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Part 1 General

1.1 RELATED SECTIONS

- .1 01 14 00 – Work Restrictions
- .2 01 32 00 – Quantity Survey
- .3 01 35 29 – Health and Safety Requirements
- .4 01 35 35 – Fire Safety Requirements
- .5 01 35 43 – Environmental Procedures

1.2 MINIMUM STANDARDS

- .1 Perform Work in accordance with the latest edition of the National Building Code of Canada (NBCC) and any other code of provincial, federal, or local application which is relevant. In the case of any conflict or discrepancy, the more stringent requirements shall apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes, and reference documents.

1.3 WORK LOCATION

- .1 Work is to be completed on Mount Collinson which is a undeveloped site located approximately 3 km South-East from Telegraph Cove, BC. Site coordinates are 50° 31' 42.1" N, 126° 47' 23.5" W.
 - .1 The site is accessed via helicopter only. The Contractor is responsible for providing all transportation services of materials, equipment and crew to and from the site before and during construction.
 - .2 Before tender closing, Contractors must familiarize themselves with the location, scope of work, site restrictions, and temporary measures required for completing the work as specified.
 - .3 A mandatory site visit will be coordinated during the tendering phase of the Contract.

1.4 GENERAL WORK DESCRIPTION

- .1 Work of this Contract comprises site clearing activities to support site development for Canadian Coast Guard's (CCG) infrastructure. Work includes, but not limited to, the following:
 - .1 Mobilization and Demobilization of all manpower, equipment, materials, and other resources necessary to execute the Work.
 - .2 Stripping material down to bedrock and stockpiling adjacent to site
 - .3 Drilling and blasting bedrock for mass rock removal



- .4 Removing blasted rock adjacent to site
- .5 Preparing blasted rock surface
- .6 Working with the CCG Representative to assess the Work done
- .7 Quantity Survey to determine volumes of material to be stripped and blasted.
- .8 Optional work to place blasted rock if directed by CCG Representative.
- .2 All work to be completed by September 30, 2019

1.5 EXECUTION

- .1 Stripping and Stockpiling
 - .1 All material including, but not limited to, existing tree stumps, plants, soil and other organic material to be stripped down to solid bedrock as indicated on the drawings in Appendix A
 - .2 Stockpiling the stripped material is to be done in an environmentally sensitive manner as to limit the environmental footprint. Refer to Section 01 35 43 Environmental Procedures for details.
 - .3 The stripped material can be placed adjacent to the site as indicated on the drawings in Appendix A
- .2 Blasting Mass Rock and Stockpiling
 - .1 The Contractor must achieve a blasted rock surface which meets or exceeds the following requirements:
 - .1 The existing rock surface must be blasted down to the required elevation and meet the area requirements shown on the drawings in Appendix A
 - .2 Over blasting within 1 metre is acceptable but is at the cost of the Contractor.
 - .3 The blasted surface must be relatively level and within the following tolerances:
 - .1 Max 4% grade measured from the edge to edge of the blasted surface.
 - .2 Finished surface must not have irregularities exceeding 150mm when checked with a 3 m straight edge placed in any direction.
 - .3 In areas where tolerances are not met the Contractor may use approved granular fill from the blasted rock surface at no cost to Canada. The granular fill must be maximum 75 minus and be suitable for the area to be filled.
 - .2 The CCG Representative must be provided, within 28 calendar days of contract award, a proposed Blasting Plan for review and must include, but not limited to, the following:
 - .1 Roles and responsibilities for blasting crew
 - .2 Certification of Contractors workers including a licenced explosives blaster holding a valid Blasters Certificate to supervise and program



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- blasting work, and to determine precautions, preparation and operations techniques.
- .3 Required permits if applicable
 - .4 Preparation requirements of surface to be blasted
 - .5 Drilling requirements and techniques
 - .6 Equipment required
 - .7 Explosive storage requirements according to applicable regulations..
 - .8 Health and safety hazards and mitigations identified and adequately accounted for according to standard practice and local regulations. This is to be included in the Health and Safety Plan as stated in Section 01 35 29 Health and Safety Requirements.
- .3 The CCG Representative must be provided, within 28 calendar days of contract award, with a proposed Blast Design for review and must include, but not limited to, the following:
- .1 The blast design must be certified by a qualified Blasting Consultant retained and paid by the Contractor. The Blasting Consultant must be registered with an applicable professional organization such as Engineers and Geoscientist BC or approved alternate.
 - .2 Indicated design parameters with the blasting techniques and meet applicable standards and regulations.
 - .3 Plan and cross section sketch drawings of proposed trim showing the drill pattern (burden and spacing), dimensions, and estimated volume.
 - .4 Diameter, inclination, orientation, depth, and number of drilled holes.
 - .5 Loading diagram showing type and amount of high explosive or non-explosive products, powder factor, initiators, and depth and type of stemming for each type of blast hole.
 - .6 Initiation sequence for blast holes including delay pattern and delay times.
 - .7 Manufacturer's data sheets for all explosive and non-explosive products, delays and initiation systems to be used.
 - .8 Proposed time and date of blast(s).
- .4 Stockpiling the blasted rock material is to be done in an environmentally sensitive manner as to limit the environmental footprint. Refer to 01 35 43 – Environmental Procedures for details.
- .5 The blasted rock material can be placed adjacent to the site as directed by the CCG Representative.
- .6 The CCG Representative must be provided with a proposed Blast Report for review and must include, but not limited to, the following:
- .1 Be provided within 14 calendar days following blasting activities.
 - .2 Be certified by the Blasting Consultant and include rock conditions and recommendations for future CCG infrastructure.



- .3 The report must document observations and recommendations made by the Blasting Consultant and consist of relevant photographs, SDS, technical data sheets, and applicable drawings.
- .7 Contractor to notify CCG Representative 7 days in advance of blasting activities. Notification to include when and where the blasting will occur and for how long.
- .8 The Contractor shall be completely responsible for all liaison and coordination with respect to blasting and notification to applicable authorities.
- .9 If directed by the CCG Representative the Contractor is to place blasted rock material from the stockpile to an area adjacent to the site being developed. The placement of the rock must be sorted in a manner to ensure adequate stability. This includes, but not limited to, removing organic material where the rock is placed to limit settlement. This Work will be an option to the Contract.

1.6 PROJECT SCHEDULE

- .1 Provide CCG with a Project Schedule of the Work within seven (7) calendar days following Contract Award. The schedule is to include, but not limited to, a detailed timeframe of the following:
 - .1 Preparation of supporting documentation to CCG including the mandatory submittals noted below.
 - .2 A project kickoff meeting with CCG.
 - .3 Mobilization to the site.
 - .4 Site set-up.
 - .5 Surveying existing ground profile.
 - .6 Stripping and stockpiling activities.
 - .7 Surveying existing bedrock profile.
 - .8 Drilling and rock preparation.
 - .9 Blasting mass rock and stockpiling.
 - .10 Blasted rock surface preparation.
 - .11 Surveying blasted rock surface – Contractor to provide 7 days notice to CCG and allow up to an additional 7 days before continuing to the next phase of activities.
 - .12 Site clean-up.
 - .13 Demobilization from site.

1.7 WORK BY OTHERS

- .1 The Contractor must co-operate with other Contractors in carrying out their respective works and follow instructions from CCG as required.

1.8 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work to allow:
 - .1 Work by other contractors.
 - .2 Co-ordinate use of premises under direction of CCG.



1.9 SUBMITTALS

- .1 Mandatory submittals and schedule for submission are detailed below and identifies general requirements only. The relevant Sections must be consulted for a complete listing of mandatory content. This summary is not an exhaustive list of all submissions required for the duration of the project, as additional submissions may be required after award.
 - .1 Blast Plan
 - .1 Deadline: 28 days following contract award.
 - .2 Blast Design
 - .1 Deadline: 28 days following contract award.
 - .3 Blast Report
 - .1 Deadline: 14 days following completion of the Work.
 - .4 Project Health and Safety Plan (Section 01 35 29).
 - .1 Deadline: 28 days following contract award.
 - .5 Environmental Protection Plan (Section 01 35 43).
 - .1 Deadline: 28 days following contract award.
 - .6 Fire Protection Plan (Section 01 35 35).
 - .1 Deadline: 28 days following contract award.
 - .7 Project Schedule
 - .1 Deadline: 7 days following contract award.
 - .8 Survey Documents and Data
 - .1 Deadline: 7 days following completion of the activity

1.10 EXISTING SERVICES

- .1 The Work site location does not provide any utilities or services for Contractor use.
- .2 Contractor to pay for and provide temporary: water supply, sanitary facilities, and electrical power supply in accordance with governing regulations and ordinances.
 - .1 Sanitary facilities to be in good repair and adequately secured to prevent spills or contamination from reaching the site.
- .3 Take care to safeguard any existing structures and/or equipment. Upon completion of Work, all rejected materials, materials declared surplus by CCG, and debris to be removed from the site.

1.11 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Health and Safety Plan and Other Safety Related Documents (Section 01 35 29).
 - .2 Environmental Protection Plan (Section 01 35 43).
 - .3 Other documents as specified.



1.12 MEASUREMENT AND PAYMENT

- .1 No payment will be made for the stripping, stockpiling, blasting and removal of rock, including all subsequent remedial backfilling, in excess of limit shown on the drawings unless authorized in writing by the CCG Representative.
- .2 Quantities for material stripped down to solid bedrock and stockpiled will be calculated from a Quantity Survey. This survey will compare the existing ground surface profile to that of solid bedrock surface and calculate the difference to determine the total volume removed.
- .3 Quantities for mass rock to be blasted and stockpiled will be calculated from a Quantity Survey. This survey will compare the existing bedrock surface to that of the Prepared Blasted Surface and calculate the difference to determine the total volume removed.
- .4 For details on the Quantity Survey see Section 01 32 00

1.13 FEES, PERMITS, AND CERTIFICATES

- .1 Contractor to pay fees, obtain certificates and permits, and provide information to authorities having jurisdiction where required.
 - .1 Contractor to provide copies to CCG of any documentation submitted to other authorities related to the Work.
- .2 Contractor to provide certificates and permits when requested.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION



Part 1 General

1.1 RELATED SECTIONS

- .1 01 11 00 – Summary of Work
- .2 01 32 00 – Quantity Survey
- .3 01 35 29 – Health and Safety Requirements
- .4 01 35 35 – Fire Safety Requirements
- .5 01 35 43 – Environmental Procedures

1.2 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including, but not limited to, foundations, storage areas, ramps or ladders, and helipad, as required to perform the Work and in accordance with relevant municipal, provincial and other regulations.

1.3 HELICOPTER OPERATIONS

- .1 Helicopters and helicopter cranes used for external load lifting during construction, maintenance and demolition activities shall comply with any and all applicable regulations of the Canadian Aviation Regulations (CAR), SOR/96-433 for helicopter external sling load operations.
- .2 Every practical precaution shall be taken to provide for the protection of the employees from flying objects in the rotor downwash. All loose gear, equipment and materials within 100 feet of the load lifting area and setting the load, and all other areas susceptible to rotor downwash, shall be secured or removed.
- .3 Maintain constant, reliable communication between the pilot and a competent rigger. Signal systems between aircrew and ground personal shall be checked and understood in advance of hoisting the load. This applies to either radio or hand signal systems.
- .4 Train the construction crew in advance of any helicopter external sling operations.
- .5 All applicable notices and permits required to perform the Work is by the Contractor, unless otherwise stated by the Canadian Coast Guard (CCG) Representative.

1.4 USE OF SITE

- .1 Execute work with least possible interference or disturbance to the existing condition of the site.
- .2 Coordinate known work restriction with CCG and make appropriate arrangements to minimize environmental footprint.
- .3 Campfires on site are not permitted.
- .4 Camping on site is allowed and must meet regulatory requirements such as, but not limited to, that stated in WorkSafe BC.

Part 2 Products

2.1 NOT USED



.1 Not used.

Part 3 Execution

3.1 NOT USED



Part 1

General

1.1 RELATED SECTIONS

- .1 01 11 00 – Summary of Work

1.2 GENERAL REQUIREMENTS

- .1 The Contractor is to coordinate the services of a qualified third party Surveyor for conducting the Quantity Survey. This will include, but not limited to:
 - .1 The third party Surveyor is to be a professional land Surveyor registered with The Association of British Columbia Land Surveyors (ABCLS).
 - .2 Determination of Quantities for stripping material down to bedrock.
 - .3 Determination of Quantities for blasting mass rock down to the Prepared Surface.
 - .4 Production of a topographical plans and supporting data, including survey point files.
- .2 The cost of the service of the qualified third party Surveyor will be paid by CCG and include helicopter support. The Contractor must coordinate the use of the helicopter service and the vender must be approved by the CCG Representative.

1.3 CONTROL LINES AND POINTS

- .1 For the purposes of establishment and the verification of the extents of stripping and blasting there is a need to establish local site control points. Control points will be established by the Contractor using the Surveyor. The accuracy requirements for these control points is set forth hereto:
 - .1 Site control will be either a sight distance traverse or points set using static GNSS methods, connected to at minimum two (2) High Precision NAD83 CSRS monuments or monuments of greater accuracy (Canadian Base Network or Federal/Provincial Active Control Systems).
 - .2 Control points must be inter-visible.
 - .3 Control points must form a closed network on site.
 - .4 Control points must be referenced by paint and an offset stake (flagged pink and blue) where possible.
 - .5 The local accuracy specifications of the control points at the 95% confidence level shall not exceed 0.02m both horizontally and vertically.
 - .6 Control points must be geo-referenced using the NAD83 CSRS (2010 epoch) reference system and the CGVD2013a vertical datum. Control ties to at least two existing monuments must be provided.
 - .7 The control point horizontal accuracy requirement is 1:10,000 or defined as 1 part per ten thousand when using optical Total Station traverse methodologies.
 - .8 Vertical control (Class II) accuracies will be determined as 0.008 times the square root of the loop distance in kilometres.



- .9 Control must be checked at beginning of a project. Random checks will be done by closed traverse or static GPS. Additional checks may be required by the CCG representative as required.
- .10 Contractor is to provide records of control point surveys that will contain all electronic survey files, reports and other relevant survey data showing closures and achieved accuracies.
- .2 CCG must approve stripping and blasting perimeters before executing the Work.
- .3 The Contractor must provide all stakes, templates, platforms, ranges and labor required in the setting of control points and the laying out of the work. The Contractor shall preserve and maintain all control lines and points until the Work is accepted by CCG.

1.4 PROVIDED BY CCG REPRESENTATIVE.

- .1 LAS File containing existing ground information collected by airborne LIDAR.
- .2 ASCII File containing existing ground information collected by airborne LIDAR.
- .3 DWG file in NAD 83 CSRS (epoch 2010) UTM Projection showing the extents of the site clearing and stripping.
- .4 DWG file in NAD 83 CSRS (epoch 2010) UTM Projection showing the extents of the site blasting.

1.5 LAYOUT

- .1 Extents of stripping layout will be provided by the CCG representative in a drawing in DWG format.
- .2 The contractor will conduct the survey layout for the extents of the site stripping. This layout will be verified by the CCG representative prior to the commencement of any stripping activity.
- .3 Extents of blasting layout will be provided by the CCG representative in a drawing in DWG format.
- .4 The contractor will conduct the survey layout for the extents of the site blasting. This layout will be verified by the CCG representative prior to the commencement of any blasting activity.

1.6 SURVEY METHODOLOGY

- .1 Initial ground surface has been surveyed using airborne LIDAR. The ground data has been used to generate an initial ground surface (Surface 1). If mutually agreed by the Contractor and CCG this surface does not require resurveying.
- .2 If there is not agreement for the use of the existing site conditions gathered by airborne LIDAR the Contractor will be required to survey the existing ground conditions of the site. The survey must achieve a point density of at minimum 1m and capture all significant break-lines and features. This ground data will then be used to generate an initial ground surface (Surface 1).



- .3 The perimeter of the surface to be stripped must be staked and verified by the CCG Representative prior to stripping activities. The Contractor is to provide min 7 days notice to CCG.
- .4 Following stripping activities to the bedrock surface the area is to be surveyed in order to quantify the amount of excavated earth. The survey must achieve a point density of at minimum 1m and capture all significant break-lines and features. This survey will create an initial rock surface (Surface 2). The difference between Surface 1 and Surface 2 will constitute the volume of earth excavation.
- .5 The perimeter of the bedrock surface to be blasted must be staked and verified by the CCG Representative prior to blasting activities. The Contractor is to provide min 7 days notice to CCG.
- .6 Following the final rock excavation the Prepared Surface area is to be surveyed in order to quantify the amount of excavated rock. The survey must achieve a point density of at minimum 1m and capture all significant break-lines and features. This survey will create a final rock surface (Surface 3). The difference between Surface 2 and Surface 3 will constitute the volume of rock excavated.

1.7

DELIVERABLES

- .1 The Contractor is to ensure the following information is submitted to CCG for verification:
 - .1 Control Points
 - .1 All survey records relating to control points established on site.
 - .2 Survey control point file in ASCII format. Control points shall use the UTM projection and the NAD83 CSRS (2010 epoch) reference system and CGVD2013a Vertical Datum.
 - .3 Control points to be established prior to stripping activities and results are to be provided within 14 days to the CCG Rep following activities.
 - .2 Surface 1 – Existing Ground Conditions
 - .1 Topographical Plan of existing site conditions in .DWG format with contour lines drawn at an interval of 0.25m.
 - .2 Survey point file of existing site conditions in ASCII format.
 - .3 Surface 1 deliverables to be provided 7 days from the completion of site survey.
 - .4 If the Contractor and CCG mutually agrees to use CCG's existing LIDAR data this deliverable is not required.
 - .3 Surface 2 – Initial Rock Conditions
 - .1 Topographical Plan of existing initial rock conditions in .DWG format with contour lines drawn at an interval of 0.25m.
 - .2 Survey point file of existing initial rock conditions in ASCII format.
 - .3 Surface 2 deliverables to be provided 7 days from the completion of site survey.



- .4 Surface 3 – Final Rock Conditions
 - .1 Topographical Plan of final rock conditions in .DWG format with contour lines drawn at an interval of 0.25m.
 - .2 Survey point file of final rock conditions in ASCII format.
 - .3 Surface 3 deliverables to be provided 7 days from the completion of site survey.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION



Part 1 General

1.1 APPLICABLE REGULATIONS

- .1 Comply with Workers Compensation Act, B.C.
- .2 Comply with WorkSafeBC Occupational Health and Safety Regulation.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.2 REFERENCE STANDARDS

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of British Columbia
 - .1 Workers Compensation Act, RSBC 1996.
 - .2 WorkSafeBC Occupational Health and Safety Regulation.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit site-specific Health and Safety Plan: Within 28 days following contract award. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Listing of all activities specific to the project and their Health and Safety risks or hazards.
 - .3 Detailed descriptions of how the activities are to be carried out as well as methods for mitigating hazards and risks.
 - .4 Listing of personnel responsible for Health and Safety measures, and Emergency procedures.
 - .5 Proof of training for all employees working at heights and proof of rescue training for at least one employee working on site.
 - .6 An effective rescue and response plan.
 - .7 If the Contractor plans to camp on site, the remote camp must meet, but not limited to, the following:
 - .1 The location must be preapproved by the CCG Representative and meet applicable standards and regulations.
 - .2 The remote camp must have a first-aid room which is suitable for the Contractor's crew size and meet applicable regulations such as WorkSafe BC.
 - .3 Have a walk off plan in case of an emergency where helicopter support can not be achieved due to visibility concerns. The plan is to include, but not limited to, a trail down to the water where pick-up by boat can be arranged. This trail must be verified by the Contractor and adequately marked prior to performing the Work.
- .2 CCG will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 calendar days.



