

District of West Vancouver

Assessment of Potential Vehicle Accessible Boat Ramp Sites

Preliminary Feasibility Assessment

FINAL REPORT

Submitted to

District of West Vancouver

750 17th Street

West Vancouver, BC

V7V 3T3

Submitted by

G3 Consulting Ltd.

206-8501 162nd Street

Surrey, BC

V4N 1B2

Voice: (604) 598-8501/226; Fax: (604) 598-8501

Contact: Gregory P. Thomas, President

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1.0 INTRODUCTION

On behalf of the District of West Vancouver (the District), G3 Consulting Ltd. (G3) was requested to provide a preliminary feasibility assessment for the development of a new vehicle accessible boat ramp in the Ambleside Area of West Vancouver, BC. The following document has been prepared in response to this request and summarizes the main components of the project, identified tasks, methods to be employed, deliverables, schedule and associated budget estimates.

1.1 Perspective

Currently the District of West Vancouver has a single (1) publicly accessible ramp for boats on trailers (up to 7.6 m) located at 14th Street and Argyle Ave. As a consequence of a motion, recently adopted by District council to modify the Spirit Trail bicycle and pedestrian pathway to run perpendicular across the existing boat ramp access road, the ramp and access road will be permanently closed to vehicles as of this fall. Associated with this motion, staff were asked to research potential alternative locations for a new boat ramp suitable for boats on trailers.

1.2 Objectives

The District identified the following objectives as part of work to be undertaken as part of this preliminary feasibility assessment for a new vehicle accessible boat ramp. Objectives include (but are not limited to):

- feasibility of potential boat ramp locations;
- marine environmental considerations;
- metro Port Authority approvals required;
- listing of other agencies (e.g., Fisheries and Oceans Canada) and associated requirements;
- list of any additional marine infrastructure required;
- listing of any supporting infrastructure required (e.g., trailer parking);
- opinion of probable costs to build the boat ramp and supporting infrastructure; and,
- assessment of other possible boat ramp locations in the Ambleside area.

1.3 Study Location

The West Vancouver public shoreline was examined from Dundarave Pier to Ambleside (Figure 1, Appendix 1). Extensive shoreline walking paths connect this area along the entire length. The Ambleside waterfront includes an area from Navvy Jack Point east to the Capilano groyne near the mouth of the Capilano River. Conceptual plans have been developed for the Ambleside waterfront area to transform the waterfront into a pedestrian-only environment in the area of the existing boat ramp. Ambleside beach includes the area from the 14th Street Pier to the Capilano groyne.

1.3.1 Existing Boat Ramp

The existing boat ramp is a single lane ramp located just west of the 14th Street Pier and just east of the sailing centre. Historically, the boat ramp chronically infills with sand and cobbles and is generally not considered for use at low tide periods due to the likelihood of vehicles becoming stuck in the sand below the concrete ramp. Trailer parking is restricted to 4 or 5 spaces located adjacent to the ramp.

1.3.2 Recent Works

The Ambleside recreational beach area was constructed in 1965 with sand and cobble pumped from the banks just west of Navvy Jack Point (located between 20th and 22nd Streets in West Vancouver). Due to erosion concerns, the upper Ambleside shoreline was also enhanced with sand and cobble taken from the mouth of the Capilano River in that same year. Continued erosion and losses of sand to deeper water facilitated the need for construction of two rock groynes in 1987 to assist in the preservation of existing beaches and retain smaller particles (sand) along the shoreline. In the early 1990's Ambleside was expanded with works involving the development of a fishing pier, boat ramp

and other upland amenities (Figure 1, Appendix 1). Ongoing erosion prompted a review of groyne structures and additional information with respect to tidal and current processes along the Ambleside waterfront (from the 14th Street Pier to the Capilano groyne). In 2006, the District's Engineering Advisory Committee (EAC) designed habitat features to enhance shoreline protection and better retain finer materials by modifying groyne profiles. The toe of each groyne was extended into deeper water to stabilize lower shore sediments and provide stable structures for algae growth and improve fish habitat. These features were implemented in 2007.

1.3.3 Shoreline Processes

In general, marine waves contact the shoreline of the study area at an oblique angle to the shore moving laterally from west to east. This action creates potential for longshore drift of fine sediments which can be transported along the shoreline settling at structural barriers (e.g., Dundarave Pier, Lawson Pier, 14th Street Pier, Totem groyne and Capilano groyne). This has been noted to create infilling at beaches along the west side of structures. Sediment at these overfull (infilled) beaches was noted to migrate around the tip of these structures or potentially drift into deeper water. At Ambleside Pier, much of the eroded sediment from the west side of the pier was observed to have deposited near the existing boat launch and float, reducing usability. Enhancement works in 2007 were completed in part to help reduce this sediment transport.

