must be disposed of on site, the washwater must be neutralized (*e.g.,* CO_2 tank with regulator, hose and gas diffuser) and filtered through a sediment control device.
	15. Do not completely fill the washwater containment basin. Allow for sufficient freeboard.
	16. Untreated washwater will not be disposed of into the marine environment.
Washwater Treatment	17. Water quality parameters (*e.g.,* pH and turbidity) should be sampled of the washwater prior to treatment and after treatment.
	18. Washwater must be appropriately treated to water quality requirements described herein prior to the release to the receiving environment.
	19. When treating washwater with CO_2, CO_2 diffusers should be placed on the bottom of the tank, this will allow carbon dioxide to bubble up through the water and diffuse more evenly.
	20. Where practical, neutralization of washwater should be conducted separately from the sludge.
	21. When releasing the treated/neutralized washwater, be sure not to release any sludge that may have accumulated on the bottom.
Washwater Water Quality Requirements	22. Any water that contacts uncured or partly cured concrete shall be isolated and held until the pH is between 7.0 and 8.7 and the turbidity is less than 100 nephelometric turbidity units (NTU), or other level approved by the onsite EM, before being released into waters frequented by fish and other marine organisms.
Materials Containment	23. If concrete is to be mixed on the worksite, store cement bags in a leak-proof, covered container to provide protection from wind or rain/snow and other influences (*e.g.,* waves).
	24. During mixing operations once cement bags are opened take all necessary precautions to limit dispersal of dry cement by the wind.
Excess Concrete / Sludge	25. Excess/unused concrete will be removed from the site and disposed of/recycled offsite appropriately at an approved facility.
	26. Collect and dispose of all collected concrete chips at an approved disposal site. Other waste materials collected during the concrete pouring operations should be retained for disposal at a municipal landfill. Waste materials must not be deposited into watercourses, riparian zones or marine foreshore areas.
Spills	27. Any accidental release of concrete will be removed prior to curing.
	28. Spill clean-up materials, such as tarps and shovels should be readily available.
	29. Immediately report any spills of uncured concrete, concrete fines, wash or contact water of reportable quantities to the onsite EM. The EM will determine if regulatory agencies should be notified. Regulatory agencies include the Provincial Emergency Program Environmental Emergency Management Plan Incident Reporting Hotline 1-800-663-3456 and DFO's Observe, Record and Report Hotline 1-800-465-4336.
	30. Immediately implement emergency mitigation and clean-up measures (such as use of CO_2 if required, and immediate removal of the material).

6.1.4 Concrete Base Abandonment Mitigation Measures

The following practices will be followed during concrete base abandonment:

Table 6-4 Concrete Base Abandonment Mitigation Measures

Category	Mitigation Measure
Waste Control	1. Care should be taken to remove all components of the Fixed Aid that are not incorporated into the concrete base.
	2. All debris deposited throughout the life of the aid should be removed from the site.
Site Footprint	3. Areas near the base should be protected from excessive disturbance.
Abandonment	4. Concrete base abandonment will be conducted only in remote sites, where aesthetic and navigational effects are not a concern.

6.1.5 Waste Control Mitigation Measures

Deposition of wastes as part of the Project will be avoided. Table 6-5 presents mitigation measures to be implemented to control wastes:

Table 6-5 Waste Control Mitigation Measures

Category	Mitigation Measure
Waste	1. An approach of "contain and recover" should be adopted.
	2. Waste or any miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the marine or terrestrial environment.
	3. All onsite personnel will make best efforts to prevent debris from entering the intertidal/marine environment.
	4. Litter in the form of coffee cups, lunch wrappers, cigarette butts, and other such items will be placed in covered trash containers at all times.
	5. Waste deposited on the dry intertidal will be collected daily before it is inundated by the tide.
	6. Cured concrete waste, such as waste created during base demolition, will be collected and disposed of at an appropriate offsite facility.
	7. Disposal of spoils (*e.g.*, concrete waste, left over concrete, wood forms, scrap wood, rebar and tie in wires, nails, screws, spent drill bits, and similar materials) is prohibited in the marine and terrestrial environment.
Recycling	8. Where practical, recyclable materials, such as drink containers, plastics and paper will be separated onsite and recycled at an appropriate offsite facility.
Paint Chips	9. Drop sheets or other means should be used to prevent paint chips and other debris from entering the surrounding environment.
Hazardous Waste	10. Hazardous waste, such as used sorbent pads, should be collected and disposed of appropriately offsite.

Table 6-5 Waste Control Mitigation Measures

Category	Mitigation Measure
Hazardous Waste	11. Creosote-treated waste will be stored in a water-proof container separate from other waste for appropriate offsite disposal.

6.1.6 Spill Prevention, Control and Response

Best efforts will be made to prevent hazardous materials from entering the environment.

Hazardous materials likely to be on site during the Project may include:

- Engine oil
- Gasoline
- Diesel
- Hydraulic fluid
- Transmission fluid
- Lubricants (e.g., grease, etc.)

6.1.6.1 Spill Prevention and Control

Table 6-6 identifies mitigation measures to be implemented to prevent and control spills.

Table 6-6 Spill Prevention and Control Mitigation Measures

Category	Mitigation Measure
Spill Coordinator	1. CCG will appoint a Spill Coordinator who has knowledge of spill mitigation, containment, and reporting procedures.
	2. The Spill Coordinator will keep inventory of hazardous materials on site.
Training	3. CCG will provide all onsite staff with training in the use of hazardous materials and the location and use of spill kits and containment booms.
	4. CCG will confirm spill kits, containment berms and other spill control materials are readily accessible and locations are known to field crew.
Fuel	5. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill.
	6. All portable fuel tanks (e.g., jerry cans) will be stored within leak-proof secondary containment.
	7. Fuel storage, including secondary containment, shall be kept free and clear of collected rainwater and snowfall.
	8. While refueling, the operator must stay with the fuel nozzle.
	9. Vehicles and equipment must be shut off while refueling.

Table 6-6 Spill Prevention and Control Mitigation Measures

Category	Mitigation Measure
Equipment	10. All equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products.
Equipment	11. Containers, hoses and nozzles will be free of leaks.
	12. At the discretion of the EM, drip trays capable of containing 150% of the fuel will be placed beneath machinery, equipment and fuel storage facilities that are within 30 m of the HHWLT line or on vessels.
	13. Machinery should not be operated below the HHWLT line unless approved by the EM.
	14. Machinery (e.g., generators) operated within 30 m of high water should be placed in secondary containment, such as within drip trays.
	15. Hydraulic hoses and couplings should be inspected and free of leaks and excess hydrocarbons prior to use near the marine environment.
	16. Containers not in use will be sealed with a proper fitting cap or lid.
Equipment maintenance/ servicing	17. Impervious materials, such as tarps, drip pans or spill trays must be placed underneath equipment and machinery during servicing when there is a potential for accidental drips or spills.
	18. Servicing and maintenance of equipment shall be conducted on the barge or at the materials staging area. Servicing and maintenance of equipment is not permitted in the intertidal or terrestrial environments unless exceptional circumstances and approved by the EM.
Spills	19. In the event of a leak, all fuelling/filling operations will be stopped until the cause of the leak has been identified and it has been repaired.
	20. All spills must be reported to the EM immediately, regardless of volume.

6.1.6.2 Spill Response and Reporting

In the event of a spill, the mitigation measures presented in Table 6-7 should be implemented.

Table 6-7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measure
Spill Response Materials	1. Spill response materials are required to be readily available when working at a Fixed Aid site. These materials include, but are not limited to: a) Spill kits b) Personal protective equipment (e.g., nitrile gloves, safety glasses) c) Fire extinguishers d) Shovels

Table 6-7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measure
Spill Kits	2. CCG will provide an appropriate number of spill kits on site. The suggested contents of a spill kit is as follows: a) 100 sorbent pads, including universal sorbent pads suitable for water based fluids (*e.g.,* coolant) b) 25 kg of dry oil sorbent c) 2 x 10 m sorbent floating booms d) 1 roll of 25 x 4 m polyethylene sheeting (for underlay) e) 10 heavy-duty plastic garbage bags.
Spill Kits	3. In addition to the spill kits on site, each piece of mobile equipment (*e.g.,* cranes, concrete trucks) will contain a spill kit. The suggested contents of the spill kit is as follows: a) Round-nose shovel or equivalent b) Absorbent sock/roll c) 10 Absorbent pads (approx. 18"x18") d) Heavy-duty plastic garbage bags e) Protective personal gear as required
	4. Spill kits will be inspected on a regular basis and will be refilled immediately after use.
	5. Spill kits will be at each project site, such as the floating accommodation barge, material staging area, vessel/tugs and barge. In addition, spill kits will be present at fuel storage areas.
Response	6. In the event of a spill, the Spill Coordinator will direct all onsite personnel to the location and use of spill kits.
	7. The initial response to the spill may include: a) Stop work b) Ensure your own safety and the safety of others c) Onsite personnel wear personal protective equipment, such as nitrile glove and safety glasses d) Identify the spilled materials and refer to the Material Safety Data Sheet (MSDS) to determine if human health or ignition hazards exist e) If possible and safe to do so, contain the spill by any safe means possible (e.g., plug leak, close/isolate leaking valve, etc.) f) Obtain assistance of others g) Begin containment of the spill and stop it from spreading h) Cleanup the spilled substance using available supplies from the onsite spill kits i) If the spill is on land or on the barge, dyke around the affected area to prevent the spill from entering the marine environment j) If the spill is to water, use measures such as installing absorbent rolls as floating booms to contain the spill and absorbent pads to soak up the material k) Report the spill to the EM l) CCG will determine if notification to regulatory agencies is required
Reporting	8. CCG Representative is responsible for notifying regulatory agencies or authorizing notification on their behalf to regulatory agencies of all hazardous spills and to verify that the spill reporting meets provincial and federal requirements.
	9. The Spill Reporting Regulation under the British Columbia *Environmental Management Act* identifies externally reportable quantities for certain substances.