- .3 CCG's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

1.4 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 CCG may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.5 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factors, hazards, or conditions occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise CCG verbally and in writing.

1.7 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have site-related working experience specific to activities of the Work.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Have applicable first-aid certification and meets the required regulations.
 - .4 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .5 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .6 Be on site during execution of Work.

1.8 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by CCG.
- .2 CCG may stop Work if non-compliance of health and safety regulations is not corrected.



1.9 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION



Part 1

General

1.1 APPICABLE REGULATIONS

- .1 Applicable regulations include, but not limited to, the following:
 - .1 Wildfire Act;
 - .2 Wildfire Regulation
- .2 The Contractor has legal obligations and responsibilities with respect to fire use, prevention, and rehabilitation.
- .3 The Contractor is to be familiar and comply with the BC Wildlife Service requirements.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit Fire Protection Plan: Within 28 days following contract award and before commencing construction activities or delivery of materials to site. The Fire Protection Plan must include:
 - .1 A comprehensive overview of known or potential fire issues to be addressed during construction.
 - .2 Information obtained from the Fire Department or BC Wildfire Service Briefing.

1.3 FIRE BRIEFING

- .1 Prior to the commencement of the Work the Contractor must co-ordinate arrangements for briefing on Fire Safety by the local Fire Department or the BC Wildfire Service. This pre-work briefing must be documented and include Fire Safety precautions and requirements.
- .2 Campfire are not permitted on site.

1.4 REPORTING FIRES

- .1 Know site location information which is to be communicated during the Fire Briefing.
- .2 Report immediately fire incidents to the Fire Department as determined through the Fire Briefing and by phoning the wildfire line at:
 - .1 1 800 663-5555 or *5555 on a cell
- .3 When reporting fire by telephone, give location of fire, name or location information of the site and be prepared to verify site details.

1.5 FIRE EXTINGUISHERS

- .1 Supply fire extinguishers, as determined from Fire Briefing, necessary to protect the environment, work in progress and contractor's physical plant on site.

1.6 RUBBISH AND WASTE MATERIALS

- .1 Keep rubbish and waste materials at minimum quantities.



- .2 Burning of rubbish is prohibited.
- .3 Remove rubbish from work site at end of work day or shift or as directed.
- .4 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove specified.

1.7 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- .1 Handling, storage and use of flammable and combustible liquids governed by current National Fire Code of Canada 2015 (NFC). The Contractor must be familiar and be prepared for such activities.
- .2 Keep flammable and combustible liquids such as, but not limited to, gasoline, kerosene and naphtha for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval and meet local regulation requirements.
- .3 Store flammable and combustible waste liquids, for disposal, in approved containers located in safe ventilated area. Keep quantities to a minimum and follow local regulations when disposing.

1.8 HAZARDOUS SUBSTANCES

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, in accordance with National Fire Code of Canada (NFC). The Contractor must be familiar and be prepared for such activities.
- .2 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of local authority of jurisdiction. Contractors are responsible for providing fire watch service for work on scale established and in conjunction with pre-work Fire Briefing.

1.9 QUESTIONS AND/OR CLARIFICATION

- .1 Direct questions or clarification on Fire Safety in addition to above requirements to the local Fire Department and authority of jurisdiction.

Part 2 Products

2.1 NOT USED

- .1 Not Used.



Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION



Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 35 35 Fire Safety Requirements
- .2 Environmental Management Plan, Canadian Coast Guard Radar Stations, BC Document in Appendix B
- .3 Environmental Overview Assessment in Support of the Development of Canadian Coast Guard Radar Sites, BC Document in Appendix B

1.2 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act (CEPA)
- .2 Canadian Environmental Assessment Act, 2012 (CEAA)

1.3 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit Environmental Protection Plan: Within 28 days following contract award and before commencing construction activities or delivery of materials to site. This must include the following:
 - .1 A comprehensive overview of known or potential environmental issues to be addressed during construction.
 - .2 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .3 Name of person responsible for ensuring adherence to Environmental Protection Plan.
 - .4 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.
 - .5 Name and qualifications of person responsible for training site personnel.
 - .6 Drawings indicating locations of proposed temporary excavations or embankments for material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.



- .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas. Plan to indicate staging, refueling, and cleaning areas.
- .8 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, discharge of collected surface run-off, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .13 Equipment to be used on site identifying age and spill containment procedures.

1.5 FIRES

- .1 Fires and burning of rubbish on site is not permitted.

1.6 DRAINAGE, EROSION AND SEDIMENTATION

- .1 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .2 Ensure pumped water into waterways is free of suspended materials and meets BC Water Quality Guidelines for the Protection of Aquatic Life.
- .3 Do not pump water containing deleterious substances into waterways.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- .5 Cover stockpiled materials to reduce or limit erosion and subsequent sediment introduction to run-off water

1.7 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Only clear vegetation in areas required for safe construction.
- .3 Minimize stripping of topsoil and vegetation. Where possible retain topsoil for revegetation post-construction
- .4 Disturbed areas are to be restored to their original condition or better after construction.



- .5 Restrict tree removal to areas designated by CCG.
- .6 Trees to be removed may be assessed for salvageable value.
- .7 For trees that are to remain onsite, protect roots to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .8 Small diameter slash will be retained in wooded areas with erodible soils.
- .9 Prevent piling of cleared material within 30 m of a watercourse or wetland, or placed on sensitive vegetation.

1.8 BLASTING

- .1 Approval for blasting will be obtained from the appropriate authority of jurisdiction.
- .2 Drills will be equipped with dust collectors.
- .3 Blast rock will not be stockpiled within 30 m of a watercourse or wetland, or placed on sensitive vegetation.
- .4 Blast rock to remain on site will be contoured to limit erosion/sedimentation and revegetated if necessary to provide continued erosion protection following construction.

1.9 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Provide methods, means, and facilities to prevent the contamination of soil, water, and atmosphere from the discharge of pollutants produced by construction operations.
- .3 Vehicles, machinery, and equipment shall be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.
- .4 Avoid unnecessary idling of vehicles or heavy machinery.

1.10 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

- .1 Develop and implement a plan which details spill response measures to be employed. The plan will include a list of spill response equipment that will be present on the site and will assign implementation and monitoring roles. On-site personnel will review the plan, understand their roles and responsibilities, and will be properly trained and equipped to conduct spill response activities.
 - .1 Identify high-risk locations where spills are probable and maintain spill kits, capable of handling the largest potential spill through the duration of the project, at these locations. Consider the location of the generator and the associated fuel tank to be a high-risk location. Include an inventory of required contents at the top of the kit. Locate PPE at the top of the spill kit to enable easy access for the spill responder(s). Keep spill kits closed with a safety seal affixed to indicate if the kit has been used or tampered with.
 - .2 Respond immediately to all spills in accordance with plan and applicable spill regulation(s).



- .2 Immediately report all spills, regardless of severity to CCG representative. Submit a written report within 24 hours of the spill.

1.11 NOTIFICATION

- .1 CCG will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform CCG of proposed corrective action and take such action for approval by CCG.
- .3 CCG will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

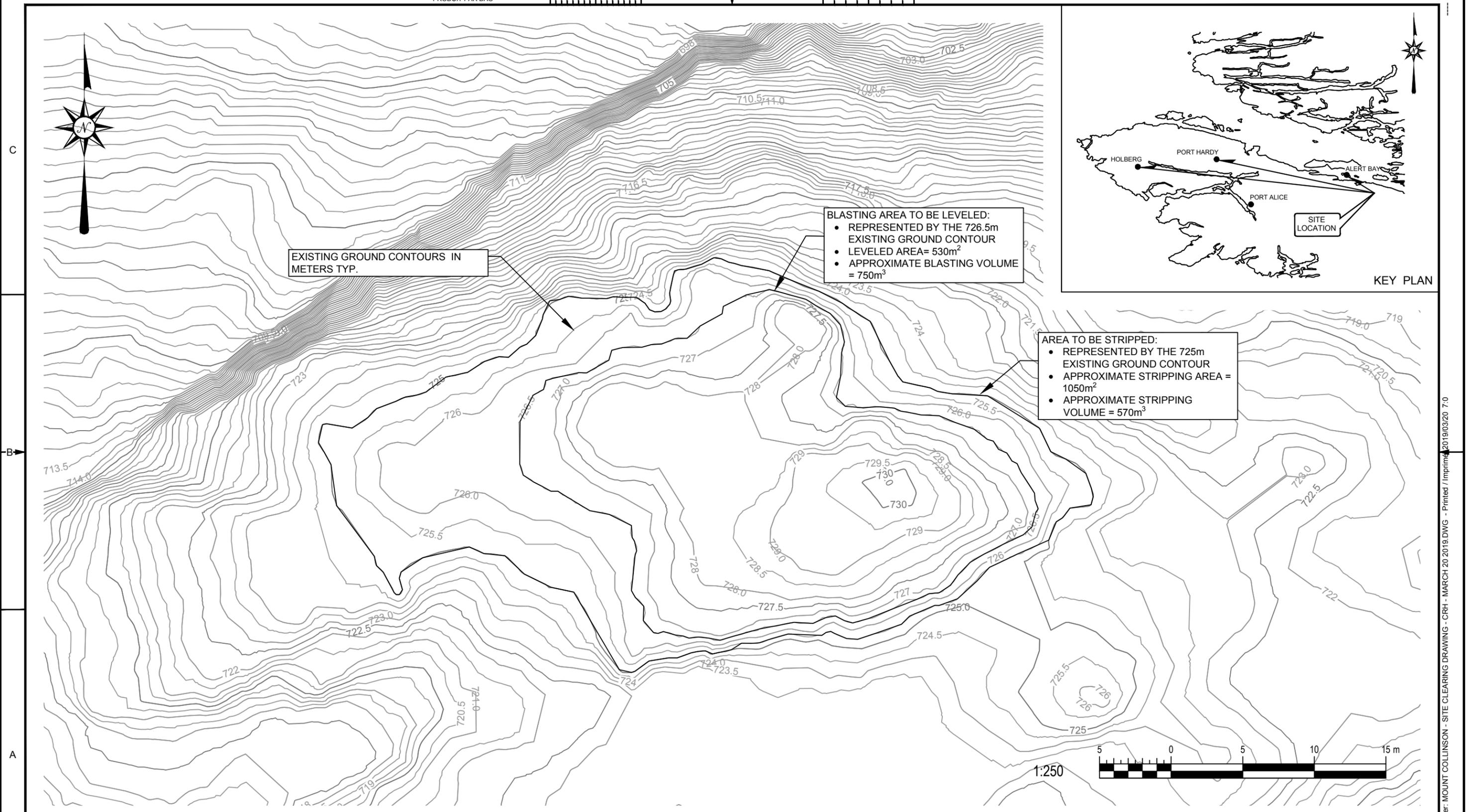
- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Do not bury or burn rubbish and waste materials on site.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .4 Waste Management: separate waste materials for recycling or reuse from materials for disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION



APPENDIX A

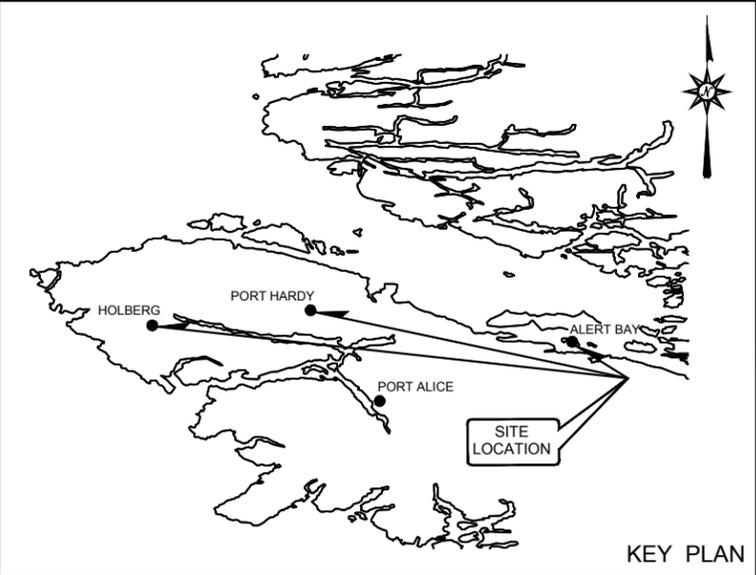
Refer to the following page



EXISTING GROUND CONTOURS IN METERS TYP.

BLASTING AREA TO BE LEVELED:
 • REPRESENTED BY THE 726.5m EXISTING GROUND CONTOUR
 • LEVELED AREA= 530m²
 • APPROXIMATE BLASTING VOLUME = 750m³

AREA TO BE STRIPPED:
 • REPRESENTED BY THE 725m EXISTING GROUND CONTOUR
 • APPROXIMATE STRIPPING AREA = 1050m²
 • APPROXIMATE STRIPPING VOLUME = 570m³



KEY PLAN

	Fisheries and Oceans Canada	Pêches et Océans Canada
	Canadian Coast Guard	Garde côtière Canadienne

designed - conception	date	checked - vérifié	date					
drawn - dessiné	date	approved - approuvé	date					
BS	2018-11-20							
CCG ref. no. - no. réf. GCC		scale - échelle		rev		description	by par	Date
8B200		1:250						

Asset - Actif
MT COLLINSON (TELEGRAPH COVE)
PROPOSED MCTS TOWER SITE

Drawing - Dessin		
MT COLLINSON (TELEGRAPH COVE)		
DRAFT SITE LAYOUT - OPTION A1		
drawing no. - no. dessin	sheet-feuille	rev
	01/01	A



APPENDIX B

Refer to the following pages



**Environmental Overview
Assessment in Support of the
Development of Canadian Coast
Guard Radar Sites,
British Columbia**

January 31, 2019

Prepared for:

Canadian Coast Guard—Marine & Civil
Infrastructure
Fisheries & Oceans Canada
25 Huron St.,
Victoria, BC V8V 4V9

Prepared by:

Stantec Consulting Ltd.
Suite 11, 2260 Mills Road
Sidney, BC V8L 5X4

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Abbreviations

BC	British Columbia
CCA	Central Coast Archaeology
CCG	Canadian Coast Guard
CDC	Conservation Data Centre
CDFmm	moist maritime Coastal Douglas-Fir
CMT	Culturally modified tree
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWHdm	dry maritime Coastal Western Hemlock
CWHvh2	very wet hypermaritime Coastal Western Hemlock
CWHvm1	submontane very wet maritime Coastal Western Hemlock
CWHvm2	very wet Coastal Western Hemlock
CWHxm	very dry maritime Coastal Western Hemlock
FISS	Fish Information Summary System
GOC	Government of Canada
GPS	Global Positioning System
MHwh1	wet hypermaritime Mountain Hemlock



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF
CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

PFR	preliminary field reconnaissance
RAAD	Remote Access to Archaeological Data
SARA	<i>Species at Risk Act</i>



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Introduction

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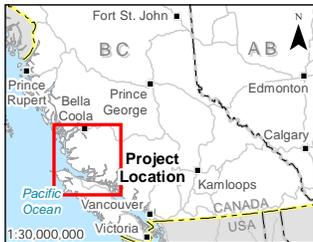
1.0 INTRODUCTION

Canadian Coast Guard (CCG) retained Stantec Consulting Ltd. (Stantec) to undertake an environmental overview assessment, including desktop and field-based assessments, for four proposed radar sites within British Columbia (BC) (the Project). The work was carried out in accordance with Stantec's proposal titled, *Scope of Work and Cost Estimate for Environmental Services in Support of the Development of Canadian Coast Guard Radar Sites, British Columbia*, dated July 27, 2018.

2.0 PROJECT LOCATIONS

Canadian Coast Guard is planning to construct four new radar stations at Denny Island, Mount Collinson, Safety Mountain, and Seymour Narrows. These sites are located along the west coast of BC near Campbell River (Seymour Narrows), Telegraph Cove (Mount Collinson), and Bella Bella (Denny Island and Safety Mountain). All locations are situated on the top of hills or are at high elevations to enhance range of radar signals (Figure 1). The Safety Mountain location is entirely within the Calvert Island Conservancy which is co-managed under an agreement between the Wuikinuxv First Nation and the Province of British Columbia.





- City, Town, or Village
- CCG Radar Tower Location
- Highway
- Road
- +— Railway



Project Location: Westcoast of British Columbia
 Project Number: 123221193
 Prepared by: LTRUDEL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, British Columbia: Environmental Overview Assessment
 Figure No.: 1

Title: Overview Map

ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Methods

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3.0 METHODS

The environmental overview assessment is focused on four valued environmental components: vegetation, wildlife, fish, and archaeology. The findings of the environmental overview assessment will inform the permitting process and be used in the development of a site-specific construction environmental management plan.

The environmental overview assessment was conducted using a combination of desktop and field-based (site reconnaissance) analysis. The desktop assessment was used to characterize the known environmental resources within the four Project locations using publicly available data and government databases. The site reconnaissance was used to confirm the presence of identified features and habitats, as well as to determine the presence of any unknown or unmapped features, habitats or species. The methods used for each of the components are described in the following sub-sections.

3.1 DESKTOP REVIEW

3.1.1 Vegetation

The study area for the desktop review is a 500 m buffer on the proposed radar tower location. Prior to the site reconnaissance, a desktop review of existing data sources was completed to identify any species or ecological communities of conservation concern, critical habitat for plant species at risk, old forest, wetlands, or invasive plants.

In this report, species and ecosystems of conservation concern include vascular plants and ecological communities that are:

- Red or blue-listed by the BC Conservation Data Centre (BC CDC)
- Designated as identified wildlife under the *Forest and Range Practices Act*
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or *Species at Risk Act* (SARA) listed

The BC CDC assigns plant species and ecological communities to provincial lists depending on their provincial conservation status. Red-listed plant species and ecological communities are those that are extirpated, endangered, or threatened in BC (BC CDC 2004). The BC Blue List includes any plant species and ecological communities considered to be of special concern in BC (BC CDC 2004). Blue-listed plant species possess characteristics that make them sensitive to either human activities or natural disturbance.

Plant species of conservation concern may also be federally listed as endangered, threatened or special concern under SARA and by COSEWIC (Government of Canada [GOC] 2017a).