2.0 METHODS

To address the above stated objectives, G3 completed the following tasks as part of the preliminary feasibility assessment:

Task 1: Start-up meeting and site visit;

Task 2: Information review;

Task 3: Determine requirements for construction;

Task 4: Potential site comparison and determination of feasibility; and,

Task 5: Estimation of cost.

2.1 Task 1: Start-Up & Site Visit

G3 met with the District to review the scope of work and intended works. Subsequently G3 conducted field reconnaissance work to begin investigating the objectives defined above. Field reconnaissance included field evaluation of potential locations for the ramp and related infrastructure.

2.2 Task 2: Information Review

General research into hydrologic and oceanographic conditions in the area was undertaken with a preliminary assessment (high level) assessment of implication(s) to structure design and siting.

It is anticipated that several regulatory and approvals would be required for a project of this nature, these were identified and outlined, including Transport Canada, Port Metro Vancouver and requirements under the federal *Fisheries Act*.

Environmental considerations discussed would need to examine aquatic and terrestrial footprint and siting location and potential short and longer-term effects to bottom substrates, intertidal and sub tidal areas and associated flora and fauna. The need for any potential compensatory offset would also be examined, should any fisheries habitat loss be anticipated to incur with potential harm to fish (as defined under the *Fisheries Act*). G3 would outline the need and requirements for a Serious Harm Assessment (SHA) and Environmental Protection Planning (EPP), in the event the project proceeds, to identify and mitigate any potential project impacts, navigation hazards, etc. during construction and ongoing operation.

2.3 Task 3: Requirements for Construction

As part of start-up activities and associated background research, a general, cursory review of potential infrastructure requirements was also completed (e.g., ramp design, parking, roadways, safety, navigational considerations, etc.).

2.4 Task 4: Potential Site Comparison & Determination of Feasibility

The West Vancouver shoreline was examined from Dundarave Pier to Ambleside beach to identify potential alternate boat ramp locations. Initially, sites were shortlisted based primarily on ease of shoreline access. Shortlisted sites were then compared using several factors including access, parking, safety, environmental considerations, user requirements, constructability, costs, etc. to determine the optimal site for an alternate location. Through this process, a preliminary determination of feasibility was also completed.

2.5 Task 5: Assessment of Cost

As part of a cursory, high level evaluation an estimate of overall project costs was provided based on limited available information to date.

3.0 DISCUSSION

3.1 Location Feasibility

The feasibility of potential boat ramp locations was examined within the Ambleside area of West Vancouver. Preliminary location screening was based primarily on foreshore access and then examined based on parking limitations, locality and pedestrian traffic concerns. Given preliminary screening considerations, only one location was deemed practical and was situated just east of the Totem groyne at Ambleside beach.

A preliminary assessment of feasibility at the Ambleside beach location included the following general considerations for the development of a boat ramp:

- adequate water depth at the toe of the ramp to allow for use at high and low tides;
- breakwater structures on the upstream side of the ramp to reduce exposure to currents;
- shelter from excessive wave action;
- avoid dominant currents across the ramp (from tidal and wave action);
- avoid areas with active shoreline erosion or accretion;
- avoid sensitive habitat (e.g. eelgrass);
- adequate available land area adjacent to the ramp for access, manoeuvring and parking;
- avoid blocking existing navigation channels;
- avoid water approaches with navigation hazards (e.g. rocky reefs, debris and shoals);
- avoid public swimming areas; and,
- other safety factors.

Specific considerations for the coastal setting include:

- launching and retrieving boats in adverse sea conditions and associated safety risks;
- potential changes in beach levels requiring ongoing and more frequent ramp maintenance;
- ramp may act as a groyne causing changes to shoreline sediment patterns and longshore drift, causing accretion or erosion of material; and,
- wave action on ramp structure may cause scour resulting in increased maintenance requirements.

The most appropriate location for a new boat ramp was determined to be at Ambleside Beach at a position just east of the Totem groyne (Figure 2, Appendix 1). The groyne would provide some shelter from prevailing wind and wave action.

Exposure to wave action should be minimised to avoid waves pushing boats across the ramp during launch and retrieval. While the groyne will prevent some wave exposure, the site will not be sheltered at all times and access may be limited under certain conditions.

The facility should have access to adequate roadways and utilities depending on the size of the facility. There should be adequate parking for boat trailers and parking areas should not be separated from the ramp by a roadway. User and public safety is a key factor in determining the suitability of a location.

A primary concern at the proposed location is the relation of the boat ramp to the pedestrian pathway that runs parallel to the beach. Typically, a launch ramp should not be separated from the ramp by a main road or pedestrian crossing due to potential safety hazards and low speed maneuvering. As part of continued planning it may be necessary to consider a pedestrian underpass or altering the pedestrian pathway in such a way as to avoid this crossing. Additional consideration should be given to determining pedestrian usage data as well as long term usage goals for the area to help determine the importance of an uninterrupted walking path along this section of the beach.

Sedimentation is also a potential concern for a boat ramp at the proposed site as accumulation of fine materials can cause shoals to form at the toe of a ramp or over the ramp and accretion of sediment in the area may prevent boats from accessing navigable depths post-launch.