Table 6-7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measure
	10. Any spills observed in the vicinity of the Project that are not the result of project-related activities will be documented and reported to CCG Representative and appropriate regulatory agencies where applicable.
	11. The EM will prepare an Environmental Incident/Non-Compliance Report in the event of a spill.
Reporting	12. The following information should be collected as it may be required when reporting a spill to regulatory agencies and may be included in the Environmental Incident/Non-Compliance Report: a) Reporting person's name and telephone number b) Name of the owner of the product that spilled or leaked and phone number c) Name and phone number of the person who caused the spill or leak d) Date and time of the spill or leak e) Description of the spill or leak f) Location of the spill or leak g) Receiving environment description h) Type of material spilled and quantity i) Source of spill or leak j) If the spill or leaked product is contained, and if not where is it flowing k) Description of the response and when it occurred l) Percent of material recovered m) Details of further action required n) Recommendations for preventative/mitigation measures o) Names of other persons or agencies advised concerning the spill or leak

6.1.7 Site Specific Mitigation Measures

Site specific mitigation measures are provided in the SSEPs. The SSEPs are provided as an appendix to this EMP.

7.0 ENVIRONMENTAL MONITORING

7.1 GENERAL

CCG will provide an EM, as needed, to monitor ongoing project components against this EMP and applicable regulatory and legal requirements. If this EMP is followed, the potential for adverse environmental effects are low; therefore an onsite EM should not be required 24/7, nor for the duration of the Project. An example of the environmental monitoring field sheet checklist to be completed during each site visit by the EM is included in Appendix D.

When the EM is not on site, CCG will communicate with the EM to discuss the onsite construction activities, potential environmental risks and specific mitigation measures. In addition, the EM will confirm with CCG that any new onsite personnel understand their environmental responsibility and requirements of the EMP.

Before fiscal year construction, CCG and the EM will determine the appropriate frequency, timing of environmental monitoring and what Fixed Aid sites onsite environmental monitoring will be conducted.

7.2 FINAL ENVIRONMENTAL MONITORING REPORT

The EM is responsible for keeping notes of site activities, identifying non-compliances with this EMP, reporting incidents such as spills, and for preparing a final environmental monitoring report upon completion of construction for submission to CCG. This report may include the following:

- Construction activities
- Mitigation measures and activities that have been implemented or recommended
- Details and results of water quality testing
- Compliance or non-compliance with the EMP and/or regulatory permits/authorizations
- Recommendations
- Site photographs

7.3 ENVIRONMENTAL INCIDENT/NON-COMPLIANCES

All non-compliances and incidents (e.g., spills, habitat loss, water quality, etc.) must be reported to CCG. From there, CCG will report to (or authorize a delegate) the appropriate regulatory agencies, if required. Non-compliances and incidents will be reported to CCG as soon as possible and within 24 hours of occurrence. Non-compliances include non-compliance with this EMP or legislation. Incidents include all workplace incidents such as spills, hazards, injuries etc.

Procedures related to environmental incidents and non-compliances may include:

- Identify the environmental incident/non-compliance
- Investigate its cause
- Implement measures to regain compliance
- Document the incident or non-compliance
- Notify CCG and the EM as soon as possible regarding the environmental incident or non-compliance
- Recommend mitigation measures to prevent a similar environmental incident/non-compliance from occurring
- Prepare an Environmental Incident/Non-Compliance Report

The Environmental Incident/Non-Compliance Report may be stand alone or included in the final Environmental Monitoring Report. The suggested content for the Environmental Incident/Non-Compliance Report is:

- Cause and nature of the environmental incident/non-compliance
- Date and time of the environmental incident/non-compliance
- Description of the environmental incident/non-compliance
- Location of the environmental incident/non-compliance
- Environmental resources impacted
- If a spill, include the spill reporting information in Section 6.1.6.2
- Mitigation measures taken
- Communication

7.4 STOP WORK

The EM will have authority to alter work methodology and/or issue stop work orders in order to prevent environmental impacts and/or adverse environmental effects, whether probable, imminent, or occurring. The EM may also stop work if circumstances are likely to result in a non-compliance with legislation, project approvals, or this EMP.

Once corrective actions have been implemented and deemed appropriate by the EM, suspended project activity will be allowed to resume under guidance of the EM.

8.0 EMERGENCY CONTACTS

Project specific emergency contact lists will be posted in visible areas onsite by CCG.

Table 8-1 Emergency Contact List for Project

Contact	Phone Number
CCG Project Manager, Clint Hoffman	Phone: 250-413-2834 Ext. 2834 Mobile 250-686-0016
CCG Site Manager, Steve James	Phone: (250) 480-2608 Mobile: (250) 480-9233
Environmental Representative TBD	Office: Mobile:
Environmental Monitor, TBD	Office: Mobile:
DFO's Observe, Record and Report (ORR) Line	1-800-465-4336 (604) 607-4186
Provincial Emergency Program, 24h spill reporting	1-800-663-3456
Coast Guard, Marine Pollution Incident Reporting (Pacific)	1-800-889-8852
Medical Emergency	Use 911 of VHF 16
Work Safe British Columbia	1-866-621-7233

9.0 CLOSURE

We trust that this information meets with your present requirements. Should you have any questions or require additional information, please do not hesitate to contact Kara Hewgill via email (kara.hewgill@stantec.com) or phone (250-655-2291).

Regards,

STANTEC CONSULTING LTD.

Prepared By:

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APPENDIX A
PROPOSED 2017/2018 FISCAL YEAR CONSTRUCTION

Appendix A PROPOSED 2017/2018 FISCAL YEAR CONSTRUCTION

A.1 SUMMARY

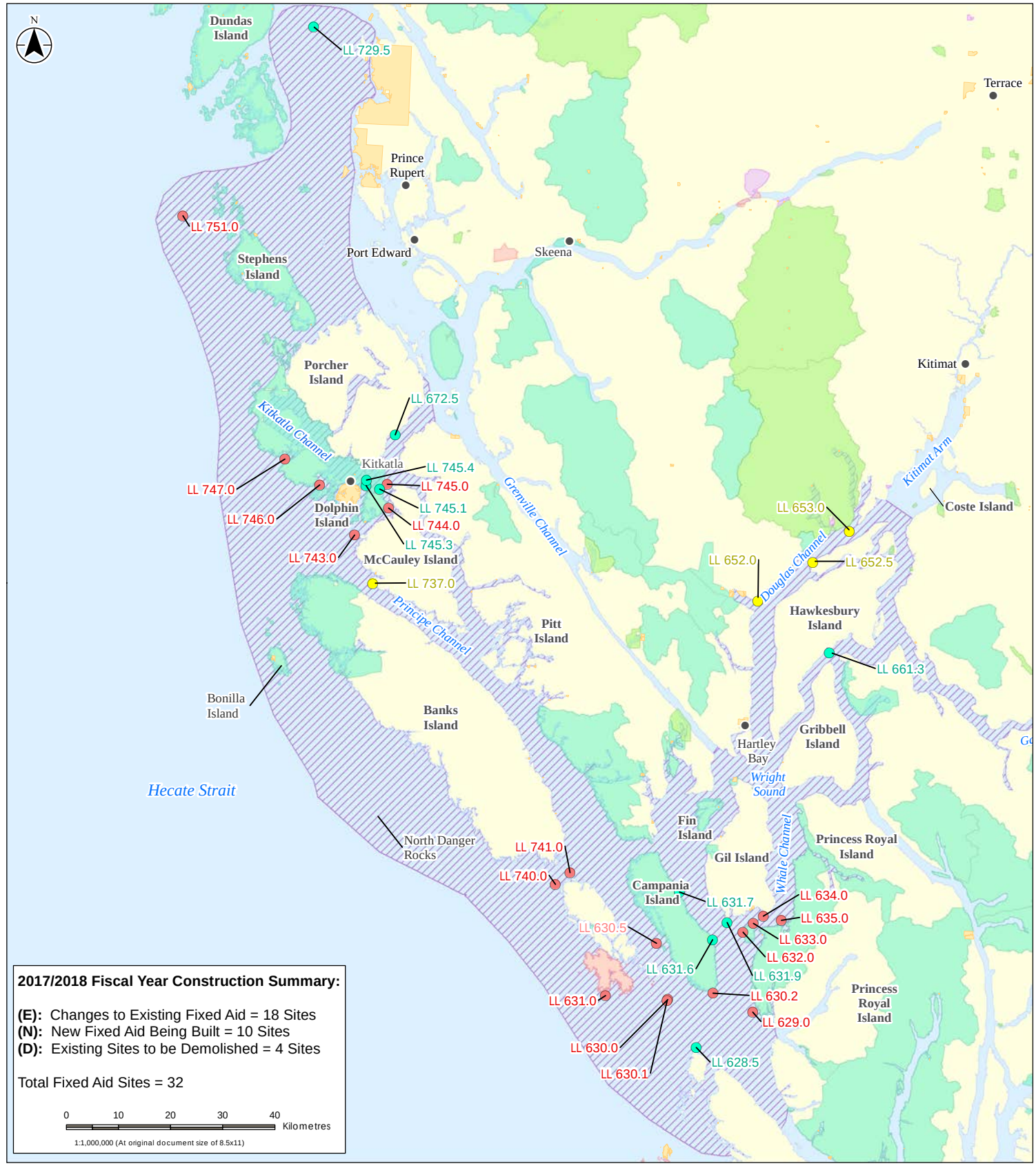
As part of the Canadian Coast Guard (CCG) World Class Kitimat Project, CCG is proposing to install, upgrade and/or remove (collectively called changes) navigational lights and radar transponders (collectively called Fixed Aids) which are used to mark navigational hazards, preferred channels and safe passages in dangerous waterways. These changes to the Fixed Aids are proposed to occur between 2015 and 2017, with approximately one third of the Fixed Aids to be completed during each of those years.