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Methods

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Existing data sources which were reviewed included:

- Element occurrences for plant species and ecological communities (BC CDC 2018a)
- Potential plant species and ecological communities of conservation concern (BC CDC 2018b)
- Critical habitat for species at risk designated under SARA (Government of Canada 2018)
- Freshwater Atlas (GeoBC 2018a)
- Vegetation Resources Inventory (GeoBC 2018b) (used to identify areas of known old forest)
- Invasive Alien Plant Program database (BC MFLNRORD 2018)
- Publicly available digital aerial photographs

3.1.2 Wildlife

The wildlife study area for the desktop review includes the site tenure area plus a 500 m buffer. A review of existing information within the study area was completed prior to undertaking the site reconnaissance to identify critical habitat, species composition and distribution, and known or likely occurrences of species of management concern in the study area. Species of management concern are defined as terrestrial vertebrates that are:

- Listed as Endangered, Threatened or Special Concern by COSEWIC
- Designated on Schedule 1 of SARA
- Red or blue-listed by the Province of BC
- Known to be important to Aboriginal groups for hunting and trapping
- Species for which special mitigations are required

Provincial, federal, and non-government organization databases and information sources were reviewed for species occurrence records and species reports. The following information sources were consulted:

- BC Conservation Data Centre (BC CDC)
- DataBC (e.g., for spatial data related to critical habitat and provincially designated wildlife areas)
- NatureCounts (e.g., eBird, BC Breeding Bird Atlas)
- Wildlife Tree Stewardship Atlas
- BC Wildlife Species Inventory database

This information was reviewed to determine if the proposed radar sites overlap with any of the following:

- Parks and protected areas
- Designated Ungulate Winter Range
- Approved Wildlife Habitat Areas
- Wildlife tree retention areas and wildlife tree patches
- Critical habitat designated under SARA
- Grizzly bear population units
- Important Bird Areas
- Occurrences of species of management concern



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Methods

1/31/2019 12:00:00 AM

3.1.3 Fish

A desktop background review was used to characterize the Project area and species that may occur at or within 1 km of the four sites. This review focused on Commercial, recreational and aboriginal fishery species and species at risk. Information sources reviewed included government databases, community databases and scientific literature. Databases that were reviewed include:

- iMap BC (GeoBC 2018c)
- British Columbia Species and Ecosystems Explorer (BC CDC 2018b)
- Fish Information Summary System (FISS) (FISS 2018)

Mapping databases (e.g., iMap) were used to identify species and habitat, including evaluating land contours to identify potential fish habitat, near each Project site. The British Columbia Species and Ecosystems Explorer database and FISS were further used to identify species that may occur within each site.

3.1.4 Archaeology

A desktop review was conducted to determine the presence of recorded archaeological sites within each radar site study area, the site type of the nearest archaeological sites to each study area, and to assess the potential for unrecorded heritage sites to be present. The following archaeological and environmental resources were reviewed:

- Provincial Heritage Register through the Remote Access to Archaeological Data (RAAD) application maintained by the Archaeology Branch of British Columbia
- Central Coast Land and Resource Management Plan archaeological potential model (Bailey et al. 1999)
- Campbell River Forest District potential model (Eldridge et al. 2007)
- Satellite imagery
- Post-glacial environment studies (McLaren et al. 2014; Shugar et al. 2014; Fedje et al. 2018)

Key factors that were considered in this assessment include archaeological potential ratings as indicated in the existing potential models, proximity to known archaeological sites, proximity to terrain and hydrological features associated with archaeological sites in the region, and post-glacial environment (sea-level changes).



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Methods

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3.2 SITE RECONNAISSANCE

Site reconnaissance surveys were undertaken by a team consisting of a vegetation ecologist, a wildlife biologist, and an archaeologist from Stantec accompanied by a representative from CCG, archaeologists from Central Coast Archaeology (CCA) for the Denny Island and Safety Mountain sites, and local First Nations participants. The surveys were completed in October:

- October 2 and 3, 2018 for Denny Island and Safety Mountain
 - Colleen Bryden—wildlife ecologist
 - Jennifer Mundy—vegetation ecologist
 - George Kaufmann—archaeologist
 - Elroy White—Coastal Archaeology Consulting and Heiltsuk Nation
 - Charlie Brown—Coastal Archaeology Consulting and Heiltsuk Nation
- October 15, 2018 for Mount Collinson
 - Christina Ball—wildlife ecologist
 - Dmitry Petelin—vegetation ecologist
 - Adam Wharram—archaeologist
 - Harry Alfred—‘Namgis First Nation
 - Rachel Dalton—‘Namgis First Nation
- October 22, 2018 for Seymour Narrows
 - Christina Ball—wildlife ecologist
 - Dmitry Petelin—vegetation ecologist
 - Ian Streeter—archaeologist

3.2.1 Vegetation

A vegetation ecologist completed a site reconnaissance at each of the four proposed radar sites during October. The focus of the site reconnaissance was the proposed locations for the hard infrastructure (radar tower, building, access road, and permanent helipad), as identified by the CCG representative in the field. Site information, vegetation species, photographs, and global positioning system (GPS) coordinates were taken of the vegetation resources.

3.2.2 Wildlife

A registered professional wildlife biologist completed a site reconnaissance of the four radar sites. The objectives of the site reconnaissance were to identify potential wildlife habitat features (e.g., bear dens, raptor nests, mineral licks), identify wildlife trails or movement corridors, and assess the habitat at the site for marbled murrelet (*Brachyramphus marmoratus*) and other wildlife species of conservation concern.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

At each radar site the wildlife biologist surveyed the proposed development area on foot, focusing on the proposed locations for the radar tower, building and permanent helipad. The wildlife biologist surveyed the area for wildlife habitat features (e.g., bald eagle nests, bear dens) and marbled murrelet nesting habitat. Notes and photographs were taken of general habitat conditions and wildlife habitat features. The coordinates of wildlife habitat features were recorded using a handheld GPS unit. Incidental wildlife detections were also recorded.

At each site marbled murrelet nesting habitat was assessed from the ground using methods adapted from Burger et al. (2009). The assessment considers vertical canopy complexity, tree age class and size, canopy cover, moss development, nesting platform abundance, site position, and tree species.

3.2.3 Archaeology

Archaeologists conducted a non-permitted preliminary field reconnaissance (PFR) of the four proposed radar sites to identify archaeological sites through a surface inspection of the Project areas, provide a field-level assessment of archaeological potential within the Project areas, and to provide recommendations for further work, if necessary.

At each radar site, the archaeologist(s) conducted a pedestrian survey of the proposed development area which included an assessment of terrain and drainage attributes as well as the examination of soil exposures where available. Standing and fallen trees and stumps were inspected for cultural modifications. The field assessment was documented with written notes and photographs, and spatial data was collected with a hand-held GPS device.

4.0 ENVIRONMENTAL CONDITIONS

Combined results from the desktop review and the field reconnaissance are presented in this section. Representative photos from the field survey are in Appendix A.

4.1 DENNY ISLAND

4.1.1 Vegetation

According to desktop information, old forest (greater than 250 years of age) is present in the proposed development area, immediately to the west of the temporary helipad (Figure 2) and in the south end of the study area, outside the proposed development area. The forest immediately around the proposed radar tower is not old forest. There is one mapped watercourse in the south-west of the proposed development area, however this high-gradient headwater stream is unlikely to support listed floodplain ecological communities. The Denny Island study area does not overlap any mapped wetlands, known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk (Figure 2).



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

This site is in the very wet hypermaritime Coastal Western Hemlock (CWHvh2) biogeoclimatic unit. The CWHvh2 occupies the outer coastal portion of the region and is found between 0 and 600 m elevation. The climate is hypermaritime; cool, very mild, with very little snow, with fog and rain year-round. CWHvh2 terrain is mostly subdued and rocky and is characterized by low to mid-elevation rainforest stands of western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and amabilis fir (*Abies amabilis*). Due to the extremely wet climate the vegetation is a mosaic of poor forest and bog, with productive forests restricted to moderate and steep slopes or floodplains (Banner et al. 2014). Many of the forested ecological communities in the CWHvh2 are listed by the BC CDC. According to a BC CDC search, there are 15 ecological communities of conservation concern which may occur in the study area (CWHvh2): 11 upland and four wetland communities (Appendix B, Table B-1). There are 20 vascular plant species of conservation concern which may occur in the study area (Table B-2).

The site reconnaissance confirmed the proposed Denny Island radar site is located in a mature western redcedar/western hemlock forested community (Appendix A, Photo A-1) with an understorey composed primarily of blueberry and a forest floor covered by feather mosses. The site has small inclusions of low areas (of up to a few meters wide) with indicator species of other (wetter) site series (e.g., sedges [*Carex* sp.], and sphagnum moss [*Sphagnum* sp.]).

Because of the timing of the site reconnaissance, the presence of plant species of conservation concern could not be determined.





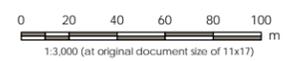
CWHvh2

Denny Island

Denny Island Radar Tower



- Topographic Contour (TRIM)
- Watercourse (TRIM)
- Waterbody (TRIM)
- CCG Radar Tower Location
- Tenure Area
- Old Growth (VRI Age > 250 years)
- Marbled Murrelet Critical Habitat
- Biogeoclimatic Ecosystem Classification Zone *
- Coastal Western Hemlock



Project Location: Denny Island, British Columbia
 Project Number: 123221193
 Prepared by: LTRUDELL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, British Columbia; Environmental Overview Assessment

Figure No.: 2

Title: Denny Island Environmental Conditions from Desktop Review and Site Reconnaissance

Notes
 1. Coordinate System: NAD 1983 BC Environment Albers
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
 3. Imagery Source: ESRI World Imagery
 * Boundaries may not be visible within current map extent.

\\cd1183403\workgroup\1232\Projects\123221193\Figures\reports\Environmental_Overview_Assessment\Fig_1_23221193_eoa_02_Site_Map.mxd Revised: 2019.01.17 By: ltrudell

ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.1.2 Wildlife

The desktop assessment of the Denny Island site indicate there are 16 species of conservation concern which may occur in the Denny Island study area: 12 bird species, two mammal species, and two amphibian species (Appendix C). Of the 16 species of conservation concern which may occur in the study area, 11 are designated on Schedule 1 of SARA. The Denny Island study area does not overlap any wildlife habitat areas, ungulate winter range, important bird areas, or grizzly bear population units. The study area does not overlap any parks or ecological reserves. There are no available occurrence records for wildlife species of conservation concern which overlap the study area. The Denny Island study area overlaps 69.4 ha of marbled murrelet critical habitat, and the tenure area overlaps 4.0 ha of marbled murrelet critical habitat (Figure 2).

The site reconnaissance results show the proposed Denny Island radar site is on a high point of land, dropping off steeply on all sides, and likely subject to strong winds, particularly in the winter. The site is an open understorey mature forest typical of higher elevations on the outer coast; the understorey is dominated by *Vaccinium* and moss (Appendix A Photo A-1). There are some small wetter areas present but, with little evidence of standing water coupled with their small dimensions, the suitability of these microsites for amphibian breeding is predicted to be low. Trees with dead tops and snags were common. No evidence of wildlife use of these trees was confirmed during the site visit although there are likely usable cavities. Wildlife may forage on the *Vaccinium* although berry production appears to be low, even accounting for the time of year the site was visited. The proposed tower and related facilities are not located in critical habitat for marbled murrelet (Figure 2). This was confirmed during the site reconnaissance; the field ranking for the site is very low suitability as nesting habitat, for example, the forest was lacking vertical canopy complexity and tree limbs when large enough to potentially support marbled murrelet nests had minimal mossy pad development and unsuitable structure (Appendix A, Photo A-2). Downslope from the site, there were larger western hemlock that appeared to have better potential as suitable nesting trees (Appendix A, Photo A-3), which is consistent with the federal mapping (see Figure 2).

No amphibians, species of conservation concern or wildlife habitat features were detected during the site reconnaissance. Common raven (*Corvus corax*) and an unidentified chickadee species (*Poecile* sp.) were recorded at the site.

4.1.3 Fish

There are no fish resources near the Denny Island site. The closest waterbodies are headwater first-order streams, one located 175 m to the west and one 300 m to the southeast (GeoBC 2018c). There are no fish records for either of these watercourses (FISS 2018). The site is located along a steep slope and therefore any unmapped watercourses at the location would not support fish species due to gradient barriers.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.1.4 Archaeology

The nearest recorded archaeological site to the Denny Island radar site is approximately 1.7 km to the southwest. FaTa-43 is a pictograph site located near the shoreline on Twilight Point. The modelled archaeological potential suggests the Denny Island radar site will have low archaeological potential for buried heritage resources, however the model tends to assign high archeological potential to mainly coastal regions, and inland or high elevation sites are restricted to within 200 m of modern freshwater sources (Bailey et al. 1999). As such, while the likelihood of subsurface archaeological sites is likely low, given the location of the radar on a high elongated ridge, the potential for trail, culturally modified tree (CMT), or rock art sites was assessed as moderate.

The PFR included a pedestrian survey of the proposed location of the radar tower, building, and permanent helipad. The mountain-top site is situated on a 10° to 12° slope with steeply sloping forested terrain just beyond the radar site development boundaries. During the field study, the CCA archaeologists noted that there are both recorded and unrecorded pictographs in the vicinity of the proposed radar site, along the Lama Passage shoreline, opposite of McLouglin Bay. Small patches of Indian Hellebore were observed on the slope around the site. These plants are used traditionally to treat arthritis and for sacred cleansing purposes (CCA crew pers. comm.), however given the location of the plants in the high-altitude area, along with their relative abundance on the west coast, the area is unlikely to be of cultural significance. No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, and helipad location.

4.2 MOUNT COLLINSON

4.2.1 Vegetation

According to desktop information, all forested ecosystems in the study area are old forest (greater than 250 years of age) (Figure 3). The Mount Collinson site is dominated by old coniferous forest on a local peak above Johnstone Strait. The radar tower location is in the submontane very wet maritime Coastal Western Hemlock (CWHvm1) biogeoclimatic unit. The CWHvm1 occupies both sides of northern Vancouver Island, and is found between sea level (or above CWHxm [dry maritime Coastal Western Hemlock] or CWHdm [dry maritime Coastal Western Hemlock] if present) to approximately 600 m on Vancouver Island. The CWHvm1 has a wet, humid climate with cool summers and mild winters featuring relatively little snow. Growing seasons are long. Forests on zonal sites are dominated by western hemlock, amabilis fir, and lesser amounts of western redcedar. Subdued terrain on the west coast and northern end of Vancouver Island features very old successional stages dominated by western redcedar, western hemlock, and salal (*Gaultheria shallon*) (Green and Klinka 1994).



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions

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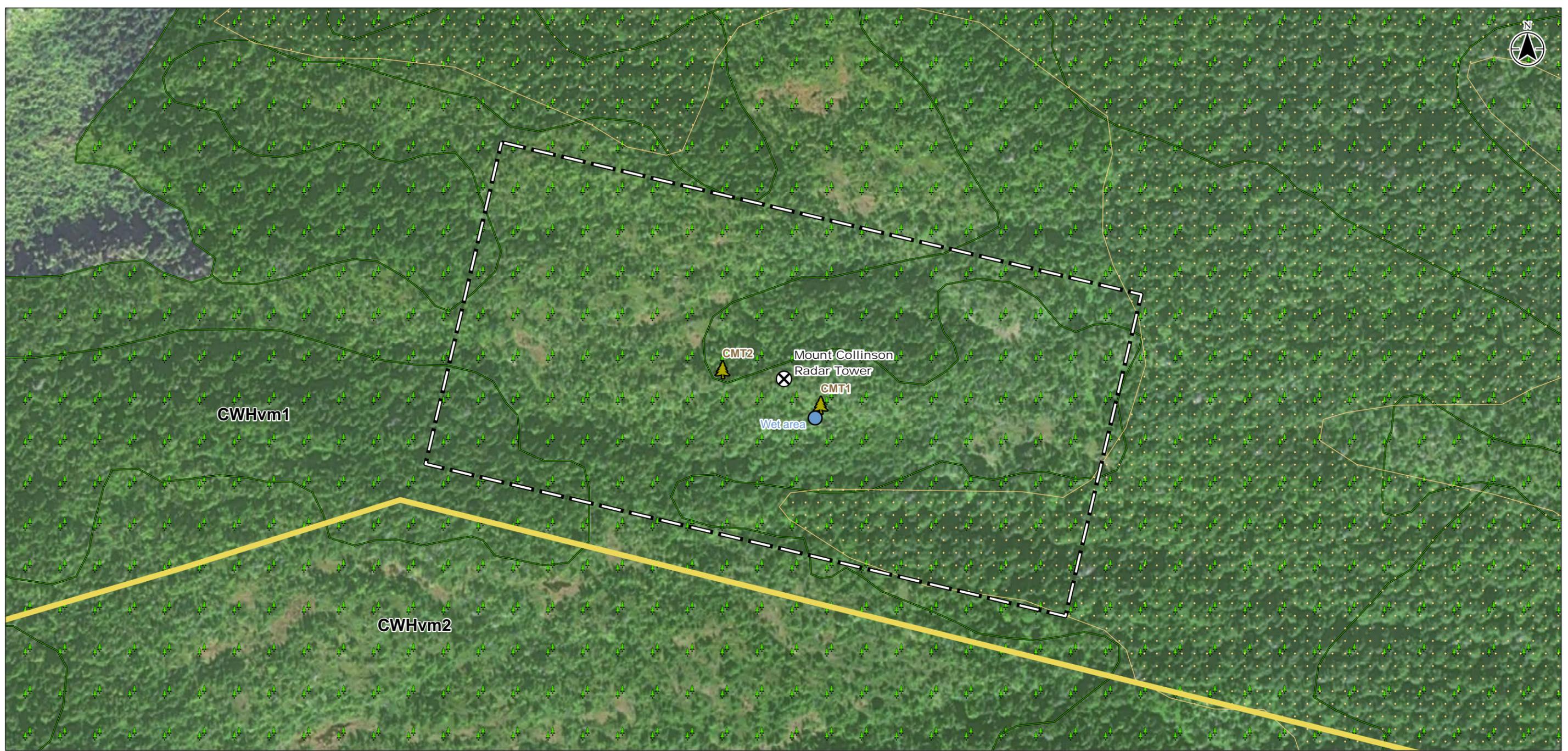
According to a BC CDC search, there are eight ecological communities of conservation concern which may occur in the study area (CWHvm1 and CWHvm2): five forested upland and three wetland communities (Appendix B, Table B-2). There are 14 vascular plant species of conservation concern which may occur in the study area (Appendix B Table B-4). The Mount Collinson study area does not overlap any mapped wetlands, riparian areas, known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk.

The site reconnaissance found the proposed Mount Collinson site is within a sparsely treed, blue-listed forested community at the top of a hill—the western hemlock—western redcedar/salal unit (CWHvm1/03) (Appendix A, Photo A-4). The forest is composed of mountain hemlock, western hemlock, and yellow cedar (*Chamaecyparis nootkatensis*) trees, with a shrub layer composed primarily of salal, blueberry, and crowberry (*Empetrum nigrum*). The ground was covered in feathermosses and lichen. Some tree clearing for the temporary helipad had already been conducted at the time of the site reconnaissance.

The site had small inclusions (of up to a few meters wide) of low areas with indicator species of other (wetter) site series (e.g., sedges [*Carex* sp.], skunk cabbage [*Lysichiton americanum*], and Indian hellebore [*Veratrum viride*]).