Historically the beach experienced erosion due to longitudinal drift which resulted in the initial construction of the rock groynes. Recent (2007) work at Ambleside beach focused on improving shoreline protection, reducing erosion and promoting sediment accretion to stabilize and naturalize the beach. The groynes were extended sub tidally to improve near-shore sediment transport to retain more fine sediments at the beach. Prior to site development, further information would be required to determine detailed shoreline processes since enhancement works were completed.

Based on bathymetric data collected by Balanced Environmental Inc. in 2009, the slope of the ramp would be within the acceptable ramp range (~12%) over the upper half of the ramp; however, the shoreline slope tends to decrease with distance from shore towards the end of the groyne. Further data is required to determine current conditions and dredging may be necessary to achieve an acceptable slope towards the toe of the ramp.

3.2 Relevant Acts, Regulations & Authorities

Works in and near waters, including marine waters, and related upland activities are governed by a variety of federal, provincial and municipal regulations that must be considered as part of any works or activities undertaken. This includes provisions stipulated in a headlease agreement, issued in January 2013, between the provincial Ministry of Forest, Lands and Natural Resource Operations (MFLNRO) and the Corporation of the District of West Vancouver under the *Land Act*. Under the agreement, the District of West Vancouver has a Crown land lease with the government of BC which permits the District to issue sub-tenures, including foreshore leases, to third parties that conform to good land use practices and ensure quality environment for the land. The District retains authority for these sub-tenures, as delegated to the District under the agreement. Ministerial approval is required for some activities within the foreshore area and the District is required to comply with all applicable provincial and federal laws, directions, orders and regulations when undertaking works on the foreshore. Some of these authorities and regulations, which may be applicable, are discussed in further detail below.

3.2.1 Fisheries Act

The federal *Fisheries Act* defines serious harm to fish as death or any permanent alteration to or destruction of fish habitat. Subsection 35(1) of the *Act* prohibits any person from carrying on any work or activity that results in serious harm to fish that are part of a commercial, recreational or aboriginal fishery or to fish that support such a fishery.

Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish except under conditions authorized by regulations made by the Governor in Council (GIC). The Authorization of works affecting fish habitat and for the killing of fish does not permit the deposit of deleterious substances in water frequented by fish. Such deposits must be avoided at all times and need to be carefully monitored.

The *Act* requires that projects avoid causing serious harm to fish unless authorized by the Department of Fisheries and Oceans Canada (DFO). If a project cannot avoid serious harm to fish, a Request for Review (RFR) must be submitted to DFO that outlines the proposed work. DFO will then review the project and determine if an application for an Authorization is required.

3.2.2 Vancouver Port Authority

The Vancouver Fraser Port Authority is responsible for the management of land and water within its jurisdiction, and as such, they require an Environmental Review Project Permit for activities and developments under their control. The Project and Environmental Review Process applies to "all proposed physical works and activities on federal lands and waters partially or wholly within the Vancouver Fraser Port Authority's jurisdiction." The criteria for a project requiring Port Metro Vancouver Review includes work on "federal lands as defined by section 2(1) of CEAA 2012: this applies to proposed projects that are wholly or partially located on lands and waters managed by Port Metro Vancouver."

As proposed, the project would fall within Port Metro Vancouver's Navigational Jurisdiction and just outside Port Metro Vancouver's Management Jurisdiction (including lands and waters managed by Port Metro Vancouver; Figure 3, Appendix 1). Due to the proximity of the project to Port Metro Vancouver Managed Federal Lands and Waters and potential increase in traffic in the area, it is recommended that a notification with project details be sent to Port Metro Vancouver before any project is considered.

3.2.3 Transport Canada

The *Navigation Protection Act* (NPA) regulates work that may result in a permanent or temporary obstacle or navigational hazard in navigable Canadian waters. Boat ramps, slipways and launch ramps fall under the Minor Works Order of the Act as designated projects. This allows for minor works to be developed without a Notice to the Minister as long as all other legal requirements are complied with.

3.2.4 Archaeological Surveys

Archaeological sites are protected by the *Heritage Conservation Act* and damage must be avoided. It is important to understand any archaeological site concerns to avoid additional and avoidable costs and impacts. A local government initiative exists to provide tools for helping local governments manage potential sites within their jurisdiction. If not done previously such assessments should be evaluated prior to any work.

3.2.5 Other Acts & Regulations

The following Acts and Regulations must also be considered as part of biophysical surveys, risk assessments, mitigation and environmental protection planning processes:

The *Species at Risk Act* (SARA) contains general prohibitions that make it an offence to kill, harm, harass, capture, or take an individual of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated. It is also an offence to possess, collect, buy, sell or trade an individual of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated; or damage or destroy the residence (e.g., nest or den) of one or more individuals of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated, if a recovery strategy has recommended the reintroduction of that extirpated species.