The CCG is proposing to change 18 existing Fixed Aids, demolish/decommission 4 Fixed Aids, and install 10 new Fixed Aids during the 2017/2018 fiscal year (Figure A-1). The proposed changes to the 32 Fixed Aids during the 2017/2018 fiscal year are within the North Coast of British Columbia (BC), ranging from the eastern side of Dundas Island, south through Stephens Island, Porcher Island and Principe Channel to the northern side of Princess Royal Island, extending inshore through Whale Channel and Wright Sound towards Kitimat Arm and east through Gardner Canal; herein referred to as the "project area" (Figure A-1). The location of the Fixed Aids are typically on bedrock in the high intertidal zone or above high water along the shoreline, with some on drying rocks mid channel or on small islets.

The proposed changes at the existing and new Fixed Aid sites differ from site to site and include, but are not limited to, removal of existing concrete bases, pour-in-place concrete bases, installation of towers atop new and existing concrete bases, installation of pile-based Fixed Aids on subtidal soft substrates and installation of ladder rungs on the bedrock shoreline.

The 2017/2018 fiscal year work is proposed to commence mid-May 2017, and is expected to take approximately six weeks to complete. A summary of the proposed work for each of the sites is provided in Table A–1. Site Specific Environmental Plans (SSEPs) are provided after this section for each of the Fixed Aid sites proposed for construction in the 2017/2018 fiscal year. These SSEPs include the location of the Fixed Aid site, site specific summaries of the proposed work, key valued ecosystem components (VECs), site specific mitigation measures and site specific recommendations. It is assumed that kelp species, such as bull kelp (*Nereocystis luetkeana*) and giant kelp (*Macrocystis* spp.), as well as salmon (e.g., juveniles) and Pacific herring are in the waters adjacent each Fixed Aid site. There is also potential for Northern abalone (*Haliotis kamtschatkana*) to be present in and around the Fixed Aid sites. In addition, it is assumed that marine mammals, such as humpback whales (*Megaptera novaeangliae*), Steller sea lions (*Eumetopias jubatus*) and harbour seals (*Phoca vitulina*) may be present in the nearshore waters of the Fixed Aid sites or hauled out nearby during construction.

The information and mitigation measures provided in the body of this Environmental Management Plan apply to these Fixed Aids. The SSEPs are meant to act as a reminder of important measures and should be reviewed during the daily tailgate meeting.



2017/2018 Fiscal Year Construction Summary:

(E): Changes to Existing Fixed Aid = 18 Sites
(N): New Fixed Aid Being Built = 10 Sites
(D): Existing Sites to be Demolished = 4 Sites

Total Fixed Aid Sites = 32

0 10 20 30 40 Kilometres

1:1,000,000 (At original document size of 8.5x11)

- City or Town
- New Fixed Aid
- Existing Fixed Aid
- To be Demolished
- Project Area
- First Nation Reserves
- Ecological Reserve
- Protected Area
- Provincial Park
- Conservancy

Notes:
1. Coordinate System: NAD 1983 Albers
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.
3. Orthoimagery © First Base Solutions, 20xx.

Stantec

Project Location
North Coast, BC

123220211
Prepared by RCOATTA on 2016-10-31
Reviewed by CMCCRACKEN on 2016-10-31

Client/Project
Client: Canadian Coast Gaurd
Title: Marine Habitat and Archaeological Assessment
Project: World Class Kitimat Project

Figure No.
A-1

Title
Fixed Aid Locations and Project Area

S:\123220211\projects\123220211\figures\reports\emp_appendix_a\123220211_emp_a_fig_01_fixed_aid_ats_2017-2018.mxd Revised 2016-11-03 By: rcoatta

Table A-1 Summary of Proposed Work and Valued Ecosystem Components—2017/2018 Fiscal Year Construction

Site Number	Site Name	Branch Trimming	Tree Falling	Base Removal	Power Wash/ Scraping	Rock Anchor	Rock Drilling	Intertidal Concrete Pour	Non Tidal Concrete Pour	No Concrete Pour	Pile Driving	Park[1]	Arch Site[2]	Bird[3]	Herring Spawn	Abalone[4]	Environmental Monitoring[5]
New Fixed Aid Sites																	
LL 628.5	Wall Islands								✓								
LL 631.6	Dougan Point								✓			✓				✓	✓
LL 631.7	Fernyhough Point								✓			✓				✓	✓
LL 631.9	Fawcett Point								✓								
LL 661.3	Fishtrap Bay									✓	✓						✓
LL 672.5	Peter Point						✓		✓					✓			✓
LL 729.5	Connis Rocks			✓					✓								
LL 745.1	Kitkatla Islands East				✓	✓		✓				✓		✓			✓
LL 745.3	Kitkatla Islands West				✓	✓		✓				✓		✓			✓
LL 745.4	Stick Islet						✓		✓			✓		✓			✓
Existing Fixed Aid Sites																	
LL 629.0	Duckers Islands														✓		
LL 630.0	Dupont Island									✓				✓			
LL 630.1	Dupont Island South									✓				✓			
LL 630.2	Alexander Island									✓		✓					
LL 630.5	Logan Rock									✓		✓					
LL 631.0	Jacinto Islands									✓		✓		✓			
LL 632.0	Ashdown Island								✓			✓					
LL 633.0	Levy Point	✓							✓			✓					✓
LL 634.0	York Point	✓							✓								✓
LL 635.0	Borde Point								✓								
LL 740.0	Otter Passage								✓								
LL 741.0	Block Islands								✓							✓	✓
LL 743.0	Hankin Rock						✓			✓				✓			✓
LL 744.0	Connis Islet			✓	✓	✓		✓				✓		✓			✓
LL 745.0	Bully Island			✓			✓		✓					✓			✓
LL 746.0	Moore Island						✓		✓			✓		✓	✓		✓
LL 747.0	Freeman Passage			✓						✓		✓		✓	✓		✓
LL 751.0	Butterworth Rocks									✓							
Demolition/Decommissioned Fixed Aid Sites																	
LL 652.0	Gertrude Point			✓													

Table A-1 Summary of Proposed Work and Valued Ecosystem Components—2017/2018 Fiscal Year Construction

Site Number	Site Name	Branch Trimming	Tree Falling	Base Removal	Power Wash/ Scraping	Rock Anchor	Rock Drilling	Intertidal Concrete Pour	Non Tidal Concrete Pour	No Concrete Pour	Pile Driving	Park[1]	Arch Site[2]	Bird[3]	Herring Spawn	Abalone[4]	Environmental Monitoring[5]
LL 652.5	Maitland Island			✓													
LL 653.0	Emilia Island			✓													
LL 737.0	Keswar Point			✓													

NOTES:

[1] Park = proposed Fixed Aid site is in a protected area, conservancy, provincial park or ecological reserve

[2] Arch = archaeological or heritage resource site has been recorded within 500 m of the proposed Fixed Aid site

[3] Bird = proposed Fixed Aid site is within an Important Bird Area or evidence of bird use have been identified at the Fixed Aid site

[4] Abalone = an abalone (living or shell) was observed at this Fixed Aid site; abalone could be present at other sites