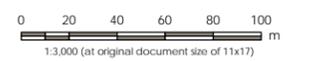
Because of the timing of the site reconnaissance, the presence of plant species of conservation concern could not be determined.





- Topographic Contour (TRIM)
- Watercourse (TRIM)
- Waterbody (TRIM)
- Old Growth (VRI Age > 250 years)
- Marbled Murrelet Critical Habitat
- Coastal Western Hemlock
- CCG Radar Tower Location
- Tenure Area
- Wet area
- Culturally Modified Tree

Notes
 1. Coordinate System: NAD 1983 BC Environment Albers
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
 3. Imagery Source: ESRI World Imagery
 * Boundaries may not be visible within current map extent.



Project Location: Mount Collinson, British Columbia
 Project Number: 123221193
 Prepared by: LTRUDELL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, Environmental Overview Assessment

Figure No.: 3

Title: Mount Collinson Environmental Conditions from Desktop Review and Site Reconnaissance

\\cdm1183-033\workgroup\1232\Projects\123221193\Figures\reports\Environmental_Overview_Assessment\Fig_123221193_eoa_02_Site_Map.mxd Revised: 2019.01.17 By: ltrudel

ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.2.2 Wildlife

The desktop assessment of the Mount Collinson site indicates there are 24 species of conservation concern which may occur in the Mount Collinson study area: 14 bird species, seven mammal species, and three amphibian species (Appendix C). Of the 24 species of conservation concern which may occur in the study area, 14 are designated on Schedule 1 of SARA.

The Mount Collinson study area does not overlap any wildlife habitat areas, ungulate winter range, important bird areas, or grizzly bear population units. The study area does not overlap any parks or ecological reserves. There are no available occurrence records for wildlife species of conservation concern which overlap the study area. The Mount Collinson study area overlaps 64.7 ha of marbled murrelet critical habitat, and the proposed development area overlaps 1.5 ha of marbled murrelet critical habitat (Figure 3).

Site reconnaissance of the site indicates it is within an open, coniferous forest at the top of a rocky hill. The forest was made up of western hemlock, mountain hemlock, and yellow cedar trees supporting arboreal lichens. The shrub layer was composed mainly of salal and blueberry, and the ground was moss. The trees at the site were smaller in diameter with limbs too small to support marbled murrelet nests and lacking moss pads (Appendix A, Photo A-5); the site is therefore not suitable for marbled Murrelet nesting.

Black bear (*Ursus americanus*) scat was found at the site, but no potential bear dens were observed. A small wet area was located within the site (Figure 3; Appendix A, Photo A-6). This may provide breeding habitat for amphibians during the breeding period, though this is unlikely due to the wet area's small size. Unidentified bird tracks and Columbian black-tailed deer (*Odocoileus hemionus columbianus*) tracks were observed in the wet area. No amphibians, species of conservation concern, or wildlife habitat features were detected during the site reconnaissance.

4.2.3 Fish

There are no fish resources near the Mount Collinson site. The closest waterbodies are the headwater reaches of three first-order streams, one located 360 m west, one 500 m north and one 400 m south (GeoBC 2018c). There are no fish records for these watercourses (FISS 2018), and the steep slopes at these locations would prevent fish access to these headwater areas. The site is located at the top of a peak along the shoreline with steep slopes on all sides, therefore any unmapped watercourses at the location would not support fish species due to gradient barriers.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
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4.2.4 Archaeology

The nearest recorded archaeological site to the Mount Collinson radar site is approximately 3.4 km to the northwest. EdSq-22 is a CMT site located near the shoreline just east of Telegraph Cove. No potential model has been created for this area, but most of the sites in the region are recorded along the shoreline or along major streams and rivers. Given the elevation and terrain near the radar site, there is low potential for subsurface archaeological sites. However, as the radar site is on the northern slope of Mount Collinson, possibly providing vantage points of Johnstone Strait, the potential for trail, CMT, spiritual, or rock art sites was assessed as moderate.

The PFR included a pedestrian survey of several proposed locations of the radar tower, building, and permanent helipad. Generally, the proposed development area consists of high, level ground with areas on hummocky and undulating terrain with steep slopes down to the north and south. The ground was well- to moderately-drained, except for an area on standing water near Building Location 2. Two likely CMTs were identified within the proposed development area, both large diameter yellow cedar bark-stripped trees (Photo 1). No other above-ground archaeological resources were identified. One area of low to moderate potential was identified adjacent to the likely CMT-1, near the area of standing water. Recommendations are discussed in Section 5.4. No other locations with high potential for buried archaeological resources were identified at the proposed tower, building, and helipad locations.



Photo 1 Likely Culturally Modified Tree CMT-1



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.3 SAFETY MOUNTAIN

4.3.1 Vegetation

The Safety Mountain site is located on top of a ridge, just east of the peak on Calvert Island. The site is located entirely within the Calvert Island Conservancy which is co-managed under an agreement between the Wuikinuxv First Nation and the Province of British Columbia. The radar tower footprint is in the wet hypermaritime Mountain Hemlock (MHwh1) biogeoclimatic unit, and the site is dominated by mature coniferous forest. The site area also includes the CWHvh2. The MHwh is a forested subalpine area characterized by yellow-cedar and mountain hemlock (*Tsuga mertensiana*) (Banner et al. 2014). The MHwh occurs at high elevations on Haida Gwaii and in hypermaritime areas of the coast, north of Smith Inlet. The elevational limits range from approximately 500 to 900 m. The MHwh has long, very wet, cold winters and short, cool, moist summers. Frozen soils are rare due to the insulating snowpack, but growing season frosts are common. Total snowfall is high, resulting in a substantial snowpack that can persist into July. Forests on zonal sites are dominated by mountain hemlock (*Tsuga mertensiana*) and yellow-cedar (*Chamaecyparis nootkatensis*), with Alaskan blueberry (*Vaccinium alaskaense*) and mosses (e.g., *Rhytidiadelphus loreus*, *Hylocomium splendens*, *Scapania bolanderi*, *Sphagnum girgensohnii*) common in the understorey. Vegetation and stand characteristics in the MHwh are strongly influenced by local topography, which affects timing and pattern of snowmelt. Upper elevations grade into discontinuous forests of the parkland subzone (Banner et al. 2014).

The CWHvh2 is found below the MH zone. It occupies the outer coastal portion of the region and is found between 0 and 600 m elevation. The climate is hypermaritime; cool, very mild, with very little snow, with fog and rain year-round. CWHvh2 terrain is mostly subdued and rocky, and characterized by low to mid-elevation rainforest stands of western hemlock, western redcedar, and amabilis fir. The climate is extremely wet, and the vegetation is a mosaic of poor forest and bog, with productive forests restricted to moderate and steep slopes or floodplains (Banner et al. 2014).

According to desktop information, no old forest (greater than 250 years of age) is present in the study area (Figure 4). There is one mapped wetland on the eastern edge of the study area, however there are no mapped wetlands in the proposed development area. There are two mapped watercourses on the northern edges of the development area, however they are not located near the proposed location for the radar tower. These high-gradient headwater streams are unlikely to support listed floodplain ecological communities (Figure 4).

According to the BC CDC search, there are two ecological communities of conservation concern, both forested upland communities (Appendix B, Table B-5), and three vascular plant species of conservation concern which may occur in the study area (MHwh1) (Appendix B Table B-6). The Safety Mountain study area does not overlap any known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk (Figure 4).



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

Site reconnaissance of the proposed Safety Mountain site indicates it is located in high elevation krummholz composed of stunted, scrub forest of mountain hemlock and yellow cedar trees, with a herb layer dominated by pink mountain heather (*Phyllodoce empetrifomis*), crowberry, and blueberries, and ground lichen cover (Appendix A Photo A-7).

Because of the timing of the site reconnaissance, the presence of plant species of conservation concern could not be determined.



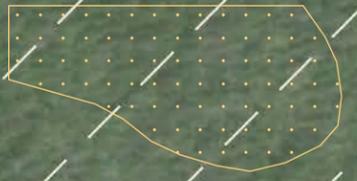


Calvert Island
Conservancy

Calvert
Island

MHwh1

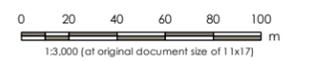
Safety Mountain
Radar Tower



- Topographic Contour (TRIM)
- Watercourse (TRIM)
- Waterbody (TRIM)
- Conservancy Area

- CCG Radar Tower Location
- Tenure Area

- Old Growth (VRI Age > 250 years)
- Marbled Murrelet Critical Habitat
- Biogeoclimatic Ecosystem Classification Zone ***
- Coastal Western Hemlock
- Mountain Hemlock



Project Location: Safety Mountain, British Columbia
 Project Number: 123221193
 Prepared by: LTRUDELL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, British Columbia; Environmental Overview Assessment

Figure No.: 4

Title: Safety Mountain Environmental Conditions from Desktop Review and Site Reconnaissance

Notes
 1. Coordinate System: NAD 1983 BC Environment Albers
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
 3. Imagery Source: ESRI World Imagery
 * Boundaries may not be visible within current map extent.

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ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.3.2 Wildlife

The desktop assessment of the Safety Mountain site indicates there are 16 species of conservation concern which may occur in the Safety Mountain study area: 12 bird species, two mammal species, and two amphibian species (Appendix C). Of the 16 species of conservation concern which may occur in the study area, 11 are designated on Schedule 1 of SARA.

The Safety Mountain study area does not overlap any wildlife habitat areas, ungulate winter range, important bird areas, or grizzly bear population units. The study area does not overlap any parks or ecological reserves. There are no available occurrence records for wildlife species of conservation concern which overlap the study area.

The Safety Mountain study area overlaps 13.3 ha of marbled murrelet critical habitat (Figure 4). The tenure area does not overlap any marbled murrelet critical habitat.

Site reconnaissance of the proposed Safety Mountain radar site indicates it is on a high point of land, dropping off steeply on all sides, and likely subject to strong winds, particularly in the winter. The site is a parkland community with patches of stunted trees and openings dominated by heather and low-growing berry-producing shrubs (Appendix A Photo A-7, Photo A-8). The production of crowberry was good and is likely a source of forage for wildlife. There is a small non-continuous drainage in a low area between two knolls which may have flowing water under very wet conditions; the suitability of this feature for amphibian breeding is predicted to be low to nil (Appendix A Photo A-9). The proposed tower and related facilities are not located in critical habitat for marbled murrelet (Figure 4). This was confirmed during the site reconnaissance; the field ranking for the site is nil suitability as nesting habitat, specifically because the patchy tree cover is generally less than 3 m in height.

No amphibians or species of conservation concern were detected during the site reconnaissance. There were trails crossing through and around the site, some likely reinforced by recent human activity, but there was also evidence of deer use of some trails. No other wildlife habitat features were observed. Golden-crowned kinglet (*Regulus satrapa*) and black-capped chickadee (*Poecile atricapillus*) were recorded at the site. Ptarmigan scat and an owl pellet and feather pile were found at the site.

4.3.3 Fish

There are no fish resources near the Safety Mountain site. The closest waterbodies are the headwater ends of three first-order streams, one located 135 m north and one 220 m west and one 430 m south (GeoBC 2018c). There are no fish records for the first two watercourses (FISS 2018), and the steep slopes at these locations would prevent fish access to these headwater areas. The watercourse to the south drains into a fish bearing stream which supports pink (*Oncorhynchus gorbuscha*) and coho salmon (*O. kisutch*), however the tributary drains over 1 km of steep slopes before reaching potentially fish bearing lower gradient areas. The site is located at the top of a peak with steep slopes on all sides, therefore any unmapped watercourses at the location would not support fish species due to gradient barriers.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.3.4 Archaeology

The nearest recorded archaeological sites to the Safety Mountain radar site are approximately 1.6 km to the south along the head of Safety Cove. EjSx-9 is a CMT site, and EjSx-10, and 11 are subsurface shell midden sites eroding from the shoreline. The modelled archaeological potential suggests the Safety Mountain radar site will have low archaeological potential for buried heritage resources, however the model tends to assign high archaeological potential to mainly coastal regions, and inland or high elevation sites are restricted to within 200 m of modern freshwater sources (Bailey et al. 1999). As such, while the likelihood of subsurface archaeological sites may be low, given the location of the radar site on a high mountain ridge with vantages over much of the surrounding landscape, the potential for trail, CMT, spiritual or rock art sites was assessed as moderate.

The PFR included a pedestrian survey of the proposed location of the radar tower, building, and permanent helipad. Terrain at this location consisted of rolling high elevation landscape with no significant landforms. Vegetation consisted of high-altitude scrub vegetation with several small and shallow ponds. No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, and helipad location.

4.4 SEYMOUR NARROWS

4.4.1 Vegetation

The Seymour Narrows site is located near the top of a hill and is dominated by mature forest, with occasional cliffs and rock outcrops. The site sits within the very dry maritime Coastal Western Hemlock (CWHxm1) biogeoclimatic unit. The CWHxm1 occurs at lower elevations along the east side of Vancouver Island (above the Coastal Douglas-fir where present) as far north as Kelsey Bay, and on the islands around southern Johnstone Strait (Green and Klinka 1994). Elevational limits range from sea level (or above the CDFmm [moist maritime Coastal Douglas Fir] where present) to approximately 700 m. The CWHxm1 has warm, dry summers and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites. Forests on zonal sites are dominated by Douglas-fir (*Pseudotsuga menziesii*), accompanied by western hemlock and minor amounts of western redcedar (Green and Klinka 1994).

According to desktop information, none of the forested ecosystems in the tenure area are old forest (greater than 250 years of age), though there is some old forest in the south-east portion of the study area (Figure 5). Most forested ecological communities in the CWHxm1 are listed by the BC CDC. According to a BC CDC search, there are 23 ecological communities of conservation concern which may occur in the study area (CWHxm1): 14 upland and nine wetland communities (Appendix B, Table B-7). There are 44 vascular plant species of conservation concern which may occur in the study area (Appendix B, Table B-8). The Seymour Narrows study area does not overlap any mapped wetlands, riparian areas, known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions

1/31/2019 12:00:00 AM

The site reconnaissance determined the proposed Seymour Narrows site is within a young red-listed forested community at the top of a hill—the Douglas-fir—lodgepole pine/grey rock-moss unit (CWHxm1/02) (Figure 5, Appendix A, Photo A-10). The Douglas—fir—lodgepole pine/grey rock-moss community is composed of Douglas fir and shore pine, with an understorey dominated by salal, grasses, mosses and ground lichen on the numerous rock outcrops. Some tree clearing for the temporary helipad had already been conducted at the time of the site reconnaissance.

The proposed access road to the radar site from the existing forest service road runs through closed canopy blue-listed forests. Douglas-fir/sword fern (CWHxm1/04) forest is present in drier areas (Appendix A, Photo A-11) and western redcedar/sword fern (CWHxm1/05) is present in wetter areas. The understorey of both communities is composed primarily of sword fern (*Polystichum munitum*) and twinflower (*Linnaea borealis*), with a moss layer. The forest along the proposed access road had small inclusions (of up to a few meters wide) of low areas with indicator species of other (wetter) site series.

Because of the timing of the site reconnaissance, the presence of plant species of conservation concern could not be determined.





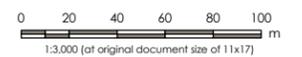
- Forest Tenure Road
- Topographic Contour (TRIM)
- Watercourse (TRIM)
- Waterbody (TRIM)

- CCG Radar Tower Location
- Access Road
- Tenure Area
- Proposed Powerline (approx. location)
- Project Component (approx. location)

- Old Growth (VRI Age > 250 years)
- Marbled Murrelet Critical Habitat
- Douglas-fir-lodgepole pine/grey rock-moss young forest (Red-listed)
- Biogeoclimatic Ecosystem Classification Zone *
- Coastal Western Hemlock

- Swampy area

Notes
 1. Coordinate System: NAD 1983 BC Environment Albers
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
 3. Imagery Source: ESRI World Imagery
 * Boundaries may not be visible within current map extent.



Project Location: Seymour Narrows, British Columbia
 Project Number: 123221193
 Prepared by: LTRUDELL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, British Columbia; Environmental Overview Assessment

Figure No.: 5
 Title: Seymour Narrows Environmental Conditions from Desktop Review and Site Reconnaissance

ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.4.2 Wildlife

The desktop assessment of the Seymour Narrows site indicates there are 25 species of conservation concern which may occur in the Seymour Narrows study area: 14 bird species, eight mammal species, and three amphibian species (Appendix C). Of the 25 species of conservation concern which may occur in the study area, 14 are designated on Schedule 1 of SARA.

The Seymour Narrows study area does not overlap any wildlife habitat areas, ungulate winter range, important bird areas, or grizzly bear population units. The study area does not overlap any parks or ecological reserves. There are no available occurrence records for wildlife species of conservation concern which overlap the study area. There are two bald eagle nests within 1 km of the tenure area along the shoreline of Seymour Narrows (WTSP 2018), which is well beyond the usual setback distance of 100 m for bald eagle.

The Seymour Narrows study area overlaps 12.6 ha of marbled murrelet critical habitat (Figure 5). The tenure area does not overlap marbled murrelet critical habitat.

Site reconnaissance of the site indicates it is located within an open, coniferous forest at the top of a rocky hill. The forest was made up of lodgepole pine and Douglas-fir supporting arboreal lichens. The shrub layer was composed mainly of salal. The ground was covered in a thick layer of moss. The trees at the site were smaller in diameter with limbs too small to support marbled murrelet nests and lacking moss pads (Appendix A, Photo A-12). The site is not suitable for marbled murrelet nesting.

Black bear scat was found at the site, but no potential bear dens were observed. Deer pellets were observed throughout the site. A northern Pacific treefrog (*Pseudacris regilla*), chestnut-backed chickadee (*Poecile rufescens*) and red-breasted nuthatch (*Sitta canadensis*) were heard calling. No species of conservation concern and no wildlife habitat features were detected during the site reconnaissance of the radar site.

The access road to the radar site goes through a closed canopy, conifer forest made up of regenerating Douglas-fir (Appendix A Photo A-13). The trees were small diameter with small limbs not suitable for marbled murrelet nesting. The shrub layer was sparse and was made up primarily of sword fern; there was little vegetative ground cover, but coarse woody debris was abundant. The access road goes past a swampy area with pools of water (Figure 4; Appendix A, Photo A-14). The water was discoloured and is unlikely to support breeding amphibians. No amphibians, species of conservation concern or wildlife habitat features were detected during the site reconnaissance of the access road.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Environmental Conditions
1/31/2019 12:00:00 AM

4.4.3 Fish

There are no fish resources near the Seymour Narrows site. The closest waterbodies are the headwater ends of two first-order streams located 400 to 500 m southwest (GeoBC 2018c). There are no fish records for either of these watercourses (FISS 2018), and the steep slopes at these locations would prevent fish access to these headwater areas. There are two fish bearing watercourses within 1.2 to 1.9 km of the site however there is no connection to these waterbodies. The site is located at the top of a hill with steep slopes along the base, therefore any unmapped watercourses at the location would not support fish species due to gradient barriers.