The federal *Migratory Birds Convention Act* prohibits deposition of any substance that is harmful to migratory birds in waters or an area frequented by migratory birds.

The *Marine Mammals Regulations* state that no person shall disturb a marine mammal except when fishing for marine mammals under the authority of these Regulations.

The *BC Environmental Management Act* (EMA) prohibits against the introduction of waste into the environment in such a manner or quantity as to cause pollution, unless the introduction of that waste is conducted in accordance with a permit, approval, order, or regulation. EMA prohibits causing pollution which is defined in the Act as "[...] the presence in the environment of substances or contaminants that substantially alter or impair the usefulness of the environment."

The *BC Wildlife Act* prohibits direct harm or capture of wildlife unless authorized and prohibits the possession, removal, injury or destruction of a bird or its egg, or the nest when it is occupied by a bird or its egg. The Act also includes designations of Endangered or Threatened and enables protection of critical habitats.

3.3 Marine Environmental Considerations

3.3.1 Habitat Enhancement Work

As part of early actions of the Shoreline Protection Plan (SPP), pilot projects were conducted between Navvy Jack Point and the Capilano groyne (Figure 1, Appendix 1) to naturalize the shoreline, improve protection and erosion measures and habitat enhancement strategies. Measures were designed to help stabilize the shoreline and increase biodiversity. At Ambleside beach, foreshore enhancements in 2007 included stabilization at the toe of both the Totem groyne and the Capilano groyne to prevent erosion and enhance habitat for algae, invertebrates and fish. Large rocks were taken from the Capilano groyne to create intertidal and subtidal habitat and to extend the toe creating more substrate for algae to colonise.

3.3.2 Biodiversity

In 2010, Balanced Environmental Services Inc. completed a survey of the Ambleside inshore and seaward pilot reefs and observed typical rocky reef species, including a variety of algae species, several species of sea stars, as well as anemones, red rock crabs (*Cancer productus*) and lingcod (*Ophiodon elongates*).

Surf smelt (*Hypomesus pretiosus*), are an important recreational fishery known to spawn on beaches from early May to late September. Surf smelt spawning surveys in 2010 found smelt eggs along fine substrates at Lawson Creek located just west of Ambleside Beach. Recent pilot projects implemented in 2007 were attributed to increasing appropriate habitat for surf smelt through increased kelp coverage and more stable beach sediments.

Eelgrass (*Zostera sp.*) meadows may also exist at the more sediment stable westerly end of the beach as noted in the *Long Term Shoreline Planning Framework* (EAC, 2005).

3.3.3 Biophysical Survey & Risk Assessment

To assess the potential for "serious harm to fish" as defined by the *Fisheries Act* and to develop an appropriate Environmental Protection Plan (EPP) to protect existing habitat and mitigate/minimize potential impacts, a biophysical survey would be required to better understand and document ambient site conditions and existing flora and fauna. This assessment would necessarily include important habitat features (e.g., bank and shore characterization, substrates, three dimensional structures and rocky reefs, cover from vegetation, etc.), species observed and potential for species, species at risk, and other biophysical characteristics of the site.

Potential effects and risks associated with construction of a boat ramp and maintenance would need to be assessed using a risk framework. This method incorporates Fisheries and Oceans Canada Effects Assessment and applies *Pathways of Effects* methods to assess mitigation options and identify any potential negative residual effects. Preliminary risk assessment was also undertaken to categorize any risk based on an analysis of identified negative effects, along with Risk Management, to identify overall risks and any required regulatory input or decisions.

3.3.4 Potential Offset (Compensation)

Projects such as a boat ramp that could result in a potential harm to fish as defined by the *Fisheries Act* must evaluate potential loss(es) and propose sufficient compensatory offsets. An overall loss of fish habitat would require offsetting to mitigate any residual effects related to the project. Offsetting is a means to reduce or compensate for perceived impacts to habitat, ecosystem function or fish productivity based on pre-work biophysical surveys in the area. Offset options/designs should be evaluated after appropriate steps have been taken to avoid, relocate and/or mitigate impacts from proposed project activities and should counteract any residual effects on habitat. There are often uncertainties regarding the impacts of projects as well as the effectiveness of offset options and the

effectiveness and monitoring of each measure should be designed and executed in conjunction with a risk-based approach to ensure there is no resulting harm to fish.

Challenges with implementing offsetting options often do not include the value of the ecosystem for both impacted areas and offset habitat and typically focus on a limited number of species. Uncertainty and time lags can be reduced by offsetting impacts before they occur with associated compliance and effectiveness monitoring considered (and typically required by DFO) to ensure that offsets are functioning as planned. Offsets may be required to be implemented prior to or during planned activities and are typically required to be larger than anticipated impacts to ensure they account for uncertainty and delays in obtaining full functional capacity. When offsetting targets habitat value, other than a direct replacement of lost habitat (e.g., like-for-like), some form of equivalency analysis is usually required to facilitate a comparison of losses from impact against expected gains from the offset.