[5] Environmental Monitoring = environmental monitoring is recommended during construction at this Fixed Aid site

[6] Rock drilling = at this site refers to drilling / hammering the concrete base to remove it

ACRONYM LIST IN SSEPs

CCG	Canadian Coast Guard
EM	Environmental Monitor
FRP	Fibre Reinforced Polymer
HHWLT	Higher High Water Large Tide
PUP	Park Use Permit
TBD	To Be Determined
VEC	Valued Ecosystem Component

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 743.0 Hankin Rock

Coordinates: 53° 42' 27.3"N | 130° 24' 43.1"W

Proposed Work:

1. Existing non tidal Fixed Aid
2. No concrete pour
3. Remove aluminum channel ladder
4. Remove 3.6 m tall white FRP tower
5. Install aluminum ladder on existing concrete base
6. Install 4.8 m tall 2 nm aluminum lattice tower with starboard dayboards
7. Drill anchors minimum ~0.2 m into existing concrete base to secure tower, ladder and stainless steel rungs
8. Freeboard ~3.4 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. Work quickly and efficiently to limit stress to birds. If birds appear stressed, stop work and contact the EM for advice.
7. Remove waste prior to leaving site.
8. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 744.0 Connis Islet

Coordinates: 53°45'26.627" N | 130°19'4.511" W

Proposed Work:

1. New intertidal Fixed Aid
2. Power washing
3. Remove existing concrete base and FRP tower
4. Drill ~8-12 rock anchors ~2 m into bedrock
5. Intertidal pour in place concrete base (1.8 m^2), ~3.7 m high (~11.2 cubic yards of concrete)
6. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards
7. Freeboard ~1.5 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Prior to base removal, allow the EM to inspect the base and document organisms to be removed to confirm no species at risk are being harmed.
4. Walk with care as nests / juvenile birds can be camouflaged on the ground.
5. Prior to work, allow EM ~15 min to survey for VECs.
6. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
7. Work quickly and efficiently to limit stress to birds. If birds appear stressed, stop work and contact the EM for advice.
8. Concrete pour will be timed so it is conducted while the bedrock site is exposed.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. Remove cured concrete and Project waste prior to leaving site.
11. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional mitigations.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 745.0 Bully Island

Coordinates: 53°47'53.30" N | 130°19'33.82" W

Proposed Work:

1. Remove existing non tidal Fixed Aid, including concrete base and 3.6 m FRP tower
2. Drill ~12 rock anchors up to 0.3 m with handheld rock drill
3. Encapsulate base with non tidal pour in place concrete (1.8 m^2), ~1.5 m high (~5 cubic yards of concrete)
4. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards
5. Freeboard ~2.3 m
6. Install stainless steel rungs on bedrock

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Prior to base removal, allow the EM to inspect the base and document organisms to be removed to confirm no species at risk are being harmed.
4. Walk with care as nests / juvenile birds can be camouflaged on the ground.
5. Prior to work, allow EM ~15 min to survey for VECs.
6. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
7. Work quickly and efficiently to limit stress to birds. If birds appear stressed, stop work and contact the EM for advice.
8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
9. Remove cured concrete and Project waste prior to leaving site.
10. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 745.1 Kitkatla Islands East

Coordinates: 53° 47' 20.865" N | 130° 20' 50.317" W

Proposed Work:

1. New intertidal Fixed Aid
2. Power washing
3. Drill ~8-12 rock anchors ~2 m into bedrock
4. Intertidal pour in place concrete base (1.8 m^2) with a flare top (1.8 m^2), ~6.3 m high (~ 19.3 cubic yards of concrete)
5. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards
6. Freeboard ~1.5 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Prior to work, allow EM ~15 min to survey for VECs.
4. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
5. If birds appear stressed, stop work and contact the EM for advice.
6. Prior to power washing/scraping, allow the EM to inspect the footprint and document organisms to be removed to confirm no species at risk are being harmed.
7. Concrete pour will be timed so it is conducted while the bedrock site is exposed.
8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
9. Remove waste prior to leaving site.
10. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 745.3 Kitkatla Islands West

Coordinates: 53° 47' 37.400" N | 130° 23' 16.203" W

Proposed Work:

1. New intertidal Fixed Aid
2. Power washing
3. Drill ~8-12 rock anchors ~2 m into bedrock
4. Intertidal pour in place concrete base (1.8 m^2) with a flare top (1.8 m^2), ~3.7 m high (~12.5 cubic yards of concrete)
5. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards
6. Freeboard ~1.5 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Prior to power washing/scraping, allow the EM to inspect the footprint and document organisms to be removed to confirm no species at risk are being harmed.
8. Concrete pour will be timed so it is conducted while the bedrock site is exposed.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. Remove waste prior to leaving site.
11. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 745.4 Stick Islet

Coordinates: 53° 48' 11.452" N | 130° 23' 14.991" W

Proposed Work:

1. New non tidal Fixed Aid
2. Drill ~12 rock anchors up to 0.3 m with handheld rock drill
3. Non tidal pour in place concrete base (1.8 m^2), ~0.2 m high (~1 cubic yard of concrete)
4. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards
5. Freeboard ~2.7 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
8. Remove waste prior to leaving site.
9. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 746.0 Moore Island

Coordinates: 53°47'23.337" N | 130°31'21.273" W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Drill ~12 rock anchors up to 0.3 m with handheld rock drill
3. Encapsulate base with intertidal pour in place concrete (1.8 m^2), ~1.1 m high (~4.3 cubic yards of concrete)
4. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards
5. Freeboard ~1.9 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Pacific herring spawn
4. Fish (e.g., juvenile salmon, Pacific herring)
5. Breeding birds and nests
6. Important Bird Area
7. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
8. Remove waste prior to leaving site.
9. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. Avoid work during Pacific herring spawn (typically between March to May at this site)
3. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional mitigations.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 747.0 Freeman Passage

Coordinates: 53°49'48.727" N | 130°37'45.487" W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Remove derelict concrete base adjacent existing Fixed Aid
3. Replace existing dayboards with new white dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Pacific herring spawn
4. Fish (e.g., juvenile salmon, Pacific herring)
5. Breeding birds and nests
6. Important Bird Area
7. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Prior to work, allow EM ~15 min to survey for VECs.
4. Prior to base removal, allow the EM to inspect the base and document organisms to be removed to confirm no species at risk are being harmed.
5. Remove cured concrete and Project waste prior to leaving site.
6. Walk with care as nests / juvenile birds can be camouflaged on the ground.
7. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
8. Work quickly and efficiently to limit stress to birds. If birds appear stressed, stop work and contact the EM for advice.
9. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. Avoid work during Pacific herring spawn (typically between March to May at this site)
3. This site is in the **Gitxaala Nii Luutiksm/Kitkatla Conservancy**. A PUP is required prior to construction. Review the PUP as it may specify restrictions and/or additional mitigations.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 628.5 Wall Islands	**Coordinates: 52° 51' 36.88" N | 129° 20' 50.64" W**

Proposed Work:

1. New non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Remove cured concrete and Project waste prior to leaving site.
8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
9. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 629.0 Duckers Island	**Coordinates: 52° 55' 30.6"N | 129° 11' 34.6"W**
Proposed Work: 1. Existing non tidal Fixed Aid 2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards	
Valued Ecosystem Components: 1. Marine water quality 2. Pacific herring spawn 3. Fish (e.g., juvenile salmon, Pacific herring) **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly. 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay. 8. Remove waste prior to leaving site. **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended 2. Avoid work during Pacific herring spawn (typically between March to May)	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 630.0 Dupont Island	**Coordinates: 52° 56' 24.80" N | 129° 26' 08.00" W**
Proposed Work: 1. Existing non tidal Fixed Aid 2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards	
Valued Ecosystem Components: 1. Kelp beds 2. Breeding birds and nests **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly. 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay. Remove waste prior to leaving site **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended.	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 630.1 Dupont Island South	**Coordinates: 52° 56' 19.49"N 129° 26' 22.22"W**
Proposed Work: 1. Existing non tidal Fixed Aid 2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards	
Valued Ecosystem Components: 1. Kelp beds 2. Breeding birds and nests **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly. 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay. Remove waste prior to leaving site **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended.	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 630.2 Alexander Island	**Coordinates: 52° 57' 15.9"N | 129° 18' 29.8"W**

Proposed Work:

1. Existing non tidal Fixed Aid
2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards

Valued Ecosystem Components:

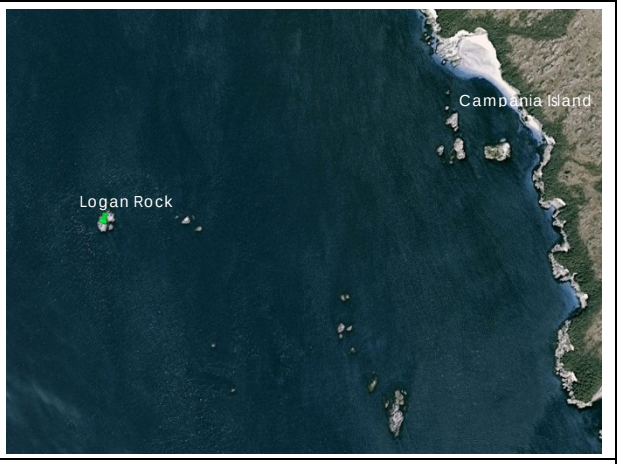
1. Kelp beds
2. Fish (e.g., juvenile salmon, Pacific herring)
3. Breeding birds and nests
4. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay. Remove waste prior to leaving site.