4.4.4 Archaeology

The nearest recorded archaeological sites to the Seymour Narrows radar site are within 2 km to the southwest and to the east-northeast. EaSi-2 is a large subsistence feature (fish trap) within the intertidal zone of Menzies Bay, and EaSh-69 is a large subsistence feature (fishing weir and clam garden) within the intertidal zone of Plumper Bay. The modelled archaeological potential suggests the radar site will have low potential for buried archaeological sites, however the model tends to assign high archaeological potential to mainly coastal regions and near major rivers and streams (Eldridge et al. 2007). As such, while the likelihood of subsurface archaeological sites may be low, given the high elevation of the radar site with vantages over Seymour Narrows and Menzies Bay, the potential for trail, CMT, spiritual or rock art sites was assessed as moderate.

The PFR included a pedestrian survey of the proposed location of the radar tower, building, and permanent helipad. An access road extending west from the proposed tower to an existing road was also assessed. Terrain at this location is undulating and rocky with numerous bedrock exposures. The central portion of the site has been recently cleared for the placement of the helipad. Surrounding vegetation consists of mature second growth and Douglas-fir, with evidence of past commercial logging activities. No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, and helipad location.

The proposed access road is proposed to be 3 to 5 m wide extending west from the tower location for approximately 300 m. Terrain along the road is sloped with a gentle to moderate west aspect, down from the hill summit. Vegetation along the road transitioned along with drainage, becoming increasingly wet with more abundant western redcedar. No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified along the proposed road.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Recommendations
1/31/2019 12:00:00 AM

5.0 RECOMMENDATIONS

5.1 VEGETATION

Recommended mitigation measures to avoid, limit, restore, or offset potential effects of the Project on vegetation are:

- Avoid effects to old forest by planning Project activities (i.e., vegetation clearing and construction of Project infrastructure) outside of the limits of old forest on Denny Island
- Reduce tree clearing by locating Project infrastructure in areas previously cleared for the temporary helipads
- Conduct a pre-disturbance rare plant survey of the footprint prior to construction. If any rare plants are found, create a rare plant management plan
- Prior to construction, flag the boundaries of red-listed communities within 30 m of the Project footprint. Minimize location of temporary workspaces within red-listed communities
- Reduce the probability of introducing noxious weeds to the sites by cleaning equipment of vegetation debris and soil prior to transport to the sites
- Monitor the radar sites for noxious weeds following construction during vegetation management activities. If noxious weeds are discovered during monitoring, create and implement a management plan to comply with the BC *Weed Control Act*.

5.2 WILDLIFE

Recommended mitigation measures to avoid, limit, restore, or offset potential effects of the Project on wildlife are:

- Reduce potential effects to migratory birds (i.e., incidental take), plan Project activities (i.e., vegetation clearing and construction) to occur outside of the primary nesting period for breeding birds. The Mount Collinson and Seymour Narrows sites are in the A1 Nesting Zone which has a general nesting period of March 31 through August 7 (all habitats) (ECCC 2018). The Denny Island and Safety Mountain sites are in the A2 Nesting Zone, which has a primary nesting period of April 11 to August 8 (all habitats) (ECCC 2018).
- If Project activities overlap with the general nesting period, engage a qualified biologist to carry out a pre-construction survey for nests ('nest sweep'). Nest setbacks will be applied (i.e., flagged exclusion area) following discovery of an active, suspected active, or protected nest. Setback distances will be based on provincial and federal guidelines, and the opinion of a qualified biologist. A qualified biologist will also determine how long a setback will remain in place. Clearing must be started within seven days of the nest sweep being completed, otherwise another nest sweep must be undertaken.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Recommendations

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- At the Seymour Narrows location where wetted habitat was identified, reduce potential effects to amphibians by avoiding Project activities (i.e., vegetation clearing and construction) in wetlands that contain amphibian egg masses or tadpoles during the amphibian breeding period (mid-April to mid-August) and in habitats where amphibian movement is observed during the post-breeding dispersal period (mid-July to mid-September).
- At the Seymour Narrows location where wetted habitat was identified, if Project activities overlap with the amphibian breeding or post-breeding dispersal periods, engage a qualified biologist to undertake pre-construction amphibian surveys. The surveys will: 1) determine the presence of amphibian eggs, tadpoles, juveniles, or adults; and 2) determine whether salvage or other mitigation measures are required. A British Columbia *Wildlife Act* permit is required to undertake amphibian salvage activities.

5.3 FISH

No mitigation measures or further work is required. None of the proposed radar sites are anticipated to require fisheries-related permits.

5.4 ARCHAEOLOGY

At the Mount Collinson site, one area of low to moderate potential was identified adjacent to the likely CMT-1, near an area of standing water. Additional investigations, which may include coring the tree with an increment borer or examining a cookie of the tree if felled, are recommended to confirm if modifications are cultural, and to determine the scar age. Further, it is recommended that shovel testing of the area occur should the bark-strip be confirmed as cultural. A *Heritage Conservation Act* (HCA) Section 14 Inspection permit will be required to complete this additional study at the Mount Collinson site. Should shovel testing result in the identification of archaeological materials, an HCA Section 12 Alteration permit will be required prior to ground works association with construction at the Mount Collinson site.

No in-field mitigation measures or further work is planned for the Denny Island, Safety Mountain, or Seymour Narrows sites. An archaeological chance find procedure will be in place to support the identification or and response to chance encounters with unanticipated and potential archaeological materials during construction at the Denny Island, Safety Mountain and Seymour Narrows sites.



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Closure

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6.0 CLOSURE

We trust the content of this report is sufficient for your current needs. Should you have any questions or concerns, please contact the undersigned.

Regards,

Stantec Consulting Ltd.

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References

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7.0 REFERENCES

- Bailey, J., E. Laanela, T. Hoffmann, G. Wada, A. McRanor, M. Karpiak, and S. Horvath. 1999. An archaeological overview of the Central Coast LRMP Area. On file at Archaeology Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Victoria, BC.
- Banner, A., W.H. MacKenzie, J. Pojar, A. MacKinnon, S.C. Saunders, and H. Klassen. 2014. A field guide to ecosystem classification and identification for Haida Gwaii. Land Management Handbook 68. Province of BC, Victoria, BC.
- BC CDC (Conservation Data Centre). 2004. Ecological Communities in British Columbia: Conservation Status Assessment Factors. Available from: http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/conservation-data-centre/conservation_status_assessment_factors.pdf.
- BC CDC. 2018a. CDC iMap [web application]. BC Ministry of Environment. Victoria, BC. Available at: <http://maps.gov.bc.ca/ess/sv/imapbc/>. Accessed September 2018.
- BC CDC. 2018b. Species and Ecosystems Explorer. Available at: <http://a100.gov.bc.ca/pub/eswp/>. Accessed September 2018.
- BC MFLNRORD (Ministry of Forests, Lands, Natural Resource Operations and Rural Development). 2018. Invasive Alien Plant Program (IAPP) Database. Available at: <https://www.for.gov.bc.ca/hra/Plants/application.htm>. Accessed February 2018.
- Burger, A.E., F.L. Waterhouse, A. Donaldson, C. Whittaker, and D.B. Lank. 2009. New methods for assessing Marbled Murrelet nesting habitat: Air photo interpretation and low-level aerial surveys. BC Journal of Ecosystems and Management 10:4–14.
- ECCC (Environment and Climate Change Canada). 2018. Nesting Periods. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#_zoneA_calendar. Accessed November 2018.
- Eldridge, M., A. Parker, J. Brunnsden, and I. McKechnie. 2007. Permit 2007-048: Campbell River Forest District archaeological overview assessment. On file at Archaeology Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Victoria, BC.
- Fedje, D, D. McLaren, T.S. James, Q. Mackie, N. F. Smith, J. R. Southon, and A. P. Mackie. 2018. A revised sea level history for the northern Strait of Georgia, British Columbia, Canada. Quaternary Science Reviews 192: 300–316. Available at: <https://www.sciencedirect.com/science/article/pii/S0277379118300908?via%3Dihub>. Accessed September 2018.



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References

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- FISS (Fisheries Inventory Summary System). 2018. Fisheries Information Summary System. Available at: <http://www.env.gov.bc.ca/fish/fiss/>. Accessed September 2018.
- GeoBC. 2018a. Freshwater Atlas. Available at: <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/freshwater>. Accessed September 2018.
- GeoBC. 2018b. VRI – Forest Vegetation Composite Polygons and Rank 1 Layer. Available at: <https://catalogue.data.gov.bc.ca/dataset/vri-forest-vegetation-composite-polygons-and-rank-1-layer>. Accessed September 2018.
- GeoBC. 2018c. iMap BC. Available at: <https://maps.gov.bc.ca/ess/hm/imap4m/> Accessed September 2018.
- GOC (Government of Canada). 2018a. COSEWIC Quantitative Criteria and Guidelines for the Status Assessment of Species. Available at: <http://sararegistry.gc.ca/default.asp?lang=En&n=FF182FA5-1>. Accessed September 2018.
- GOC. 2018b. Critical Habitat for Species at Risk, British Columbia. Available at: <http://donnees.ec.gc.ca/data/species/developplans/critical-habitat-for-species-at-risk-british-columbia/>. Accessed September 2018.
- GOC. 2018c. *Species at Risk Act* Public Registry. Available at: http://www.sararegistry.gc.ca/sar/index/default_e.cfm Accessed September 2018.
- Green, R.N., and K. Klinka. 1994. A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region. Land Management Handbook 28. Victoria, BC.
- McLaren, D., D. Fedje, M. Hay, Q. Mackie, I.J. Walker, D.H. Shugar, J.B.R. Eamer, O.B. Lian, and C. Neudorf. 2014. A post-glacial sea level hinge on the central Pacific coast of Canada. *Quaternary Science Review* 97:148–169. Available at: <https://www.sciencedirect.com/science/article/pii/S0277379114002042?via%3Dihub#cebib0010>. Accessed September 2018.
- Shugar, D.H., I.J. Walker, O.B. Lian, J.B.R. Eamer, C. Neudorf, D. McLaren, and D. Fedje. 2014. Post-glacial sea-level change along the Pacific coast of North America. *Quaternary Science Review* 97:170–192. Available at: <https://www.sciencedirect.com/science/article/pii/S0277379114002030?via%3Dihub>. Accessed September 2018.
- WTSP (Wildlife Tree Stewardship Program). 2018. Nest Tree Report. The Community Mapping Network. Available at: <http://www.cmnmaps.ca/wits/>. Accessed September 2018.



APPENDIX A
SITE RECONNAISSANCE PHOTOS

**ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF
CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA**

Appendix A Site ReConnaissance Photos
January 31, 2019

Appendix A SITE RECONNAISSANCE PHOTOS

A.1 DENNY ISLAND



Photo A-1 Proposed Denny Island Radar Site—Mature Western Redcedar/Western Hemlock Forest



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Appendix A Site ReConnaissance Photos
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Photo A-2 Example of Larger Limbed Tree at Proposed Denny Island Radar Site



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Appendix A Site ReConnaissance Photos
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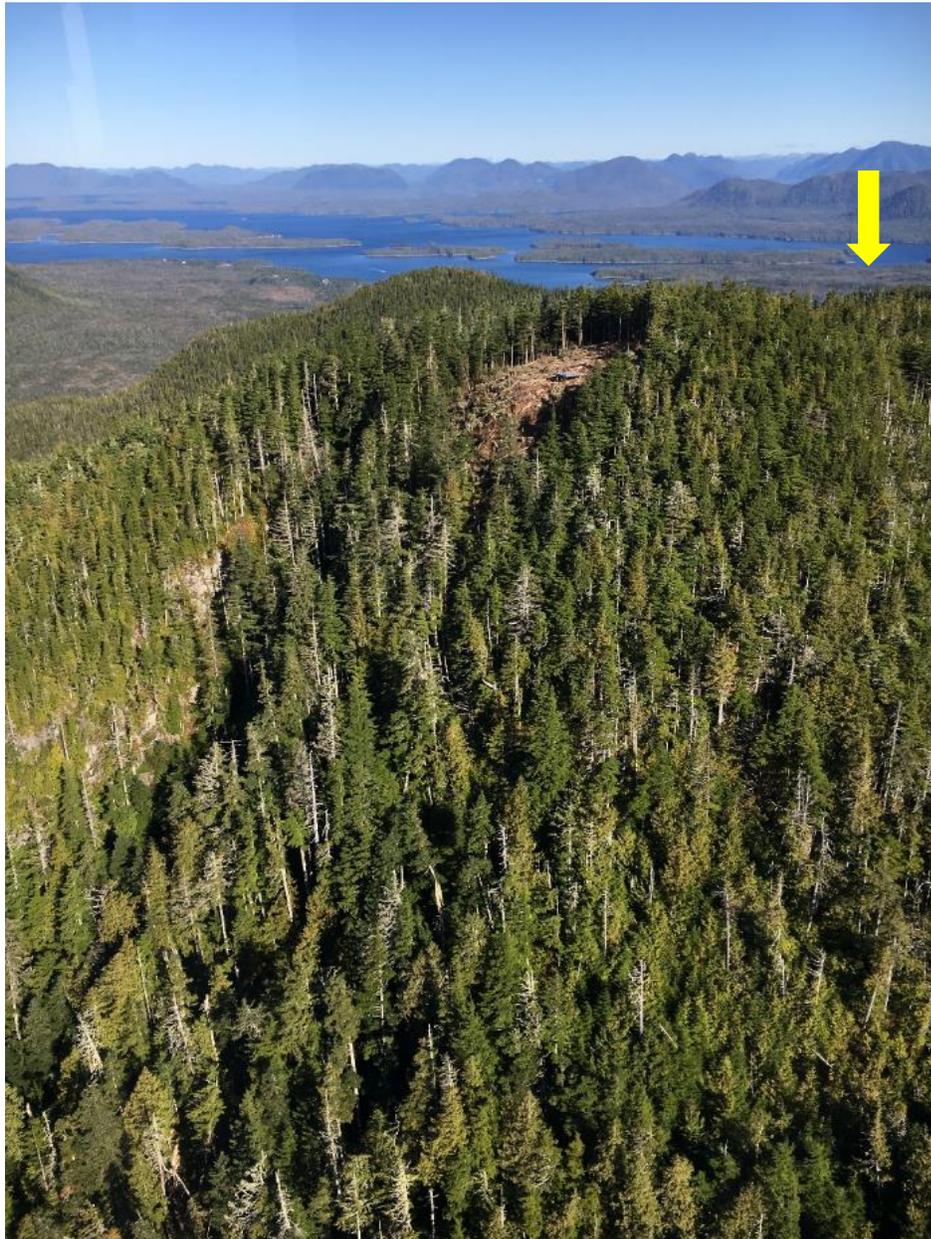


Photo A-3 Aerial View of Proposed Denny Island Radar Site (Indicated by Arrow)



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Appendix A Site ReConnaissance Photos
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A.2 MOUNT COLLINSON



Photo A-4 Proposed Mount Collison Radar Site—Blue-listed Western Hemlock—Western Redcedar/Salal Forested Community



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Appendix A Site ReConnaissance Photos
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Photo A-5 Proposed Mount Collison Radar Site—Open Forest Habitat



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Appendix A Site ReConnaissance Photos
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Photo A-6 Proposed Mount Collison Radar Site—Small Wet Area



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Appendix A Site ReConnaissance Photos
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A.3 SAFETY MOUNTAIN



Photo A-7 Proposed Safety Mountain Radar Site—Krummholz Scrub Forest of Mountain Hemlock and Yellow Cedar



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Appendix A Site ReConnaissance Photos
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Photo A-8 Proposed Safety Mountain Radar Site (Indicated by Arrow)



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Appendix A Site ReConnaissance Photos
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Photo A-9 Proposed Safety Mountain Radar Site—Small Intermittent Non-Continuous Drainage



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CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA**

Appendix A Site Reconnaissance Photos
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A.4 SEYMOUR NARROWS



Photo A-10 Proposed Seymour Narrows Radar Tower Site—Red-listed Douglas-fir—Lodgepole Pine/Grey Rock-moss Forested Community



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Appendix A Site Reconnaissance Photos
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Photo A-11 Proposed Seymour Narrows Access Road Site—Blue-listed Douglas-fir/Sword Fern Forest



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Appendix A Site Reconnaissance Photos
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Photo A-12 Proposed Seymour Narrows Radar Tower Site—Open, Regenerating Douglas-fir Forest



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Appendix A Site ReConnaissance Photos
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Photo A-13 Proposed Seymour Narrows Access Road Site—Closed Canopy Douglas-fir Forest



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Appendix A Site ReConnaissance Photos
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Photo A-14 Proposed Seymour Narrows Access Road Site—Swampy Area



APPENDIX B

**VEGETATION—POTENTIAL SPECIES AND ECOLOGICAL
COMMUNITIES OF CONSERVATION CONCERN**

**ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES,
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Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
January 31, 2019

**Appendix B VEGETATION—POTENTIAL SPECIES AND ECOLOGICAL COMMUNITIES
OF CONSERVATION CONCERN**

B.1 DENNY ISLAND

Table B-1 Denny Island Potential Ecological Communities of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Terrestrial Realm				
Sitka spruce/Oregon beaked-moss	<i>Picea sitchensis/Eurhynchium oregonum</i>	Blue	CWHvh2/15	Coniferous—dry
Sitka spruce/Pacific crab apple	<i>Picea sitchensis/Malus fusca</i>	Blue	CWHvh2/19	Coniferous—moist/wet
Sitka spruce/Pacific reedgrass	<i>Picea sitchensis/Calamagrostis nutkaensis</i>	Blue	CWHvh2/16	Coniferous—dry
Sitka spruce/salal	<i>Picea sitchensis/Gaultheria shallon</i>	Blue	CWHvh2/14	Coniferous—dry
Sitka spruce/slough sedge	<i>Picea sitchensis/Carex obnupta</i>	Blue	CWHvh2/18	Coniferous—moist/wet
Sitka spruce/sword fern	<i>Picea sitchensis/Polystichum munitum</i>	Blue	CWHvh2/17	Coniferous—moist/wet
Sitka spruce/tall trisetum	<i>Picea sitchensis/Trisetum canescens</i>	Red	CWHvh2/09	Coniferous—moist/wet
Western hemlock—Sitka spruce/lanky moss	<i>Tsuga heterophylla—Picea sitchensis/Rhytidiadelphus loreus</i>	Blue	CWHvh2/04	Coniferous—mesic
Western redcedar—Sitka spruce/devil's club Very Wet Hypermaritime 2	<i>Thuja plicata—Picea sitchensis/Oplopanax horridus Very Wet Hypermaritime 2</i>	Blue	CWHvh2/07	Coniferous—moist/wet
Western redcedar—Sitka spruce/skunk cabbage	<i>Thuja plicata—Picea sitchensis/Lysichiton americanus</i>	Blue	CWHvh2/13	Coniferous—moist/wet or Swamp Wetland Class (Ws)
Western redcedar—Sitka spruce/sword fern	<i>Thuja plicata—Picea sitchensis/Polystichum munitum</i>	Blue	CWHvh2/05	Coniferous—dry or mesic