As part of the District's Shoreline Protection Plan, several foreshore protection and enhancement measures were installed and appear to be functioning well though a full assessment would be required. It is possible that some of these works could be considered as offsetting measures (banked habitat value) to use to offset some or all anticipated residual impacts related to the proposed boat ramp project.

3.4 Ramp Infrastructure

Several guidelines were available from which to develop a systematic approach to design of a boating facility and related infrastructure requirements for a proposed boat ramp. Guidelines reviewed during this process included:

- Oregon State Marine Board *Design Guidelines for Recreational Boating Facilities* (2011)
- NSW Roads and Maritime Services *NSW Boat Ramp Facility Guidelines* (2015)
- Ohio Department of Natural Resources *Ohio Boating Facilities Standards and Guidelines* (2003)

Initial steps in developing an appropriate plan include a general site assessment and conceptual designs. The site assessment included an overview of the general topography of the site, bathymetric conditions, prevailing current and wave conditions, access to open water, general environmental concerns, adjacent uses, and size of area available for development. Conceptual drawings developed as a result of this assessment include an example of the layout of the site as well as potential ramp location, size and parking areas. These designs are only high level conceptual drawings and provided to allow discussion regarding practicality, and an estimate of cost.

Initial considerations for design include the nature and usage of the existing facility and a prediction of the level of usage for the proposed boat ramp facility. Seasonal use should also be considered and design for use during non-peak periods coinciding with adverse weather conditions should not be a primary focus; however, the facility should be designed to endure all environmental conditions.

Each of the reviewed guidelines uses standard trailerable boat sizes as a reference for boat ramp construction, with general designs focused on motor vessels less than 7.5 m to 7.9 m in length. General infrastructure considerations should include the following:

Facility Size Vehicle and trailer parking should be provided to meet the demand for typical high season usage; however, in general, it is often found that parking capacity will help guide the size of the facility, usage and number of lanes required. As such, the parking area should provide no more capacity than the desired level of typical use. Available parking area and demand for parking based on present usage and proximity of alternative boat ramps as well as desired level use are important considerations for the design of the facility.

For up to 45 trailer parking spaces, 1 lane is typically preferred. A typical lane can accommodate 30 to 40 launchings and retrievals each day. At the existing boat ramp, there appears to be boat trailer parking for four or five vehicles.

Parking	The parking area should be located as close to the launch ramp as possible for ease of access and safety. Parking spaces should be a minimum of 3 m wide and 12.5 m long to accommodate vehicles with trailers. An angle of 45 degrees is preferred for trailer parking.
Manoeuvring	To allow for vehicle and trailer turning and reversing a manoeuvring area should be provided near the crest of the boat ramp.
Loading Area	Areas for loading and unloading and tie-down should be provided near the manoeuvring area to reduce vehicle time on the boat ramp and lower congestion and safety risks.
Ramp Slope	<p>Standard launch ramp slope should be between 12% and 15% with a preferred ramp slope of approximately 14%. During launch and retrieval this will allow for the trailer to be in sufficient water without the tow vehicle tires entering the water. A launch ramp slope with a slope lower than 12% can cause the vehicle to immerse while a launch ramp slope greater than 15% can cause traction and handling issues.</p> <p>The crest of the ramp, including the vertical curve, should be designed to be above the high high water level. A suitable curve should be provided between the ramp slope and approach to prevent trailer hitches from hitting the ramp surface.</p>
Ramp Length	Typically, the toe of the ramp should extend below the low water level to provide a hard surface for launch and retrieval at all water levels. A ramp extending below the low water level would also be at a reduced risk for scour.
Ramp Width	It is recommended that a single lane boat ramp be between 4.5 m to 6.0 m wide to accommodate trailer width and provide sufficient space to manoeuvre.
Ramp Surface	Concrete ramps are superior to gravel or asphalt ramps. A v-groove finish provides good traction for vehicles especially along the coast where marine growth may create slick surfaces. V-grooves also help keep the surface of the ramp clean by washing debris off along the grooves to the side of the ramp.
Floats	A boarding float can help increase safety and efficiency during boat launch and retrieval. Floats allow boaters to access vehicles more quickly for boat retrieval and can be used for holding, loading and boarding.

3.5 Cost Estimates

Cost estimates are preliminary and not based on engineered plans/designs and exclude archaeological assessments (if required) and costs for engineering, project management and design review phases.