Site Specific Recommendations:

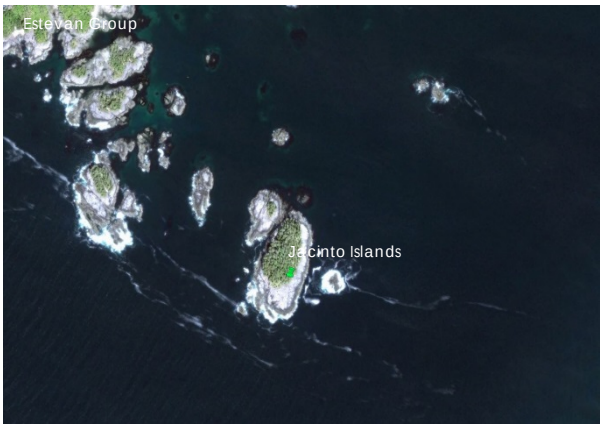
1. Environmental Monitoring is not recommended.
2. This site is in the **Lax Ka'Gaas/Campania Conservancy**. A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 630.5 Logan Rock	**Coordinates: 53° 02' 07.3"N | 129° 28' 39.4"W**
Proposed Work: 1. Existing non tidal Fixed Aid 2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards.	
Valued Ecosystem Components: 1. Kelp beds 2. Fish (e.g., juvenile salmon, Pacific herring) 3. Breeding birds and nests 4. Marine mammals **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay. 8. Remove waste prior to leaving site. **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended.	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 631.0 Jacinto Islands	**Coordinates: 52° 56' 30.20" N | 129° 36' 49.10" W**

Proposed Work:

1. Existing non tidal Fixed Aid
2. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards



Valued Ecosystem Components:

1. Kelp beds
2. Fish (e.g., juvenile salmon, Pacific herring)
3. Breeding birds and nests
4. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
8. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended.
2. This site is in the **Dewdney and Glide Islands Ecological Reserve**. A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 631.6 Dougan Point

Coordinates: 53° 02' 48.40" N | 129° 18' 56.49" W

Proposed Work:

1. New non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Marine mammals
6. Species at Risk: Northern abalone

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Spudding should not be conducted at this site as this has the potential to harm or kill northern abalone, which violates the Species at Risk Act.
4. Inspect Fixed Aid footprint and barge landing areas for northern abalone. If northern abalone are within the work area, stop work and contact the EM immediately. AT NO TIME CAN NORTHERN ABALONE BE DISTURBED OR MOVED. DO NOT TAKE NORTHERN ABALONE SHELLS.
5. Walk with care as nests / juvenile birds can be camouflaged on the ground.
6. Prior to work, allow EM ~15 min to survey for VECs.
7. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits
8. If birds appear stressed, stop work and contact the EM for advice.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
11. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring **is** recommended.
2. This site is in the **Lax Ka'Gaas/Campania Conservancy**. A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 631.7 Fernyhough Point

Coordinates: 53° 07' 33.2"N | 129° 25' 01.90"W

Proposed Work:

1. New non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Marine mammals
6. Species at Risk: Northern abalone

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Spudding should not be conducted at this site as this has the potential to harm or kill Northern abalone, which violates the Species at Risk Act.
4. Inspect Fixed Aid footprint and barge landing areas for northern abalone. If northern abalone are within the work area, stop work and contact the EM immediately. AT NO TIME CAN NORTHERN ABALONE BE DISTURBED OR MOVED. DO NOT TAKE NORTHERN ABALONE SHELLS.
5. Walk with care as nests / juvenile birds can be camouflaged on the ground.
6. Prior to work, allow EM ~15 min to survey for VECs.
7. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits
8. If birds appear stressed, stop work and contact the EM for advice.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
11. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring recommended.
2. This site is in the **Lax Ka'Gaas/Campania Conservancy**. A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 631.9 Fawcett Point	**Coordinates 53° 04' 39.01" N | 129° 16' 33.54" W**

Proposed Work:

1. New non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Remove cured concrete and Project waste prior to leaving site.
8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
9. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 632.0 Ashdown Island

Coordinates: 53° 03' 42.30"N | 129° 13' 50.30"W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with starboard dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits
6. If birds appear stressed, stop work and contact the EM for advice.
7. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
8. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
9. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended.
2. This site is in the **K'Nabiyaaxl/Ashdown Conservancy.** A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 633.0 Levy Point

Coordinates: 53° 04' 40.10"N | 129° 12' 08.90"W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with starboard dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Marine Riparian
3. Kelp beds
4. Fish (e.g., juvenile salmon, Pacific herring)
5. Breeding birds and nests
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits
6. Prior to brushing/ falling, inspect trees within 30 m for dens, nests or CMTs. Trees with these features are not to be removed without approval from the EM and acquisition of appropriate permits.
7. Collect cut vegetation from marine environment and deposit above the HHWLT line or offsite.
8. If birds are appearing stressed, stop work and contact the EM for advice.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
11. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring **is** recommended.
2. This site is in the **K'Nabiyaaxl/Ashdown Conservancy**. A PUP is required prior to construction. Review PUP as it may specify restrictions and/or additional mitigations.

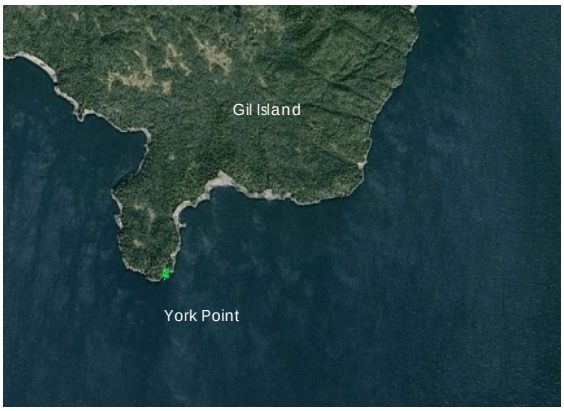
Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 634.0 York Point

Coordinates: 53° 05' 27.9" N | 129° 10' 30.0" W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards
4. Riparian brushing



Valued Ecosystem Components:

1. Marine water quality
2. Marine Riparian
3. Kelp beds
4. Fish (e.g., juvenile salmon, Pacific herring)
5. Breeding birds and nests
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits
6. Prior to brushing/ falling, inspect trees within 30 m for dens, nests or CMTs. Trees with these features are not to be removed without approval from the EM and acquisition of appropriate permits.
7. Collect cut vegetation from marine environment and deposit above the HHWLT line or offsite.
8. If birds appear stressed, stop work and contact the EM for advice.
9. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
10. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
11. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring **is** recommended.

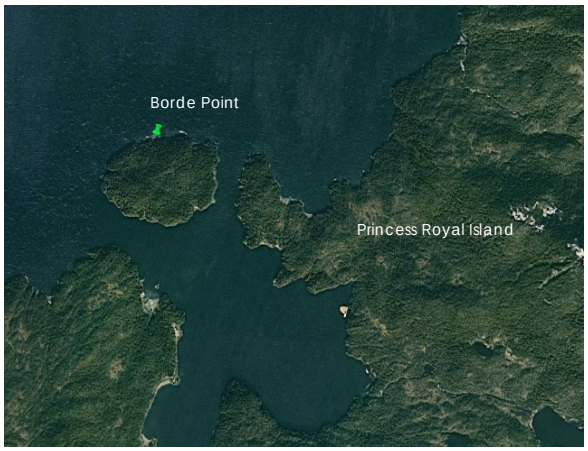
Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 635.0 Borde Point

Coordinates: 53° 05' 07.8" N | 129° 07' 15.20" W

Proposed Work:

1. Existing non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards



Valued Ecosystem Components:

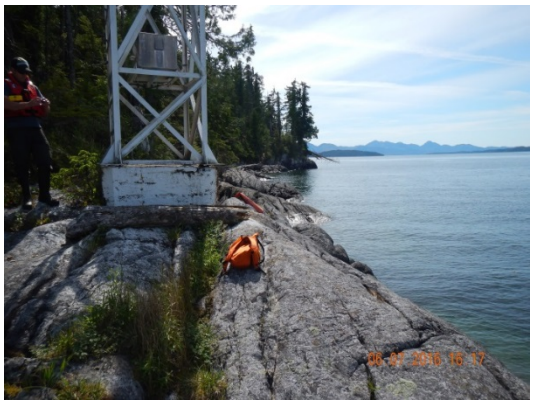
1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Remove cured concrete and Project waste prior to leaving site.
8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
9. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended.



Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 672.5 Peter Point

Coordinates: 53° 53' 02.164" N | 130° 18' 43.432" W

Proposed Work:

1. New non tidal Fixed Aid
2. Drill ~12 rock anchors up to 0.3 m with handheld rock drill
3. Non tidal pour in place concrete base (1.8 m^2), ~1 m high (~3.1 cubic yards of concrete)
4. Install 4.8 m tall 2 nm aluminum lattice tower with porthand dayboards
5. Freeboard ~1.5 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Important Bird Area
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
8. Remove waste prior to leaving site.
9. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue care.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.

Stantec

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL **729.5 Connis Rocks**	**Coordinates: 54° 34' 27.86" N | 130° 37' 38.98" W**
Proposed Work: 1. New non tidal Fixed Aid 2. Non tidal pour in place concrete base 3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards	
Valued Ecosystem Components: 1. Marine water quality 2. Kelp beds 3. Fish (e.g., juvenile salmon, Pacific herring) **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly. 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. Remove cured concrete and Project waste prior to leaving site. 8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment. 9. Remove waste prior to leaving site. **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 740.0 Otter Passage	**Coordinates: 53° 07' 41.9"N | 129° 46' 27.2"W**
Proposed Work: 1. Existing non tidal Fixed Aid 2. Non tidal pour in place concrete base 3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards	
Valued Ecosystem Components: 1. Marine water quality 2. Kelp beds 3. Fish (e.g., juvenile salmon, Pacific herring) **Site Specific Mitigations:** 1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own. 2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly. 3. Walk with care as nests / juvenile birds can be camouflaged on the ground. 4. Prior to work, allow EM ~15 min to survey for VECs. 5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits. 6. If birds appear stressed, stop work and contact the EM for advice. 7. Remove cured concrete and Project waste prior to leaving site. 8. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment. 9. Remove waste prior to leaving site. **Site Specific Recommendations:** 1. Environmental Monitoring is not recommended.	 

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 741.0 Block Islands	**Coordinates: 53° 08' 58.5"N | 129° 44' 01.2"W**

Proposed Work:

1. Existing non tidal Fixed Aid
2. Non tidal pour in place concrete base
3. Install 4.8 m tall 2 nm aluminum lattice tower with white dayboards

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Species at Risk: Northern abalone

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Spudding should not be conducted at this site as this has the potential to harm or kill northern abalone, which violates the Species at Risk Act.
4. Inspect Fixed Aid footprint and barge landing areas for Northern abalone. If Northern abalone are within the work area, stop work and contact the EM immediately. AT NO TIME CAN NORTHERN ABALONE BE DISTURBED OR MOVED. DO NOT TAKE NORTHERN ABALONE SHELLS.
5. Walk with care as nests / juvenile birds can be camouflaged on the ground.
6. Prior to work, allow EM ~15 min to survey for VECs.
7. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
8. If birds appear stressed, stop work and contact the EM for advice.
9. Remove cured concrete and Project waste prior to leaving site.
10. Washwater will be collected, treated and disposed of appropriately. Do not dispose untreated washwater into marine environment.
11. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring **is** recommended

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project	
Site Name: LL 751.0 Butterworth Rocks	**Coordinates: 54° 14' 07.00" N | 130° 58' 36.10" W**

Proposed Work:

1. Existing non tidal Fixed Aid
2. Install white dayboards on existing tower

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Pacific herring spawn
4. Fish (e.g., juvenile salmon, Pacific herring)
5. Breeding birds and nests
6. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Walk with care as nests / juvenile birds can be camouflaged on the ground.
4. Prior to work, allow EM ~15 min to survey for VECs.
5. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
6. If birds appear stressed, stop work and contact the EM for advice.
7. If herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.
8. Remove waste prior to leaving site.

Site Specific Recommendations:

1. Environmental Monitoring is not recommended.

Project Name: World-Class New and Modified Fixed Aids, Kitimat Project

Site Name: LL 661.3 Fishtrap Bay

Coordinates: 53° 32' 52.20" N | 129° 00' 56.80" W

Proposed Work:

1. New intertidal / subtidal Fixed Aid
2. Pile driving (~3-4 piles; diameter TBD)
3. Steel platform
4. Install new 2 nm lattice tower with white dayboards
5. No concrete pour
6. Freeboard ~1.5 m

Valued Ecosystem Components:

1. Marine water quality
2. Kelp beds
3. Fish (e.g., juvenile salmon, Pacific herring)
4. Breeding birds and nests
5. Marine mammals

Site Specific Mitigations:

1. If marine mammals are hauled out at the Fixed Aid site, do not approach or harass them. Allow them to leave on their own.
2. Avoid spudding, anchoring, grounding and prop wash at kelp beds. Anchoring/ spudding will be done sparingly.
3. Prior to work, allow EM ~15 min to survey for VECs.
4. If migratory bird nests within 30 m, raptor nests within 300 m and seabird colonies within 1 km of the Fixed Aid site are encountered, contact the EM for guidance. Construction is not to proceed until given approval by the EM and if required, acquisition of applicable permits.
5. If birds are appearing stressed, stop work and contact the EM for advice.
6. Measures to protect fish, marine mammals and wildlife (i.e., seabirds) will be employed during construction, particularly pile driving.
7. Soft starts, bubble curtains, marine mammal safety exclusion zones and acoustic monitoring may be required during construction at this Fixed Aid site.
8. Remove waste prior to leaving site.
9. If Pacific herring spawn occurs or is documented in the area during work, stop work and contact the EM without undue delay.

Site Specific Recommendations:

1. Environmental monitoring **is** recommended.
2. Consult with EM prior to construction to determine if a marine mammal safety exclusion zone is required and the specific materials that should be on site (e.g., bubble curtain) to mitigate pile driving effects.

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APPENDIX B
REGULATORY REQUIREMENTS AND OPTIONS FOR DISCHARGE OF TREATED WASTEWATER FROM FLOATING BARGE CAMPS

Stantec Consulting Ltd.
400A - 2261 Keating Cross Road, Saanichton BC V8M 2A5

February 26, 2015
File: 123220211

Attention: Clinton Hoffman, P.Eng, M.Eng, LEED AP
Project Engineer, Western Canada
Canadian Coast Guard - Marine & Civil Infrastructure
Fisheries & Oceans Canada
25 Huron St., Victoria, BC V8V 4V9

Dear Clint,

Reference: Regulatory Requirements and Options for Discharge of Treated Wastewater from Floating Barge Camps

The Canadian Coast Guard retained Stantec Consulting Ltd. to investigate and summarize the regulatory requirements and options for discharging wastewater from a floating barge camp.

BACKGROUND

The Canadian Coast Guard is planning to upgrade navigation aids in and around Douglas Channel in the summer of 2015 (the Project). In order to complete these upgrades, Project personnel (up to 20 people) require temporary lodgings in the area for up to seven weeks. Floating barge camp(s) have been identified as the most feasible lodgings.

The Canadian Coast Guard is committed to following all required regulatory processes in order to complete the Project in an environmentally responsible manner. This includes following the required process for treating and discharging municipal wastewater produced on the floating barge camp.

"Municipal wastewater" is defined by the *Municipal Wastewater Regulation* (MWR) as '*domestic wastewater or municipal liquid waste, including contributions from*

- *holding tanks in recreational vehicles, boats and houseboats,*
- *commercial, institutional and industrial sources,*
- *inflow and infiltration,*
- *septic tank pumpage,*
- *holding tank solids, and*
- *sludge from wastewater facilities;*'

Reference: Regulatory Requirements and Options for Discharge of Treated Wastewater from Floating Barge Camps

OPTIONS FOR WASTEWATER DISCHARGE FROM A FLAOTING BARGE CAMP

Under the existing legislation in British Columbia (BC), there are three options for handling municipal wastewater generated on floating barge camps:

1. **Store and Haul Wastewater**: this option would involve collecting and storing all generated wastewater on board the barge camp and disposing it in approved facilities on land. This would involve having a support vessel meet the barge onsite, pump out holding tanks, and ferry the wastewater to available treatment facilities on land. Available treatment facilities on land could include the city of Prince Rupert, Kitimat, or other community-based treatment facility. This could also involve paying a waste management company to treat and dispose of the waste.
    - Note: discussion and/or permits may be required to discharge to an existing system and fees may apply.

2. **Discharge Wastewater while Barge is Underway:** this option would involve collecting and storing all generated wastewater on board the barge camp and disposing it while the barge is underway. This is allowed by the *Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69) (section 96)* under the *Canada Shipping Act* as long as the barge is registered as a vessel by Transport Canada.
    - No permit is required for this type of discharge; however, there are a number of requirements and restrictions for this type of discharge.