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
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Table B-1 Denny Island Potential Ecological Communities of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Wetland Realm				
Northern mannagrass Fen	<i>Glyceria borealis</i> Fen	Blue	CWHvh2/ ³	Fen Wetland Class (Wf)
Sitka sedge—Pacific water-parsley	<i>Carex sitchensis</i> — <i>Oenanthe sarmentosa</i>	Blue	CWHvh2/Wm50	Marsh Wetland Class (Wm)
Sitka sedge/peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	CWHvh2/Wf51	Fen Wetland Class (Wf)
Sweet gale/Sitka sedge	<i>Myrica gale</i> / <i>Carex sitchensis</i>	Red	CWHvh2/Wf52	Fen Wetland Class (Wf)
NOTES:				
¹ BC List: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction				
² Excludes flood plain and beach ecosystem groups due to study area conditions				
³ Uncorrelated unit—does not have a site series				

Table B-2 Denny Island Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Alpine anemone	<i>Anemone drummondii</i> var. <i>drummondii</i>	Blue	--	--	Rock/Sparsely Vegetated Rock; Tundra; Meadow
Angled bittercress	<i>Cardamine angulata</i>	Red	--	--	Riparian Forest; Stream/River; Conifer Forest—Moist/wet
California wax-myrtle	<i>Morella californica</i>	Blue	--	--	Shrub—Natural
Dwarf bog bunchberry	<i>Cornus suecica</i>	Red	--	--	Bog; Marsh; Tundra; Meadow; Conifer Forest—Mesic (average); Conifer Forest—Moist/wet
Dwarf red fescue	<i>Festuca rubra</i> ssp. <i>mediana</i>	Blue	--	--	
Estuarine paintbrush	<i>Castilleja ambigua</i> ssp. <i>ambigua</i>	Blue	--	--	Estuary; Vernal Pools/Seasonal Seeps; Garry Oak Maritime Meadow
Fischer's chickweed	<i>Cerastium fischerianum</i>	Blue	--	--	Stream/River; Lake; Meadow; Riparian Herbaceous



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Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
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Table B-2 Denny Island Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Hairy goldfields	<i>Lasthenia maritima</i>	Red	--	--	Cliff; Rock/Sparsely Vegetated Rock; Marine Island
Hibberson's trillium	<i>Trillium hibbersonii</i> comb. ined.	Blue	--	--	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Blue	--	--	Bog; Marsh; Meadow; Pond/Open Water
Pygmy waterlily	<i>Nymphaea tetragona</i>	Red	--	--	Lake; Pond/Open Water
Queen Charlotte avens	<i>Geum schofieldii</i>	Blue	--	--	Cliff; Rock/Sparsely Vegetated Rock; Talus
Queen Charlotte twinflower violet	<i>Viola biflora</i> var. <i>carlottae</i>	Blue	--	--	Bog; Cliff; Rock/Sparsely Vegetated Rock; Talus; Tundra; Glacier/Icefield; Meadow; Krummholtz; Alpine/Subalpine Meadow; Alpine Grassland; Heath; Fellfield; Nivation; Zoogenic
Redwood sorrel	<i>Oxalis oregana</i>	Blue	--	--	Conifer Forest—Moist/wet
River bulrush	<i>Bolboschoenus fluviatilis</i>	Blue	--	--	Estuary; Marsh; Riparian Shrub
Smith's fairybells	<i>Prosartes smithii</i>	Blue	--	--	Riparian Forest; Deciduous/Broadleaf Forest; Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix)
Tall woolly-heads	<i>Psilocarphus elatior</i>	Red	Endangered	Endangered	Meadow; Garry Oak Vernal Pool
Tooth-leaved monkey-flower	<i>Erythranthe dentata</i>	Blue	--	--	Riparian Forest; Stream/River
White glacier lily	<i>Erythronium montanum</i>	Blue	--	--	Avalanche Track; Alpine/Subalpine Meadow
White-lip rein orchid	<i>Platanthera ephemerantha</i>	Red	--	--	Conifer Forest—Dry; Garry Oak Woodland



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Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
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Table B-2 Denny Island Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
NOTES:					
¹ Provincial Status: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction					
² COSEWIC: Endangered is a species facing imminent extirpation or extinction; Threatened is a species likely to become endangered; Special Concern is a species that may become threatened or endangered.					
³ SARA: Endangered is a species that is facing extinction or extirpation; Threatened is a species that may become endangered; Special Concern is a species with characteristics that make it sensitive to natural events or human activities.					
⁴ Excludes Habitat Subtypes due to study area conditions: Estuary, Mudflats—Intertidal, Sand Dune, Beach, Marine					

B.2 MOUNT COLLINSON

Table B-3 Mount Collinson Potential Ecological of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Terrestrial Realm				
Amabilis fir—Sitka spruce/devil's club	<i>Abies amabilis</i> — <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	CWHvm1/08; CWHvm2/08	Coniferous—moist/wet
Western hemlock—amabilis fir/deer fern	<i>Tsuga heterophylla</i> — <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	CWHvm1/06; CWHvm2/06	Coniferous—moist/wet
Western hemlock—western redcedar/salal Very Wet Maritime	<i>Tsuga heterophylla</i> — <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	Blue	CWHvm1/03; CWHvm2/03	Coniferous—dry
Western redcedar—Sitka spruce/skunk cabbage	<i>Thuja plicata</i> — <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Blue	CWHvm1/14	Coniferous—moist/wet or Swamp Wetland Class (Ws)
Western redcedar—western hemlock/sword fern	<i>Thuja plicata</i> — <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	CWHvm1/04; CWHvm2/04	Coniferous—dry



ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES, BRITISH COLUMBIA

Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
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Table B-3 Mount Collinson Potential Ecological of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Wetland Realm				
Labrador-tea/western bog-laurel/peat-mosses	<i>Rhododendron groenlandicum/Kalmia microphylla/Sphagnum spp.</i>	Blue	CWHvm1/Wb50	Bog Wetland Class (Wb)
Sitka sedge/peat-mosses	<i>Carex sitchensis/Sphagnum spp.</i>	Red	CWHvm1/Wf51; CWHvm2/Wf51	Fen Wetland Class (Wf)
Sitka willow/Sitka sedge	<i>Salix sitchensis/Carex sitchensis</i>	Blue	CWHvm1/Ws06; CWHvm2/Ws06	Swamp Wetland Class (Ws)
NOTES: ¹ BC List: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction ² Excludes flood plain and beach ecosystem groups due to study area conditions				

Table B-4 Mount Collinson Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Alaska holly fern	<i>Polystichum setigerum</i>	Blue	--	--	Riparian Forest; Riparian Shrub; Stream/River; Rock/Sparsely Vegetated Rock; Conifer Forest—Moist/wet
Corrupt spleenwort	<i>Asplenium adulterinum</i>	Blue	--	--	NA
Dwarf maiden-hair fern	<i>Adiantum aleuticum var. subpumilum</i>	Blue	--	--	NA
Dwarf red fescue	<i>Festuca rubra ssp. mediana</i>	Blue	--	--	NA
Estuarine paintbrush	<i>Castilleja ambigua ssp. ambigua</i>	Blue	--	--	Estuary; Vernal Pools/Seasonal Seeps; Garry Oak Maritime Meadow
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Blue	--	--	Bog; Marsh; Meadow; Pond/Open Water
Northern adder's-tongue	<i>Ophioglossum pusillum</i>	Blue	--	--	Fen; Pasture/Old Field; Meadow; Riparian Herbaceous; Cold Spring



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Appendix B Vegetation—Potential Species and Ecological Communities of Conservation Concern
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Table B-4 Mount Collinson Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Redwood sorrel	<i>Oxalis oregana</i>	Blue	--	--	Conifer Forest—Moist/wet
Shinleaf wintergreen	<i>Pyrola elliptica</i>	Blue	--	--	Conifer Forest—Mesic (average); Conifer Forest—Dry; Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix)
Smith's fairybells	<i>Prosartes smithii</i>	Blue	--	--	Riparian Forest; Deciduous/Broadleaf Forest; Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix)
Tooth-leaved monkey-flower	<i>Erythranthe dentata</i>	Blue	--	--	Riparian Forest; Stream/River
Two-edged water-starwort	<i>Callitriche heterophylla</i> var. <i>heterophylla</i>	Blue	--	--	Pond/Open Water
White glacier lily	<i>Erythronium montanum</i>	Blue	--	--	Avalanche Track; Alpine/Subalpine Meadow
Whitebark pine	<i>Pinus albicaulis</i>	Blue	Endangered	Endangered	Cliff; Rock/Sparsely Vegetated Rock; Talus; Conifer Forest—Mesic (average); Conifer Forest—Dry

NOTES:

¹ Provincial Status: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction

² COSEWIC: Endangered is a species facing imminent extirpation or extinction; Threatened is a species likely to become endangered; Special Concern is a species that may become threatened or endangered.

³ SARA: Endangered is a species that is facing extinction or extirpation; Threatened is a species that may become endangered; Special Concern is a species with characteristics that make it sensitive to natural events or human activities.

⁴ Excludes Estuary, Sand Dune, Beach Habitat Subtypes due to study area conditions

NA = habitat subtype data not available for some species



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B.3 SAFETY MOUNTAIN

Table B-5 Safety Mountain Potential Ecological Communities of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group
Terrestrial Realm				
Sitka spruce—mountain hemlock/Pacific reedgrass	<i>Picea sitchensis</i> — <i>Tsuga mertensiana</i> / <i>Calamagrostis nutkaensis</i>	Blue	MHwh1/03	Coniferous—mesic
Yellow-cedar—mountain hemlock/rosy twistedstalk	<i>Xanthocyparis nootkatensis</i> — <i>Tsuga mertensiana</i> / <i>Streptopus lanceolatus</i>	Blue	MHwh1/05	Coniferous—moist/wet
NOTES:				
¹ BC List: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction				



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Table B-6 Safety Mountain Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype
Fischer's chickweed	<i>Cerastium fischerianum</i>	Blue	--	--	Stream/River; Lake; Meadow; Riparian Herbaceous
Queen Charlotte avens	<i>Geum schofieldii</i>	Blue	--	--	Cliff; Rock/Sparsely Vegetated Rock; Talus
Queen Charlotte twinflower violet	<i>Viola biflora var. carlottae</i>	Blue	--	--	Bog; Cliff; Rock/Sparsely Vegetated Rock; Talus; Tundra; Glacier/Icefield; Meadow; Krummholtz; Alpine/Subalpine Meadow; Alpine Grassland; Heath; Fellfield; Nivation; Zoogenic

NOTES:

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³ SARA: Endangered is a species that is facing extinction or extirpation; Threatened is a species that may become endangered



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B.4 SEYMOUR NARROWS

Table B-7 Seymour Narrows Potential Ecological Communities of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Terrestrial Realm				
Arbutus/hairy manzanita	<i>Arbutus menziesii</i> / <i>Arctostaphylos columbiana</i>	Red	CWHxm1/00	Broadleaf—dry
Douglas-fir—lodgepole pine/grey rock-moss	<i>Pseudotsuga menziesii</i> — <i>Pinus contorta</i> / <i>Racomitrium canescens</i>	Red	CWHxm1/02	Coniferous—dry
Douglas-fir—western hemlock/salal Dry Maritime	<i>Pseudotsuga menziesii</i> — <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> Dry Maritime	Blue	CWHxm1/03	Coniferous—dry
Douglas-fir/sword fern	<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	Blue	CWHxm1/04	Coniferous—dry
Roemer's fescue—junegrass	<i>Festuca roemerii</i> — <i>Koeleria macrantha</i>	Red	CWHxm1/00	Grassland Class (Gg)
Wallace's selaginella/reindeer lichens	<i>Selaginella wallacei</i> / <i>Cladina</i> spp.	Blue	CWHxm1	Grassland Class (Gg) or Rock Outcrop Class (Ro)
Western hemlock—Douglas-fir/Oregon beaked-moss	<i>Tsuga heterophylla</i> — <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oregonum</i>	Red	CWHxm1/01	Coniferous—mesic
Western hemlock—western redcedar/deer fern	<i>Tsuga heterophylla</i> — <i>Thuja plicata</i> / <i>Blechnum spicant</i>	Red	CWHxm1/06	Coniferous—moist/wet
Western redcedar—Sitka spruce/skunk cabbage	<i>Thuja plicata</i> — <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Blue	CWHxm1/12	Coniferous—moist/wet or Swamp Wetland Class (Ws)
Western redcedar/black twinberry	<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	Red	CWHxm1/14	Coniferous—moist/wet
Western redcedar/salmonberry	<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	Red	CWHxm1/13	Coniferous—moist/wet
Western redcedar/slough sedge	<i>Thuja plicata</i> / <i>Carex obnupta</i>	Blue	CWHxm1/15	Coniferous—moist/wet or Swamp Wetland Class (Ws)
Western redcedar/sword fern Very Dry Maritime	<i>Thuja plicata</i> / <i>Polystichum munitum</i> Very Dry Maritime	Blue	CWHxm1/05	Coniferous—mesic
Western redcedar/three-leaved foamflower Very Dry Maritime	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Dry Maritime	Blue	CWHxm1/07	Coniferous—moist/wet



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Table B-7 Seymour Narrows Potential Ecological Communities of Conservation Concern

Common Name	Scientific Name	BC List ¹	Site Series	Ecosystem Group ²
Wetland Realm				
Common cattail Marsh	<i>Typha latifolia</i> Marsh	Blue	CWHxm1/Wm05	Marsh Wetland Class (Wm)
Hard-stemmed bulrush Deep Marsh	<i>Schoenoplectus acutus</i> Deep Marsh	Blue	CWHxm1/Wm06	Marsh Wetland Class (Wm)
Labrador-tea/western bog-laurel/peat-mosses	<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Blue	CWHxm1/Wb50	Bog Wetland Class (Wb)
Lodgepole pine/peat-mosses Very Dry Maritime	<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	Blue	CWHxm1/11	Bog Wetland Class (Wb)
Sitka sedge—Pacific water-parsley	<i>Carex sitchensis</i> — <i>Oenanthe sarmentosa</i>	Blue	CWHxm1/Wm50	Marsh Wetland Class (Wm)
Slender sedge—white beak-rush	<i>Carex lasiocarpa</i> — <i>Rhynchospora alba</i>	Red	CWHxm1/Wf53	Fen Wetland Class (Wf)
Sweet gale/Sitka sedge	<i>Myrica gale</i> / <i>Carex sitchensis</i>	Red	CWHxm1/Wf52	Fen Wetland Class (Wf)
Trembling aspen/Pacific crab apple/slough sedge	<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>	Red	CWHxm1/ ³	Swamp Wetland Class (Ws)
Western redcedar/sword fern—skunk cabbage	<i>Thuja plicata</i> / <i>Polystichum munitum</i> — <i>Lysichiton americanus</i>	Blue	CWHxm1/Ws53	Coniferous—moist/wet or Swamp Wetland Class (Ws)

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² Excludes flood plain, estuary, and beach ecosystem groups due to study area conditions

³ Uncorrelated unit—does not have a site series



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Table B-8 Seymour Narrows Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Branching montia	<i>Montia diffusa</i>	Red	--	--	Rock/Sparsely Vegetated Rock
California-tea	<i>Rupertia physodes</i>	Blue	--	--	Deciduous/Broadleaf Forest; Garry Oak Woodland
Chamisso's montia	<i>Montia chamissoi</i>	Blue	--	--	Estuary; Marsh; Stream/River; Beach; Riparian Herbaceous
Common bluecup	<i>Githopsis specularioides</i>	Red	--	--	Vernal Pools/Seasonal Seeps; Rock/Sparsely Vegetated Rock; Grassland; Garry Oak Maritime Meadow
Cup clover	<i>Trifolium cyathiferum</i>	Blue	--	--	Vernal Pools/Seasonal Seeps; Riparian Forest; Riparian Shrub; Garry Oak Maritime Meadow
Deltoid balsamroot	<i>Balsamorhiza deltoidea</i>	Red	Endangered	Endangered	Rock/Sparsely Vegetated Rock; Grassland; Mixed Forest (deciduous/coniferous mix); Sand Dune; Beach; Garry Oak Woodland
Dwarf bramble	<i>Rubus lasiococcus</i>	Blue	--	--	Conifer Forest—Mesic (average); Conifer Forest—Moist/wet
Dwarf red fescue	<i>Festuca rubra</i> ssp. <i>mediana</i>	Blue	--	--	NA
Elegant Jacob's-ladder	<i>Polemonium elegans</i>	Blue	--	--	Cliff; Rock/Sparsely Vegetated Rock; Talus
Estuarine paintbrush	<i>Castilleja ambigua</i> ssp. <i>ambigua</i>	Blue	--	--	Estuary; Vernal Pools/Seasonal Seeps; Garry Oak Maritime Meadow
Giant chain fern	<i>Woodwardia fimbriata</i>	Blue	--	--	Stream/River; Rock/Sparsely Vegetated Rock
Gray's desert-parsley	<i>Lomatium grayi</i> var. <i>grayi</i>	Red	Threatened	Threatened	Cliff; Rock/Sparsely Vegetated Rock; Talus; Conifer Forest—Dry; Garry Oak Woodland
Green-fruited sedge	<i>Carex interrupta</i>	Blue	--	--	Stream/River; Riparian Herbaceous; Gravel Bar
Heterocodon	<i>Heterocodon rariflorus</i>	Blue	--	--	Vernal Pools/Seasonal Seeps; Conifer Forest—Mesic (average); Conifer Forest—Moist/wet; Garry Oak Maritime Meadow
Howell's violet	<i>Viola howellii</i>	Red	--	--	Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest—Moist/wet; Garry Oak Woodland



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Table B-8 Seymour Narrows Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Leafy mitrewort	<i>Mitellastris caulescens</i>	Blue	--	--	Riparian Forest; Cliff; Rock/Sparsely Vegetated Rock; Talus; Conifer Forest—Mesic (average); Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix)
Macoun's groundsel	<i>Packera macounii</i>	Blue	--	--	Rock/Sparsely Vegetated Rock; Grassland; Conifer Forest—Dry
Macoun's meadow-foam	<i>Limnanthes macounii</i>	Red	Threatened	Threatened	Meadow; Deciduous/Broadleaf Forest; Garry Oak Vernal Pool; Garry Oak Maritime Meadow
Macrae's clover	<i>Trifolium dichotomum</i>	Red	--	--	Cliff; Rock/Sparsely Vegetated Rock; Talus; Meadow; Garry Oak Coastal Bluffs
Needle-leaved navarretia	<i>Navarretia intertexta</i>	Red	--	--	Vernal Pools/Seasonal Seeps; Meadow; Garry Oak Maritime Meadow
Nevada marsh fern	<i>Thelypteris nevadensis</i>	Red	--	--	Riparian Forest; Stream/River; Rock/Sparsely Vegetated Rock; Mixed Forest (deciduous/coniferous mix)
Northern adder's-tongue	<i>Ophioglossum pusillum</i>	Blue	--	--	Fen; Pasture/Old Field; Meadow; Riparian Herbaceous; Cold Spring
Nuttall's quillwort	<i>Isoetes nuttallii</i>	Blue	--	--	Vernal Pools/Seasonal Seeps; Stream/River; Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest—Dry; Garry Oak Woodland; Garry Oak Vernal Pool; Garry Oak Maritime Meadow
Oregon ash	<i>Fraxinus latifolia</i>	Red	--	--	Estuary; Swamp; Stream/River
Phantom orchid	<i>Cephalanthera austiniiae</i>	Red	Endangered	Threatened	Conifer Forest—Mesic (average); Mixed Forest (deciduous/coniferous mix)
Pine broomrape	<i>Orobanche pinorum</i>	Red	--	--	Conifer Forest—Mesic (average); Conifer Forest—Moist/wet
Poverty clover	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	Blue	--	--	Vernal Pools/Seasonal Seeps; Rock/Sparsely Vegetated Rock; Meadow; Grassland; Garry Oak Vernal Pool