Table 3-2: Estimated Project Costs	
Construction Items	Estimated Cost
Boat ramp facility construction	\$1,000,000 – \$3,000,000
Boat ramp annual maintenance	\$15,000 – \$30,000
Surveys and Additional Pre-construction Items	
Biophysical surveys (including risk assessment and compensation options)	\$15,000
Potential compensation construction	\$100,000 - \$250,000
Fisheries Act notification/ authorization	\$5,000 to \$10,000

4.0 SUMMARY

If the District of West Vancouver wishes to consider moving forward on this project the following steps will need to be considered:

- Bathymetric surveys should be completed to assess feasibility of the ramp at the proposed location. Standard launch ramp slopes should be between 12% and 15% with a preferred ramp slope of approximately 14%. Based on bathymetric data provided (2009), the shoreline slope tends to decrease with distance from shore. Further data is required to determine the current suitability of the slope at the site and dredging and ongoing maintenance may be necessary to achieve an acceptable slope towards the toe of the ramp.
- Concerns also exist with potential sedimentation at the site. Historically the beach experienced erosion due to longitudinal drift. Further studies should be completed to determine how shoreline protection measures have stabilized the site and altered sedimentation patterns. This information may also indicate potential dredging and maintenance requirements for the proposed boat launch;
- A biophysical survey would need to be completed to determine existing habitat and potential for serious harm to fish; mitigation measures to protect habitat; and possible compensation works to offset any losses;
- Contact Port Metro Vancouver and Transport Canada and notify them of proposed works and address any navigational concerns;
- Subsequent to biophysical survey work, the Department of Fisheries and Oceans Canada (DFO) may need to be contacted through a Request for Review (RFR) if the project, as designed, cannot avoid causing serious harm to fish;
- Consideration should also be given to pedestrian safety along the pedestrian pathway as well as long term usage goals for the area to help determine the importance of an uninterrupted walking path along this section of the beach.

5.0 REFERENCES

- District of West Vancouver. 2012. Shoreline Protection Plan 2012-2015.
- Engineering Advisory Committee (EAC). 2005. Ambleside - Dundarave Long Term Shoreline Planning Framework. District of West Vancouver.
- Foreshore Technologies Inc. 2008. Shoreline Preservation Plan 2008-2011: District of West Vancouver shoreline preservation plan, British Columbia, December 14, 2007.
- NSW Roads and Maritime Services. 2015. NSW Boat Ramp Facility Guidelines.
- Ohio Department of Natural Resources. 2003. Ohio Boating Facilities Standards and Guidelines.
- Oregon State Marine Board. 2011. Design Guidelines for Recreational Boating Facilities.
- West Vancouver Shoreline Preservation Society. <http://www.westvanshoreline.ca/photos/index.html>

APPENDICES

Appendix 1: Figures

Appendix 2: Photos

Appendix 1

Figures



Figure 1: Overview of West Vancouver Shoreline (Dundarave to Ambleside)