3. **Discharge Wastewater while the Barge is Stationary:** this option would involve collecting and treating all generated wastewater on board the barge camp and disposing via a marine outfall. This is permitted within the MWR under the BC *Environmental Management Act*.
    - This type of discharge would require registration from the BC Ministry of Environment (MoE).

Additional details on each of these options is provided below.

OPTION 1: STORE AND HAUL BARGE WASTEWATER EFFLUENT

Option 1 is to store and haul the wastewater and dispose of into a city system via fee. The MoE has advised that separating greywater from blackwater does not provide any advantage, as greywater is considered municipal waste under the MWR.

OPTION 2: DISCHARGE WHILE THE BARGE IS UNDERWAY

The discharge of municipal wastewater by registered Canadian vessels is allowed by the *Vessel Pollution and Dangerous Chemicals Regulations ((SOR/2012-69)*. The requirements of these regulations vary by location. Under this regulation, the Project falls within 'Section I or Section II

waters'. The discharge requirements for vessels in Section I or Section II waters varies based on gross tonnage and the number of passengers the vessel is certified to carry:

Vessels Less than 400 Gross Tonnes Certified to Carry less than 15 passengers

These vessels can discharge either untreated municipal wastewater or treated wastewater, depending on the discharge location:

- Untreated Discharge
  The discharge is made at a distance of at least **3 nautical miles from shore** while the vessel is enroute at the fastest feasible speed;

- The vessel is located in waters that are less than 6 nautical miles from shore to shore:
  Note: this provision does not apply if a reception facility that can receive the sewage in an environmentally safe manner is available to receive it.
  The discharge is made while the vessel is enroute at a speed of at least 4 knots or, if the discharge is not feasible at that speed, the discharge is made:

  A. during an ebb tide, while the vessel is enroute at the fastest feasible speed and into the deepest waters that are located the farthest from shore, or
  B. while the vessel is enroute at the fastest feasible speed and into the deepest and fastest moving waters that are located the farthest from shore.

- Discharge is comminuted and disinfected using a marine sanitation device:
  The discharge is made at a distance of at least **1 nautical mile from shore**;

Vessels greater than 400 Gross Tonnes Certified to Carry more than 15 passengers

These vessels can discharge either untreated municipal wastewater or treated wastewater, depending on the discharge location:

- Untreated Discharge
  The discharge is made at a distance of at least **12 nautical miles from shore** while the vessel speed at least 4 knots;

- Discharge is comminuted and disinfected using a marine sanitation device:
  The discharge is made at a distance of at least **3 nautical miles from shore**;

Additional Requirements for Option 2

Discharge under the *Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69), section 96* may only occur if it does not contain any visible solids and the discharge does not cause:

- a film or sheen to develop on the water;
- a discoloration of the water or its shorelines; or
- sewage sludge or an emulsion to be deposited beneath the surface of the water or on its shorelines.

In addition, under the *Vessel Pollution and Dangerous Chemicals Regulations* (SOR/2012-69), Section 90, wastewater must be comminuted and disinfected using a marine sanitation device that meets the requirements of regulation 9.1.2 of Annex IV to MARPOL.

The effluent standards outlined in Environment Canada's *Wastewater Systems Effluent Regulations* (SOR/2012-139) should meet these standards, and are described below:

- Effluent comminuted and disinfected
- Total Suspended Solids (TSS) < 25 mg/L
- Carbonaceous biochemical demand (CBOD) < 25 mg/L

In addition, the effluent requirements for fecal coliform concentration under the *Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69* should be met:

- Fecal coliforms < 250/100 mL.

Effluent quality meeting these requirements are not likely to be considered deleterious to fish or fish habitat.

OPTION 3: DISCHARGE WHILE THE BARGE IS STATIONARY

The discharge of municipal wastewater by stationary barge camps is regulated under the MWR.

In order to register a discharge under the MWR, an application package including engineering design, effluent parameters, and an Environmental Impact Study (EIS) must be submitted to the British Columbia Ministry of Environment (MOE). The EIS must be conducted as described in Division 3, Section 19 of the MWR and the Environmental Impact Study Guideline.

Typically domestic wastewater produced on the barge must undergo secondary treatment with effluent having Biological Oxygen Demand (BOD_5) and TSS each below 45 mg/L with effluent then being discharged to the marine environment. Disinfection may also be required.

Reference: Regulatory Requirements and Options for Discharge of Treated Wastewater from Floating Barge Camps

An EIS must be completed by a qualified professional (QP) and included in an application package to the MOE. The application must be reviewed and approved by the MOE prior to commencement of construction of any facility discharging to the environment. The EIS will determine whether a discharge of effluent will substantially alter or impair the usefulness of the environment or adversely affect human or ecological health.

MOE has indicated that an EIS for a "Lower Risk" discharge would be required for this Project. An EIS for a Lower Risk discharge is of limited scope and typically applies to discharges with a maximum daily effluent flow of < 50 m^3/day discharging to open marine water. A Lower Risk EIS is typically a desktop study; however the MOE may determine that field studies conducted by a QP may be required to assess the potential for impact from the discharge. This is typically determined by the proponent, the Ministry, and the QP during a pre-registration meeting.

The following scope of work is recommended for determining the requirements of registering a new discharge under the MWR:

- **Pre-Registration Meeting and Regulatory Liaison:** the MOE recommends that a meeting occur between the discharger (or designate) and the Regional Environmental Protection Director prior to the formal registration of a discharge. This meeting should be conducted at least 60 days prior to registration to reduce delays; however, Stantec recommends that this meeting occur as soon as possible to confirm the requirements of the MWR, operating plan, monitoring and the appropriate level of scope for the EIS, should Canadian Coast Guard proceed with Option 3. During this meeting, the discussion of a blanket registration for the discharge for future year's work will be conducted with the MOE.

- **Develop Scope and Complete the Environmental Impact Study and MWR application Package:** Typically an application package and EIS defines the flows, treatment technology, effluent parameters, and the EIS characterizes the physical environment, effluent dilution, aquatic resources and assesses impacts in the Project area. Often the engineering design of the wastewater treatment facilities is refined based on the results of the EIS. The scope of work required for the EIS will be refined and generally confirmed by the MOE during the pre-registration meeting.

OPTIONS ASSESSMENT

An options assessment is provided in Table 1, which outlines the pros, cons, timelines and potential costs for each of the presented options. The most feasible and cost-effective solution will depend on the results of the tender for the barge contractor, specifically:

Reference: Regulatory Requirements and Options for Discharge of Treated Wastewater from Floating Barge Camps

- The size of the barge selected
- The existing wastewater treatment infrastructure on the barge
- If the barge is a registered vessel in Canada

We recommend procuring a registered barge that is less than 400 gross tonnes and has a treatment system capable of meeting the effluent requirements outlined in 'Additional Requirements for Option 2'. If this is not possible, storing and hauling the effluent may be the most feasible, timely and cost-effective option.

CLOSURE

We trust that the information provided meets your needs at this time. We look forward to the opportunity to continue working with you on this Project. If you have any questions please do not hesitate to contact the undersigned at (250) 655-6063.

Regards,

STANTEC CONSULTING LTD.

Brian Lynch, MSc, RPBio
Aquatic Scientist
Phone: (250) 655-6063
brian.lynch@stantec.com

Reviewed by:

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Associate
Phone: (250) 655-2291
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Stantec Consulting Ltd.
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Table 1. Options Assessment for Discharge of Wastewater from a Flaoting Barge Camp.

Option	Legislation	Treatment Level	Pros	Cons	Timeline	Costs
Store and Haul (no discharge)	• Municipal Approval for Discharge into their System	• No onboard treatment	• No onboard treatment • No Permits • No delays	• Needs larger storage capacity • Costs associated with pump out • Costs associated with disposal/treatment	• Dependent on discussion with municipalities	• Discharge/Treatment fees • Pump out fees, such as vessel charter for pump out on site • Holding tanks
Discharge while Underway (Vessel < 400 gross tonnes)	• *Vessel Pollution and Dangerous Chemicals Regulations*	• Untreated effluent (≥ 3 nm from shore) • Untreated effluent (< 6 nm from shore to shore) • Comminuted and disinfected effluent (≥1 nm from shore) – TSS < 25 mg/L – CBOD < 25 mg/L – Coliforms < 250 per 100 mL	• No permits • No delays	• Smaller barge camp • Untreated discharge must: - be made while underway and far from shore, or - be made at minimum speed of 4 knots or under specific tide conditions • No discharge permitted while stationary • 3 nm is a long way offshore for a barge camp • Untreated discharge in waters < 6 nm shore to shore may need to store and haul (rather than discharge) if a reception facility is available - See store and haul cons	• If vessel/barge meets treatment specifications project is ready to go • Untreated discharge in waters < 6 nm shore to shore may need to store and haul - See store and haul timeline	• No aditional costs if barge meets specifications • Untreated discharge in waters < 6 nm shore to shore may need to store and haul - See store and haul costs
Discharge while Underway (Vessel ≥ 400 gross tonnes)	• *Vessel Pollution and Dangerous Chemicals Regulations*	• Untreated effluent (≥ 12 nm from shore) • Comminuted and disinfected effluent (≥ 3 nm from shore) – TSS < 25 mg/L – CBOD < 25 mg/L – Coliforms < 250 per 100 mL	• Larger barge camp • No permits • No delays	• Untreated discharge must be made while underway and far from shore • No discahrge permitted while stationary • 12 nm is a long way offshore for a barge camp • 3 nm is a long way offshore for a barge camp	• If vessel/barge meets treatment specifications project is ready to go	• No aditional costs if barge meets specifications
Discharge while Stationary	• *Municipal Wastewater Regulation*	• BOD_5 < 45 mg/L • TSS < 45 mg/L • Disinfection may be required • Other provincial water quality guideliens may apply	• Discharge can occur while stationary and nearshore	• Additional studies required to get permits • Longer timeline	• Dependant on pre-registration meeting with Ministry of Environment, estimate minimum of 3 to 6 months for approval	• Could be significant due to: – Application package – Environmental impact Study – Regulatory liaison and meetings