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Table B-8 Seymour Narrows Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
Prairie lupine	<i>Lupinus lepidus</i>	Red	Endangered	Endangered	Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Maritime Meadow
Purple sanicle	<i>Sanicula bipinnatifida</i>	Red	Threatened	Threatened	Rock/Sparsely Vegetated Rock; Deciduous/Broadleaf Forest; Garry Oak Woodland; Garry Oak Maritime Meadow
Rough-leaved aster	<i>Eurybia radulina</i>	Red	--	--	Rock/Sparsely Vegetated Rock; Conifer Forest—Dry; Garry Oak Woodland
Salt marsh Philadelphia daisy	<i>Erigeron philadelphicus</i> var. <i>glaber</i>	Red	--	--	NA
Short-seeded waterwort	<i>Elatine brachysperma</i>	Red	--	--	Bog; Fen; Swamp; Marsh
Slender-spiked mannagrass	<i>Glyceria leptostachya</i>	Blue	--	--	Bog; Fen; Swamp; Marsh; Lake; Pond/Open Water; Mudflats—Intertidal
Slimleaf onion	<i>Allium amplexans</i>	Blue	--	--	Vernal Pools/Seasonal Seeps; Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Woodland; Garry Oak Coastal Bluffs
Smith's fairybells	<i>Prosartes smithii</i>	Blue	--	--	Riparian Forest; Deciduous/Broadleaf Forest; Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix)
Streambank lupine	<i>Lupinus rivularis</i>	Red	Endangered	Endangered	Stream/River; Meadow; Urban/Suburban; Mudflats—Intertidal; Garry Oak Woodland
Texas toadflax	<i>Nuttallanthus texanus</i>	Red	--	--	Vernal Pools/Seasonal Seeps; Cliff; Rock/Sparsely Vegetated Rock; Grassland; Sand Dune; Garry Oak Coastal Bluffs
Two-edged water-starwort	<i>Callitriche heterophylla</i> var. <i>heterophylla</i>	Blue	--	--	Pond/Open Water
Washington springbeauty	<i>Claytonia washingtoniana</i>	Red	--	--	Cliff; Talus; Conifer Forest—Dry; Mixed Forest (deciduous/coniferous mix)
Western wahoo	<i>Euonymus occidentalis</i> var. <i>occidentalis</i>	Red	--	--	Riparian Forest; Conifer Forest—Moist/wet; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland



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Table B-8 Seymour Narrows Potential Vascular Plant Species of Conservation Concern

Common Name	Scientific Name	BC List ¹	COSEWIC ²	SARA ³	Habitat Subtype ⁴
White meconella	<i>Meconella oregana</i>	Red	Endangered	Endangered	Rock/Sparsely Vegetated Rock; Deciduous/Broadleaf Forest; Garry Oak Coastal Bluffs
White-top aster	<i>Sericocarpus rigidus</i>	Blue	Special Concern	Special Concern	Rock/Sparsely Vegetated Rock; Meadow; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Wine-cup clarkia	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Red	--	--	Meadow; Garry Oak Maritime Meadow
Yellow montane violet	<i>Viola praemorsa</i> var. <i>praemorsa</i>	Red	Endangered	Endangered	Pasture/Old Field; Meadow; Garry Oak Woodland
Yellow sand-verbena	<i>Abronia latifolia</i>	Blue	--	--	NA

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⁴ Excludes Estuary, Mudflats—Intertidal, Sand Dune, Beach, Marine Habitat Subtypes due to study area conditions

NA = habitat subtype data not available for some species



APPENDIX C

**WILDLIFE SPECIES OF CONSERVATION CONCERN WHICH
MAY OCCUR IN THE FOUR WILDLIFE STUDY AREAS**

**ENVIRONMENTAL OVERVIEW ASSESSMENT IN SUPPORT OF THE DEVELOPMENT OF CANADIAN COAST GUARD RADAR SITES,
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Appendix C Wildlife Species of Conservation Concern which may Occur in the Four Wildlife Study Areas
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**Appendix C WILDLIFE SPECIES OF CONSERVATION CONCERN WHICH MAY OCCUR
IN THE FOUR WILDLIFE STUDY AREAS**

Species	Scientific Name	Provincial Status ¹	COSEWIC Status ²	SARA Schedule 1 Status ³	Study Area			
					Denny Island	Mount Collinson	Safety Mountain	Seymour Narrows
Birds								
Bald eagle ⁴	<i>Haliaeetus leucocephalus</i>	Yellow	-	-	X	X	X	X
Band-tailed pigeon	<i>Patagioenas fasciata</i>	Blue	Special Concern	Special Concern	X	X	X	X
Barn swallow ⁵	<i>Hirundo rustica</i>	Blue	Threatened	Threatened	X	X	X	X
Black swift	<i>Cypseloides niger</i>	Blue	Endangered	-	X	X	X	X
Common nighthawk	<i>Chordeiles minor</i>	Yellow	Special Concern	Threatened		X		X
Evening grosbeak	<i>Coccothraustes vespertinus</i>	Yellow	Special Concern	-	X	X	X	X
Great blue heron, <i>fannini</i> subspecies ⁴	<i>Ardea herodias fannini</i>	Blue	Special Concern	Special Concern	X	X	X	X
Marbled murrelet	<i>Brachyramphus marmoratus</i>	Blue	Threatened	Threatened	X	X	X	X
Northern goshawk, <i>laingi</i> subspecies	<i>Accipiter gentilis laingi</i>	Red	Threatened	Threatened	X	X	X	X
Northern pygmy-owl, <i>swarhi</i> subspecies	<i>Glaucidium gnoma swarhi</i>	Blue	-	-		X		X
Olive-sided flycatcher	<i>Contopus cooperi</i>	Blue	Special Concern	Threatened	X	X	X	X
Osprey ⁴	<i>Pandion haliaetus</i>	Yellow	-	-	X	X	X	X



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Species	Scientific Name	Provincial Status ¹	COSEWIC Status ²	SARA Schedule 1 Status ³	Study Area			
					Denny Island	Mount Collinson	Safety Mountain	Seymour Narrows
Peregrine falcon, <i>pealei</i> subspecies ⁴	<i>Falco peregrinus pealei</i>	Blue	Special Concern	Special Concern	X	X	X	X
Western screech-owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii</i>	Blue	Threatened	Threatened	X	X	X	X
Mammals								
American water shrew, <i>brooksi</i> subspecies	<i>Sorex navigator brooksi</i>	Blue	-	-		X		X
Ermine, <i>anguinae</i> subspecies	<i>Mustela erminea anguinae</i>	Blue	-	-		X		X
Keen's myotis	<i>Myotis keenii</i>	Blue	-	-	X	X	X	X
Little brown myotis	<i>Myotis lucifugus</i>	Yellow	Endangered	Endangered	X	X	X	X
Roosevelt elk	<i>Cervus elaphus roosevelti</i>	Blue	-	-		X		X
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Blue	-	-				X
Townsend's vole, <i>cowani</i> subspecies	<i>Microtus townsendii cowani</i>	Red	-	-		X		X
Wolverine, <i>vancouverensis</i> subspecies ⁶	<i>Gulo gulo vancouverensis</i>	Red	Special Concern	Special Concern		X		X
Amphibians								
Northern red-legged frog	<i>Rana aurora</i>	Blue	Special Concern	Special Concern		X		X
Wandering salamander	<i>Aneides vagrans</i>	Blue	Special Concern	Special Concern	X	X	X	X
Western toad	<i>Anaxyrus boreas</i>	Yellow	Special Concern	Special Concern	X	X	X	X



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Species	Scientific Name	Provincial Status ¹	COSEWIC Status ²	SARA Schedule 1 Status ³	Study Area			
					Denny Island	Mount Collinson	Safety Mountain	Seymour Narrows
<p>NOTES:</p> <p>¹ Provincial Status: Red is any indigenous species or subspecies that is extirpated, endangered, or threatened in BC; Blue is any indigenous species or subspecies considered to be of special concern in BC; Yellow is species considered to be secure and not at risk of extinction</p> <p>² COSEWIC Status: Endangered is a species facing imminent extirpation or extinction; Threatened is a species likely to become endangered; Special Concern is a species that may become threatened or endangered</p> <p>³ SARA Status: Endangered is a species that is facing extinction or extirpation; Threatened is a species that may become endangered; Special Concern is a species with characteristics that make it sensitive to natural events or human activities</p> <p>⁴ Nests protected year-round under the BC <i>Wildlife Act</i></p> <p>⁵ Nests protected year-round under <i>Species at Risk Act</i></p> <p>⁶ Last verified sighting on Vancouver Island was in 1991 (COSEWIC 2014)</p> <p>SOURCES: Nagorsen and Brigham 1993; Nagorsen 1996, 2005; Hatler et al. 2008; Davidson et al. 2015; Rodewald 2015; BC CDC 2018; BSC 2018; e-Fauna BC 2018; GOC 2018</p>								



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Appendix C Wildlife Species of Conservation Concern which may Occur in the Four Wildlife Study Areas
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C.1 REFERENCES

- BC CDC (British Columbia Conservation Data Centre). 2018. Species and Ecosystems Explorer. Available at: <http://a100.gov.bc.ca/pub/eswp/>. Accessed September 2018.
- BSC (Bird Studies Canada). 2018. Nature Counts. Available at: <https://www.birdscanada.org/birdmon/default/main.jsp>. Accessed September 2018.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2014. COSEWIC assessment and status report on the Wolverine *Gulo gulo* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 76 pp.
- Davidson, P.J.A., R.J. Cannings, A.R. Couturier, D. Lepage, and C.M. Di Corrado (eds.). 2015. The Atlas of the Breeding Birds of British Columbia, 2008-2012. Bird Studies Canada, Delta, B.C. Available at: <http://www.birdatlas.bc.ca/>. Accessed September 2018.
- e-Fauna BC. 2018. e-Fauna BC Electronic Atlas of the Wildlife of British Columbia. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. Available from: <http://ibis.geog.ubc.ca/biodiversity/efauna/> Accessed: September 2018.
- GOC (Government of Canada). 2018. *Species at Risk Act* Public Registry. Available at: http://www.sararegistry.gc.ca/sar/index/default_e.cfm. Accessed September 2018.
- Hatler, D.F., D.W. Nagorsen, and A.M. Beal. 2008. Carnivores of British Columbia. Royal British Columbia Museum Handbook. Royal British Columbia Museum, Victoria, BC.
- Nagorsen, D.W. 1996. Opossums, Shrews, and Moles of British Columbia. Royal British Columbia Museum Handbook. UBC Press, Vancouver, BC.
- Nagorsen, D.W. 2005. Rodents and Lagomorphs of British Columbia. Royal British Columbia Museum Handbook. UBC Press, Vancouver, BC.
- Nagorsen, D.W., and R.M. Brigham. 1993. Bats of British Columbia. Royal British Columbia Museum Handbook. UBC Press, Vancouver, BC.
- Rodewald, P. (Editor). 2015. The Birds of North America. Cornell Laboratory of Ornithology, Ithaca, NY. Available at: <https://birdsna.org>. Accessed September 2018.





Environmental Management Plan

Canadian Coast Guard Radar Stations,
British Columbia

January 31, 2019

Prepared for:

Canadian Coast Guard—Marine & Civil
Infrastructure
Fisheries & Oceans Canada

Prepared by:

Stantec Consulting Ltd.

Issued for Tender

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Abbreviations

BC	British Columbia
BMP	best management practices
CCG	Canadian Coast Guard
CMT	culturally modified tree
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EM	environmental monitor
EMP	Environmental Management Plan
HCA	<i>Heritage Conservation Act</i>
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
QEP	qualified environmental professional
WCA	<i>Weed Control Act</i>



ENVIRONMENTAL MANAGEMENT PLAN

Introduction
January 31, 2019

1.0 INTRODUCTION

This Environmental Management Plan (EMP) was compiled for the Canadian Coast Guard (CCG) Radar Stations Project (the Project), and describes roles and responsibilities (Section 1.3), regulatory and legislative requirements (Section 2.0), planned construction activities (Section 0), the existing environment at the project location (Section 4.0) and environmental protection measures developed to avoid or mitigate effects to the environment during construction (Section 5.0). This EMP also provides recommendations for environmental monitoring, and reporting requirements related to environmental monitoring and non-compliance incidents (Section 6.0).

1.1 PROJECT BACKGROUND

The CCG arm of Fisheries and Oceans Canada (DFO), is planning to construct four new radar stations at Denny Island, Mount Collinson, Safety Mountain, and Seymour Narrows (the Project) as part of the Oceans Protection Program aimed at enhancing navigational safety in Canadian waters. These sites are located along the west coast of British Columbia (BC) near Campbell River (Seymour Narrows), Telegraph Cove (Mount Collinson), Bella Bella (Denny Island) and Calvert Island (Safety Mountain). All locations are situated on the top of hills or are at high elevations to enhance the range of radar signals (Figure 1).

1.2 PURPOSE OF THE ENVIRONMENTAL MANAGEMENT PLAN

This EMP is intended to mitigate adverse environmental effects and reduce the risk of unforeseen environmental incidents from the Project. Contractor(s) working on the Project must complete this Project in accordance with applicable legislation and comply with this EMP and/or provide suitable alternative approaches pre-approved by the CCG project manager and/or the environmental monitor (EM) (if applicable¹). This document outlines the following:

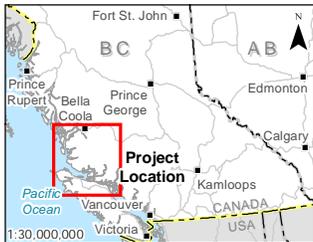
- Roles and responsibilities for the CCG project manager, the contractor(s), and the EM
- Regulatory requirements and permits for the Project
- Key construction activities and schedule
- Existing environmental conditions and resources
- Potential project effects and mitigation measures
- Management measures to mitigate potential project effects
- Environmental monitoring, reporting, and compliance requirements

The EMP is a living document that will be reviewed and updated as needed prior to and during construction of the Project. The mitigation measures and monitoring protocols outlined in this EMP may be re-evaluated to identify and update deficiencies and improve overall environmental management and protection.

¹ CCG will determine whether a dedicated EM will be onsite. If a dedicated EM (CCG staff or external) is not required for the Project site or specific activities, the contractor will assign an individual to act as the onsite EM and fulfil the duties and responsibilities outlined in Table 1.



\\Cd1183_603\Workgroup\1232\193\projects\123221193\figures\reports\Environmental\Conditions from Desktop_Review_and_Site_Reconnaissance\Fig_123221193_andrdr_01_Overview_Map.mxd Revised: 2019/01/08 By: lruddell



Notes
 1. Coordinate System: NAD 1983 BC Environment Albers
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
 3. Imagery Source: ESRI World Ocean Base

- City, Town, or Village
- CCG Radar Tower Location
- Highway
- Road
- +— Railway



Project Location: Westcoast of British Columbia
 Project Number: 123221193
 Prepared by: LTRUDEL on 20180913
 Discipline Review by: SNABESS on 20190107
 GIS Review by: SPARKER on 20190107

Client/Project/Report: Canadian Coast Guard Radar Stations, British Columbia; Environmental Management Plan
 Figure No.: 1
 Title: Overview Map

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ENVIRONMENTAL MANAGEMENT PLAN

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1.3 ROLES AND RESPONSIBILITIES

Table 1 describes the roles and responsibilities of the project team.

Table 1 Roles and Responsibilities of the Project Team

Role	Responsibilities
CCG project manager	<ul style="list-style-type: none"> • Project owner with overall responsibility for delivery of the works associated with this Project; provides direction and general oversight for the Project • Responsible for overall environmental management and performance of the Project • Administers contracts and assesses the Contractor(s)'s ability to comply with this EMP as part of the tender evaluation • Attends health and safety meetings and Contractor tailgate meetings where appropriate, to communicate potential environmental concerns/requirements • Provides the contractor(s) and EM with project-specific details, such as background information, permits and this EMP • Authorizes stop work authority to project personnel (e.g., EM) for non-compliance with this EMP and contravention of regulatory permits and allow them to suspend project activities that are at risk of causing or potentially causing serious harm to fish, wildlife or the environment (e.g., water quality, drinking water quality, terrestrial, air quality) • Notifies regulatory agencies or authorizes notification of environmental non-compliance or environmental incidences, where applicable • Oversee compliance of the EMP • Advises EM(s) as required • Liaise with regulatory agencies, as necessary • Reviews and provides comment to the EM reports • Has the authority to issue a Stop Work order where activities are affecting or will affect the environment (e.g., water quality, drinking water quality, terrestrial, air quality), fish and wildlife.
Contractor(s)	<ul style="list-style-type: none"> • Understands details of the Project by reviewing relevant documentation and regulatory approvals supplied by CCG (e.g., EMP, environmental permits) • Constructs works according to approved designs and standards, regulatory requirements/approvals, this EMP and if required, contractor-specific management plans • Verifies that personnel are appropriately trained and competent in the use of environmental protection and mitigation measures, such as sediment, waste, spill and noise control measures • Notifies project manager and/or EM(s) of any observed or potential non-compliances with this EMP • Immediately reports incidents to the project manager or EM(s) and initiates an appropriate response • Acts as the EM, or assigns a designated person to be EM, at all times when a dedicated EM is not on site. During these times the contractor will provide environmental monitoring updates to the CCG project manager weekly or whenever site activities change. • Corrects deficiencies and any non-compliance upon direction from the project manager, EM(s) and/or regulators



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Table 1 Roles and Responsibilities of the Project Team

Role	Responsibilities
Environmental monitor	<ul style="list-style-type: none">• Will be a qualified environmental professional (QEP)²• Liaises/reports back to the project owner on status of work and of any emerging environmental issues and assists in addressing them• Completes and records environmental pre-job meetings with the contractor(s)• Attends health and safety meetings and contractor tailgate meetings where appropriate, to communicate potential environmental concerns/requirements• Maintains a current version of the EMP and is familiar with all aspects of the document• Communicates requirements of this EMP to the project manager and contractor(s)• Evaluates and reports on the effectiveness of the environmental mitigation measures and on the contractor's work procedures through regular site visits during construction. Frequency of site visits will be determined prior to construction start-up and will be based on regulatory (e.g., <i>Wildlife Act</i>) requirements and higher risk activities.• Advises the contractor 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 the environment (e.g., water quality, drinking water quality, terrestrial, air quality), fish and wildlife• Maintains records of site visits and regularly updates the CCG project manager• Writes environmental monitoring and permit-required reports to be submitted to the CCG project manager and appropriate regulatory authorities• Addresses and closely monitors non-compliance issues immediately• Provides guidance and direction as needed during clean-up and restoration activities (e.g., after a spill or hydraulic leak) according to the requirements in this EMP

² A qualified environmental professional (QEP) is an applied scientist or technologist who is registered and in good standing with an appropriate BC professional organization constituted under an Act.