Date: October 24, 2016
 Coordinate system: NAD1983

0 1.5
 Kilometers

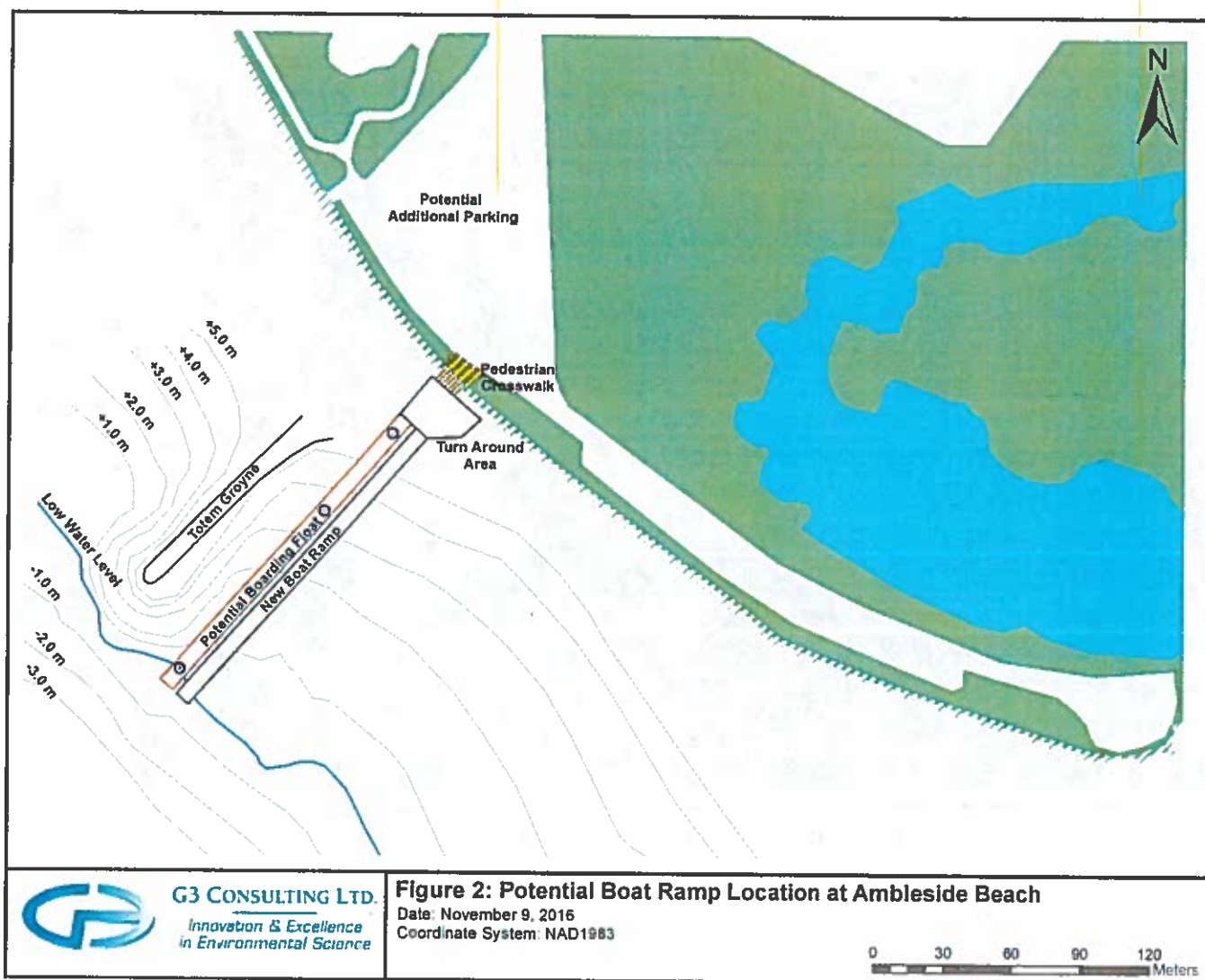
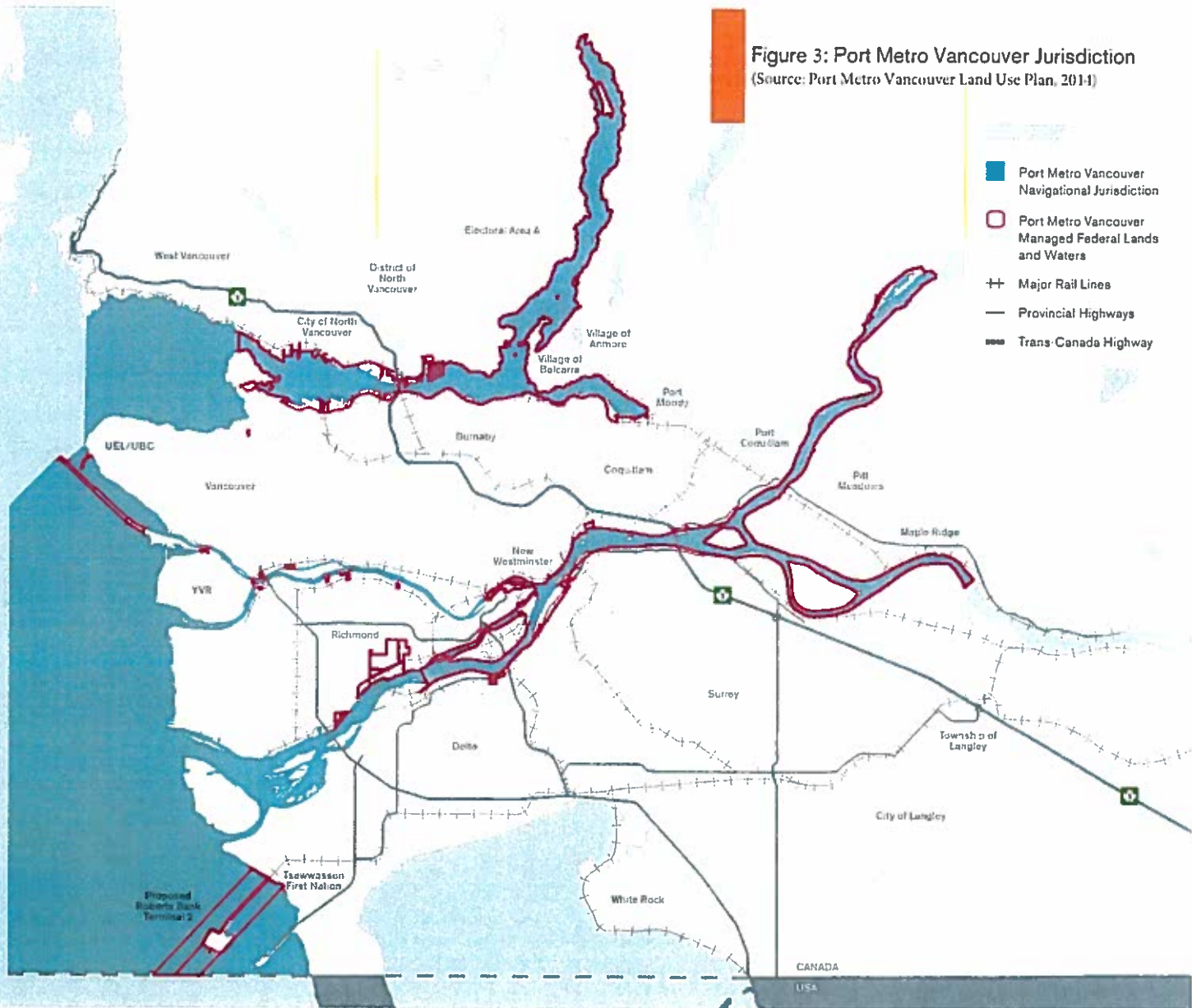