APPENDIX C
CHANCE FIND PROTOCOL: ARCHAEOLOGICAL SITES IN BRITISH COLUMBIA'S COASTAL REGION

Chance Find Protocol

Archaeological Sites in British Columbia's Coastal Region

This document presents a descriptive summary of archaeological sites commonly found in British Columbia's coastal region and provides contractors with a protocol should archaeological sites be encountered during the course of ground disturbing activities. It is recommended that all people involved in ground disturbing activities become familiar with the types of archaeological sites present in the region of development and what to do in the event of a chance find.

What is an archaeological site?

Heritage sites and objects on private and Provincial Crown Land in British Columbia that predate 1846 are protected under the *Heritage Conservation Act* (HCA), which is administered by the Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations. Heritage resources specifically protected by the Act include Provincial heritage sites, burial places with historical or archaeological value, aboriginal rock paintings or carvings, sites with evidence of human habitation or use before 1846 and heritage wrecks.

Common archaeological sites in the region:

Shell midden: Shell midden is typified by the presence of shellfish (clam, mussel, scallop, etc.) shells discarded after the consumption of shellfish. Shell midden also commonly contains charcoal, ash and burnt sediments, fire-broken rock, and stone, bone and antler artifacts. Shell midden deposits vary from small pockets to very large sites many hundreds of metres long. They are usually but not only found along or near the shoreline. Shell midden sites often represent villages or seasonal encampments where shellfish were consumed in quantity. Shell midden deposits are unique inasmuch as the shells neutralize soil acidity, such that archaeological materials that usually degrade quickly are preserved. Artifacts of bone and antler, faunal remains, and human bone all preserve in shell midden.

> Tools manufactured from bone/antler: Tools manufactured from the bones of land and sea mammals or of antler from land mammals vary in size, form and function but on the coast are largely associated with fishing economies. These are known to have served as parts of spears, gaffs, fish hooks, harpoons, etc. Others were used as multipurpose tools like awls or as wedges/chisels for woodworking and some bone/antler artifacts were simply fashioned as decorative items. These types of artifacts may be found along the ground surface or buried, often within shell midden.

Human remains and burial features: Respect is paramount when dealing with human remains. It must be remembered at all times that human remains are exactly that – human remains – and should be shown the proper respect and dignity due any human being, living or deceased. Mortuary features represent deliberate depositional events and can be identified by a number of different practices some of which include barrows/mounds, burial cairns, box and crevice burials or interment within shell midden.

Lithic (stone) scatters: Lithic scatters are sites comprised of stone tools, stone tool fragments, and *debitage*—the flakes of stone that are produced when stone tools are manufactured. These stone artifacts may be found scattered across the ground surface or may have been buried since their original

deposition. These sites may vary from a single, isolated artifact—a stone arrowhead, knife, or hide-scraper, for example—to extensive scatters of hundreds of tools, tool fragments and debitage flakes.

Culturally Modified Trees (CMTs): In the most general sense, CMTs are any trees having evidence of human modification. In a more specific and commonly used sense, CMTs are trees that have been modified by aboriginal people for traditional purposes such as removal of bark or wood for traditional building materials, and removal of cambium for consumption. Provincial guidelines suggest most CMTs should be recorded as traditional use sites unless they pre-date AD 1846. The majority of CMTs recorded in the study region are western red cedars although other species such as western hemlock, Douglas-fir, spruce, and western yew have also been reported. CMTs, especially recently modified trees, may have visible cut marks on the scar from the tools used in cultural modification.

Rock art: Rock art pictographs (paintings) and petroglyphs (carvings) are located on the surfaces of rock walls in caves/shelters or on rocky outcrops or boulders. They are often found in association with geographic locations thought to hold spiritual power and are common in mountainous areas or near water sources. They are also found in areas where groups were known to congregate for fishing and for trade in places of economic and environmental diversity and to mark significant past occurrences. Pictographs and petroglyphs often display anthropomorphic (human) or zoomorphic (animal) figures, but may also be entirely abstract designs.

Shipwrecks: Unlike terrestrial archaeological sites, all abandoned vessels (ships, aircraft, submarine, etc.) located in a submerged or intertidal setting older than 2 years are considered provincial heritage resources under the HCA. The condition and significance of these sites can vary greatly based on age, exposure and method of deposit. The variety of sites along the Pacific Northwest coast makes a precise definition difficult. However, any vessel remains identified should be considered and the instructions below followed.

If you encounter archaeological or heritage resources:

If you encounter possible archaeological or heritage resources in the course of work, or if in doubt, the following steps are recommended:

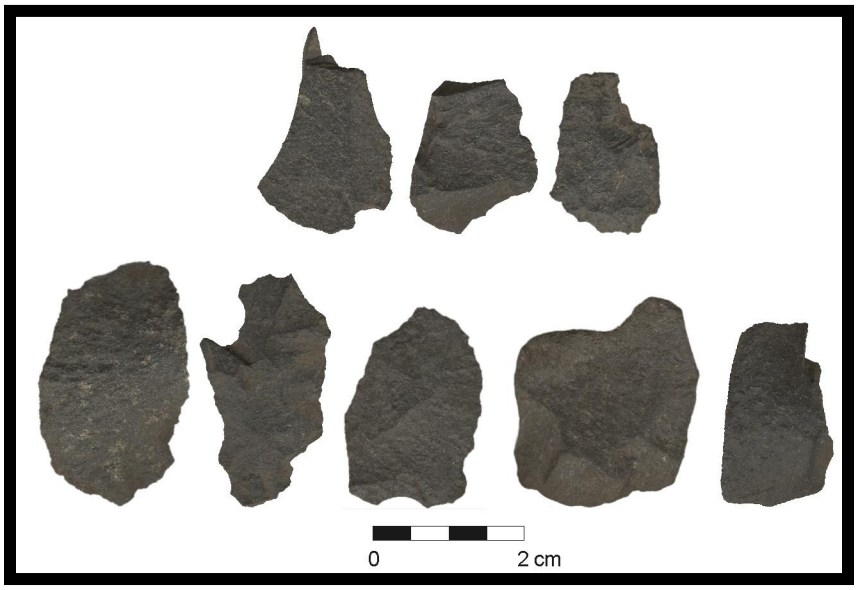
- Cease all ground disturbance in the vicinity of the find and leave all possible archaeological or heritage materials in place
- Briefly note the type of archaeological materials you think you've encountered, and their location, including, if applicable, the depth below surface of the find
- Cordon off a no-work-zone, no less than 30 m in diameter, with flagging tape. Photograph the material, preferably with a scale, and record the location with GPS
- Notify your Project Manager who will then contact an archaeological consultant for advice, the applicable First Nations and the Archaeology Branch at 250-953-3334. In the unlikely event that possible human remains are encountered the Project Manager will also contact the RCMP.

Shell Midden

Exposed Shell Midden

Burial Cairn

Lithic (Stone) Scatter



Debitage (waste material from stone tool manufacturing)

Projectile Points

Bone and antler artifacts

Culturally Modified Tree (CMT)

Pictograph

Petroglyph

APPENDIX D
ENVIRONMENTAL MONITORING FIELD SHEET

Daily Environmental Monitoring Field Sheet

Client: Canadian Coast Guard			__ of __
Site:		**Foreman:**	
Date:		**EM: Stantec**	
Time:			
Weather:			
Mitigation / Management Measure		**Status**	**Revisions/Actions**
Permits/EPPs/Contingency Plans			
Site Access			
Hydrocarbons/Spill Control			
Sediment & Erosion Control			
Wildlife & Vegetation			
Barge Camp			
Waste Control			
Concrete			
Archaeology			
General Other			
Compliance Status Definitions			
✓	In compliance with EMP. No action required.		
!	In compliance with EMP. Requires revised measures.		
X	Out of compliance with EMP. Action required.		

Stantec

Daily Environmental Monitoring Field Sheet

Construction Activities	__ of __

Record of Communications

Additional Notes

Site Drawings