Figure 3: Port Metro Vancouver Jurisdiction
(Source: Port Metro Vancouver Land Use Plan, 2014)



Appendix 2

Photos

Appendix 1: Site Photos

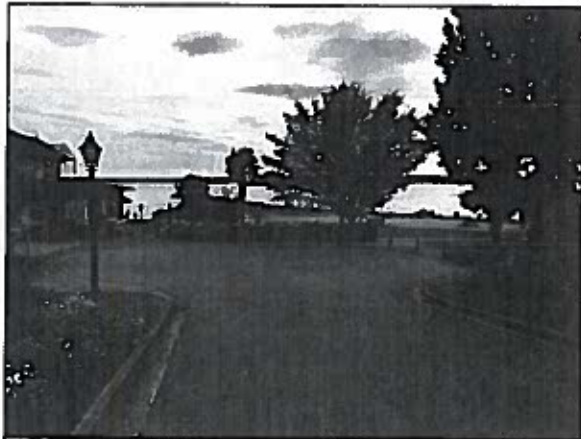


Photo 01: Looking south on 25th Street at Dundarave Park



Photo 02: Looking south at Dundarave Pier



Photo 03: Looking north at 24th Street from Centennial Walkway

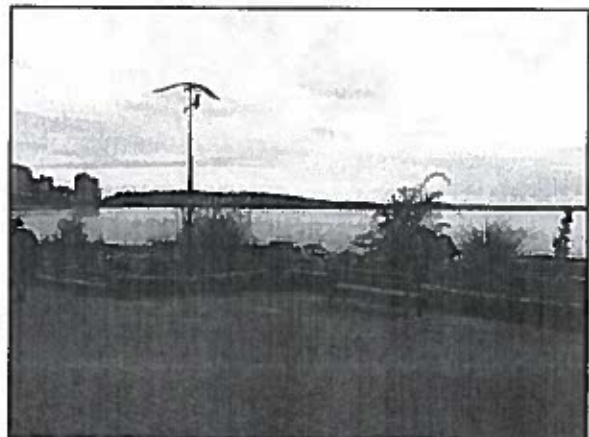


Photo 04: Looking southeast from 24th Street and the Centennial Walkway



Photo 05: Looking south at the existing boat ramp

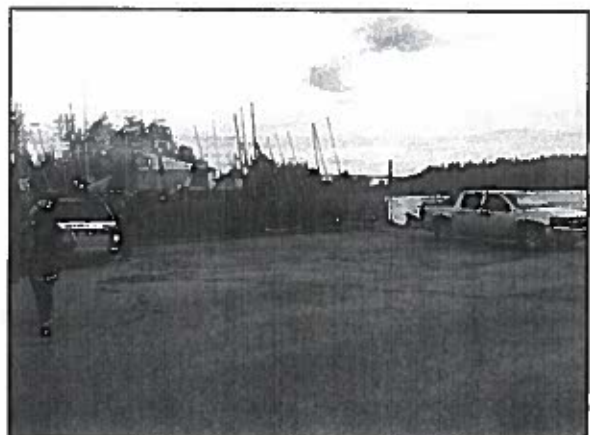


Photo 06: Looking southeast at existing boat ramp trailer parking

Appendix 1: Site Photos



Photo 07: Looking east at parking along Ambleside beach. Potential for trailer parking along this section



Photo 08: Looking north at Argyle Avenue from Ambleside Beach.



Photo 09: Looking south at potential boat ramp location and Totem groyne.



Photo 10: Looking north from potential boat ramp location

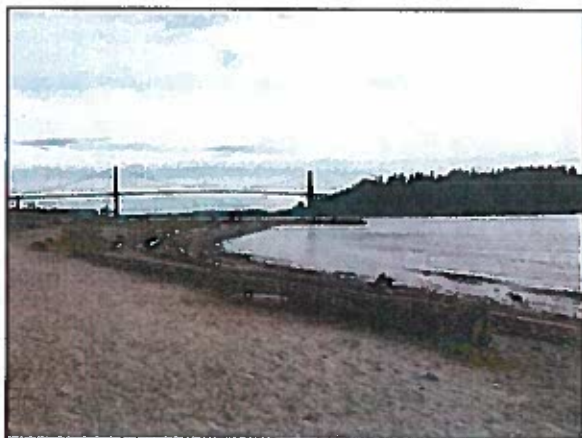


Photo 11: Looking west at Ambleside beach from Totem groyne



Photo 12: Looking south from Ambleside beach at Totem groyne and cobble shoreline