2.0 REGULATORY AND LEGISLATIVE REQUIREMENTS

A summary of the key federal and provincial environmental legislation relevant to the Project, including required permits, notifications and approvals to regulatory agencies to facilitate the proposed project works are provided in Table 2.

Table 2 Construction Environmental Permits and Notifications

Legislation	Environmental Permits for Construction	Regulatory Agency	Description
<i>Migratory Birds Convention Act, 1994</i>	None applicable	Environment and Climate Change Canada (ECCC)	Most migratory birds and their nests and eggs are protected everywhere in Canada under the <i>Migratory Birds Convention Act</i> . If vegetation clearing or other activities that may result in incidental take must occur during the primary migratory bird nesting period, a bird nest mitigation plan should be implemented.
<i>Wildlife Act</i>	General wildlife permit; amphibian salvage permit (may be required at the Seymour Narrows Site)	Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD)	A permit under the <i>Wildlife Act</i> is required to salvage and relocate amphibians and to remove and relocated unoccupied protected nests of certain species (e.g., bald eagle, osprey, and great blue heron). A permit may be required for wildlife disturbance caused by blasting.
<i>Heritage Conservation Act (HCA)</i>	An HCA inspection permit is required to date the age of the tree modification and determine the heritage status of trees at the Mount Collinson Site.	MFLNRORD	Heritage objects and archaeological sites, on provincial Crown land and private land in British Columbia, that predate 1846 are protected by the 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 MFLNRORD.
<i>Forest Act</i>	Occupant licence to cut	MFLNRORD	An occupant licence to cut is required for any cutting or removal of Crown timber from Crown land or private land.
<i>Park Act</i>	Park Use Permit—Land Use Occupancy	MFLNRORD	A land use occupancy permit is required for commercial use of conservancy areas (Safety Mountain site only)



3.0 CONSTRUCTION ACTIVITIES

Each site will include a radar tower, a prefabricated aluminum building (5 m by 10 m), solar panels and or fuel tank, and a helicopter landing pad. Construction at each site will require clearing of a temporary helicopter landing area (23 m by 23 m); general site clearing to support the tower, building and helicopter pads; radar tower construction; building installation; and helipad installation. Some tree clearing will be completed for tower site lines. The radar towers range from 46 m (Seymour Narrows and Mount Collinson) to 24.4 m (Safety Mountain and Denny Island). In addition to the facilities described above, the Seymour Narrows site will also have a 1 km powerline to Brown's bay, and a 300 m access road, both of which will require vegetation and tree clearing. The road clearing for Seymour Narrows and radar site construction at Mount Collinson will require rock blasting.

4.0 EXISTING CONDITIONS

The following section describes the existing biophysical conditions and key environmental components for each of the four proposed radar station sites compiled from an environmental overview assessment and site reconnaissance completed in 2018 (Stantec 2018). None of the four sites overlap with any wildlife habitat areas, ungulate winter range, important bird areas, parks, ecological reserves, or grizzly bear population units.

4.1 DENNY ISLAND

Denny Island is an island on the central coast of British Columbia, located east of the community of Bella Bella (Figure 1). The proposed radar site location is on a high point of land, dropping off steeply on all sides, and likely subject to strong winds, particularly in the winter. The site is located in a mature western redcedar/western hemlock forested community with an understory composed primarily of blueberry and a forest floor covered by feather mosses (Photo 1). The key environmental components and existing conditions for this site are summarized in Table 3.



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Photo 1 Proposed Denny Island Radar Site—Mature Western Redcedar/Western Hemlock Forest

Table 3 Denny Island—Key Environmental Components and Conditions

Key Environmental Component	Description
Vegetation	<ul style="list-style-type: none"> 15 ecological communities of conservation concern and 20 vascular plant species of conservation concern may occur in the project area
Wildlife	<ul style="list-style-type: none"> Project tenure area overlaps 4.0 ha of marbled murrelet critical habitat; however, the tower and related facilities do not overlap with this critical habitat Field ranking identified very low suitability as nesting habitat (trees with dead tops, snags, and likely usable cavities, one larger hemlock tree downslope from site may be suitable nesting tree) No amphibians, species of conservation concern or wildlife habitat features were detected during the site reconnaissance
Fish	<ul style="list-style-type: none"> No fish resources present at site; nearest waterbody located 175 to the west
Archaeology	<ul style="list-style-type: none"> No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, and helipad location Small patches of Indian Hellebore (traditional use plant) on slopes around site
SOURCE: Stantec 2018	



Existing Conditions

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4.2 MOUNT COLLINSON

Mount Collinson is located near the community of Telegraph Cove on Vancouver Island, British Columbia (Figure 1). The proposed radar site is located at the top of a peak above Johnstone Strait along the shoreline with steep slopes on all sides, dominated by old coniferous forest (Photo 2). The key environmental components and existing conditions for this site are summarized in Table 4.



Photo 2 Proposed Mount Collinson Radar Site—Blue-listed Western Hemlock—Western Redcedar/Salal Forested Community



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Table 4 Mount Collinson—Key Environmental Components and Conditions

Key Environmental Component	Description
Vegetation	<ul style="list-style-type: none"> • Site is in a sparsely treed forest of mountain hemlock, western hemlock, and yellow cedar; shrub layer (primarily salal, blueberry, and crowberry); ground layer (feathermosses and lichen) • Project area does not overlap with any mapped wetlands, riparian areas, known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk
Wildlife	<ul style="list-style-type: none"> • Proposed development area overlaps 1.5 ha of marbled murrelet critical habitat; however, site is not considered suitable for marbled murrelet nesting • Small wet area within site may serve as amphibian breeding habitat • No amphibians, species of conservation concern, or wildlife habitat features were detected during the site reconnaissance
Fish	<ul style="list-style-type: none"> • No fish resources near site (e.g., within 350 m) the
Archaeology	<ul style="list-style-type: none"> • Two likely CMTs were recorded within the proposed development area, both large diameter yellow cedar bark-stripped trees • Six species of traditional use plants (kwak'wala names in brackets): <ul style="list-style-type: none"> – Indian Hellebore (axwsuli) – Oval leaf blueberry (nuxwa) – Alaska blueberry – Salal (nakuł) – Red huckleberry (gwadam) – Bog cranberry (kikalis)
NOTE: CMT = culturally modified tree	
SOURCE: Stantec 2018	

4.3 SAFETY MOUNTAIN

Safety Mountain is located on top of a ridge, just east of the peak on Calvert Island, east of the Queen Charlotte Sound (Figure 1). The proposed radar site is on a high point of land, dropping off steeply on all sides, and likely subject to strong winds, particularly in the winter. The site is located entirely within the Calvert Island Conservancy which is co-managed under an agreement between the Wuikinuxv First Nation and the Province of British Columbia. The site is a parkland community with patches of stunted trees and openings dominated by heather and low-growing berry-producing shrubs (Photo 3). The key environmental components and existing conditions for this site are summarized in Table 5.



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Photo 3 Proposed Safety Mountain Radar Site—Krummholz Scrub Forest of Mountain Hemlock and Yellow Cedar



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Table 5 Safety Mountain—Key Environmental Components and Conditions

Key Environmental Component	Description
Vegetation	<ul style="list-style-type: none">• Stunted scrub forest of mountain hemlock and yellow cedar trees, with a herb layer dominated by pink mountain heather crowberry, and blueberries, and ground lichen cover• Project area does not overlap with any known occurrences of plant species or ecological communities of conservation concern, invasive plants, or critical habitat for plant species at risk
Wildlife	<ul style="list-style-type: none">• Small non-continuous drainage in a low area between two knolls which may have flowing water under very wet conditions, however with low to nil suitability for amphibian breeding• No amphibians or species of conservation concern were detected during the site reconnaissance
Fish	<ul style="list-style-type: none">• No fish resources present at site; closest waterbody is 135 m to the north
Archaeology	<ul style="list-style-type: none">• No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, helipad location, and access road

SOURCE: Stantec 2018

4.4 SEYMOUR NARROWS

Seymour Narrows is located near Campbell River on Vancouver Island (Figure 1). The proposed radar site is located near the top of a hill and is dominated by mature forest, with occasional cliffs and rock outcrops (Photo 4). The key environmental components and existing conditions for this site are summarized in Table 6.



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Existing Conditions

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Photo 4 Proposed Seymour Narrows Radar Tower Site—Red-listed Douglas-fir—Lodgepole Pine/Grey Rock-moss Forested Community

Table 6 Seymour Narrows—Key Environmental Components and Conditions

Key Environmental Component	Description
Vegetation	<ul style="list-style-type: none"> • Forest is composed of Douglas fir and shore pine, with an understory dominated by salal, grasses, mosses and ground lichen on the numerous rock outcrops • 23 ecological communities of conservation concern and 44 vascular plant species of conservation concern may occur in the project area
Wildlife	<ul style="list-style-type: none"> • Two bald eagle nests within 1 km of the tenure area along the shoreline of Seymour Narrows (WTSP 2018)
Fish	<ul style="list-style-type: none"> • No fish resources near site; closest waterbody is approximately 400 m to the southwest
Archaeology	<ul style="list-style-type: none"> • No above-ground archaeological resources or locations with high potential for buried archaeological resources were identified at the proposed tower, building, helipad location, and access road
SOURCE: Stantec 2018	



5.0 ENVIRONMENTAL PROTECTION MEASURES

Construction activities associated with the Project have the potential to affect environmental resources, however with the implementation of the mitigation measures outlined below, potential effects associated with the Project can be limited.

5.1 GENERAL BEST MANAGEMENT PRACTICES

Mitigation and management measures that avoid and/or mitigate adverse environmental effects associated with the Project are based on best management practices (BMPs) and standard industry procedures. These documents are from various government agencies, industry BMPs and recommendations by qualified professionals. The mitigation and management measures included in these documents have been created, modified and enhanced as needed for the purposes of this EMP. Examples of BMPs used to develop this EMP include, but are not limited to:

- Field Guide to Fuel Handling, Transportation and Storage (MWLAP 2002)
- Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1993)
- Environment and Climate Change Canada’s General Nesting Periods of Migratory Birds in Canada (ECCC 2018b)
- Guidelines for Raptor Conservation During Urban and Rural Land Development in British Columbia (MOE 2013)

5.2 GENERAL CONSTRUCTION PRACTICES

Many environmental mitigation measures are common to many construction components and activities. Table 7 provides general environmental mitigation measures applicable to all project activities.

Table 7 General Mitigation Measures

Category	Mitigation Measure
EMP and permits	1. A copy of the EMP and any applicable permits will be onsite and readily available.
Project start up	2. At the start of project construction, onsite personnel should review and discuss the measures in this EMP to promote an understanding of the Project, environmentally sensitive areas, reporting responsibilities and emergency response plans.
Training	3. Personnel involved with construction activities will be adequately trained and will utilize appropriate personal protective equipment.
Stop work	4. The contractor will stop work and contact the EM for assistance prior to commencing or continuing any activities that may pose any environmental risk not addressed in this document.
	5. The EM will have authority to issue a stop work order where activities are adversely affecting or are likely to adversely affect environmental conditions presented in Section 4.0. The EM will also make recommendations in the field for avoiding and mitigating effects, where measures in this EMP are not effective.



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Environmental Protection Measures

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Table 7 General Mitigation Measures

Category	Mitigation Measure
Construction footprint	6. Construction footprint will be limited to the extent feasible to safely construct the Project.
	7. Construction limits will be flagged to identify work areas, sensitive habitats (e.g., old forest/sensitive habitat/nest buffer zones).
Site cleanliness	8. Sites (staging areas, construction sites) will be kept tidy during construction and left in a good condition at the end of the Project.
Stock piles/ laydown areas	9. Stockpiling of material and laydown area shall be in accordance with BMPs (e.g., erosion and sediment control measures) and limited to approved areas.
	10. Blast rock will not be stockpiled within 30 m of a watercourse or wetland, or placed on sensitive vegetation
Deleterious substance	11. To the extent practical, construction materials will be free of deleterious substances that may be harmful to fish, fish habitat or drinking water quality (e.g., fine sediments, hydrocarbons, contaminants) downstream of the project sites.
	12. Machinery will be in good working condition (free or leaks) and cleaned prior to arriving on site; machinery will be inspected/maintained for the duration of the Project to limit leaks/spills.
Hydrocarbons	13. Hydrocarbons (e.g., hydraulic fluids and fuel, detectable by sight or smell) will not be released to the environment).
Flora and fauna	14. Activities should be completed in such a way as to limit stress and disturbance to flora and fauna.
Air and noise quality	15. Limit equipment and machine idling.
	16. Turn off heavy equipment when inactive for more than 30 minutes.
	17. Verify that equipment and machinery are in good operating condition prior to work.
	18. Carry out regular maintenance on equipment and machinery.
	19. Equipment and machinery will have noise abatement equipment (e.g., mufflers) in good working order.
	20. Drills will be equipped with dust collectors.
	21. Burning of slash material will follow Provincially accepted guidelines to increase burning efficiency.
Wildfire Prevention	22. Smoking will only be permitted in designated areas.
	23. Smoking will not be permitted on site when the fire danger ranking is high or extreme.
	24. Fire suppressing equipment must be present at the work site and at designated smoking areas.
	25. Burning of slash material will be scheduled to avoid high fire hazard periods.



5.3 SPILL PREVENTION, RESPONSE AND REPORTING

Substances that are deleterious to the environment and may pose a spill risk for this Project could include:

- Gasoline
- Diesel
- Hydraulic fluid
- Transmission fluid
- Engine oil
- Lubricants (grease, etc.)
- Drilling fluids
- Sediment

Table 8 outlines procedures for prevention and control of spills including responsibilities, storage, and equipment.

Table 8 Spill Prevention, Mitigation Measures, Response and Reporting

Category	Mitigation Measure
Training	1. The contractor will provide on-site staff with training in the use of hazardous materials and the location and use of spill kits and containment booms.
Fuel handling guide	2. Fuel handling, storage and labelling procedures shall be consistent with <i>A Field Guide to Fuel Handling, Transportation and Storage</i> (MWLAP 2002). If there are discrepancies between this EMP and the Fuel Handling Guide (MWLAP 2002), the Project will err on the side of more stringent unless otherwise approved by CCG
Fuel	3. Where possible, fuel storage, equipment or machinery refueling, and servicing will occur a minimum of 30 m from any waterbody. Where operational constraints require fuel storage, equipment or machinery re-fueling and servicing within 30 m of a waterbody (e.g., on the trestle above the creek), measures to prevent the release or spill of hazardous materials must be discussed and approved by CCG and the EM.
	4. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill.
	5. An inventory of all hazardous materials on site will be maintained.
	6. Portable fuel tanks (e.g., jerry cans) will be stored within leak-proof secondary containment with absorbent pads with a capacity of 110% of its volume. Accumulated water in the containment shall be removed regularly as not to diminish the capacity of the containment.
	7. Vehicles and equipment must be shut off while refueling.
Equipment	8. Equipment (e.g., containers, hoses and machinery) 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.
	9. At the discretion of the EM, drip trays, poly sheet or sorbent pads will be placed beneath machinery and equipment that are within 30 m of the high-water mark of water bodies.
	10. Small machinery (e.g., generators) should be placed in secondary containment, such as within drip trays with sorbent pads.
	11. Containers not in use will be sealed with a proper fitting cap or lid.



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Environmental Protection Measures

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Table 8 Spill Prevention, Mitigation Measures, Response and Reporting

Category	Mitigation Measure
Equipment maintenance/ servicing	12. 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.
Spills	13. In the event of a leak, all fueling/filling operations will be stopped until the cause of the leak has been identified and it has been repaired.
	14. Spills must be reported to the EM immediately, regardless of volume.

In the event of a spill, the measures presented in Table 9 should be implemented.

Table 9 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measure
Spill kits	1. The contractor will provide an appropriate number of spill kits on site based on the type and amount of equipment on site.
	2. Spill kits will be inspected by the contractor on a regular basis and will be re-filled immediately after use.
	3. Spill response materials contained in spill kits are required to be readily available when working at the project site. These materials include, but are not limited to: <ol style="list-style-type: none"> a. Spill kits b. Sorbent pads and booms c. Dry oil sorbent d. Personal protective equipment (e.g., nitrile gloves, safety glasses, suits) e. Heavy duty plastic garbage bags f. Fire extinguishers g. Shovels
Response	4. The initial response to the spill may include: <ol style="list-style-type: none"> a. Stop work b. Ensure your own safety and the safety of others c. On-site personnel wear personal protective equipment, such as nitrile gloves and safety glasses d. Identify the spilled materials and refer to the appropriate Safety Data Sheet 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 on-site spill kits i. If the spill is to water, use measures such as installing sorbent rolls as floating booms to contain the spill and sorbent pads to soak up the material j. Report the spill to the EM, where the EM will notify the CCG project manager k. The CCG project manager and/or the EM will determine if notification to regulatory agencies is required



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Table 9 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measure
Clean-up	5. Final clean-up and reclamation will be conducted following an assessment (by QEP) of soil and/or water conditions. Conduct in situ remediation only if approved by CCG and appropriate regulatory agencies. Specific clean-up measures will be determined in consultation with CCG, regulatory agencies, and the appropriately qualified professionals.
Reporting	6. CCG is responsible for notifying regulatory agencies or authorizing notification on their behalf (e.g., environmental representative) to regulatory agencies of all hazardous spills and to verify that the spill reporting meets provincial and federal requirements. CCG should report all spills to water to the Provincial Emergency Program (1-800-663-3456).
	7. The Spill Reporting Regulation under the British Columbia <i>Environmental Management Act</i> identifies externally reportable quantities for certain substances (Appendix A).
Environmental incident/non-compliance report	8. The CCG project manager will prepare an Environmental Incident/Non-Compliance Report in the event of a spill. Information required to be included in this report is provided in Section 6.2.

5.4 SEDIMENT AND EROSION CONTROL

Construction mitigation measures designed to limit the loss of soil and sediment mobilization to watercourses and vegetation adjacent to project areas are provided in Table 10. Sediment inputs to the aquatic environment can increase turbidity levels, directly affecting the quality of fish habitat. Sedimentation of vegetation can reduce the health of plants.

Table 10 Sediment and Erosion Control Mitigation Measures

Category	Mitigation Measure
Work	1. Activities should be completed in such a way as to limit the amount of fines and organic debris that may enter nearby aquatic and terrestrial environments.
Rain events	2. The contractor shall be prepared for rain events and have sediment and erosion control measures readily available and of sufficient amount.
	3. During high rainfall (e.g., 100 mm in 24-hour period) or when there is a risk of sediment and runoff entering waterbodies, work may be stopped at the discretion of the EM.
Vegetation	4. Limit disturbance to existing vegetation as part of sediment and erosion control measures in order to prevent sediment release.
	5. Avoid clearing vegetation on steep slopes during periods with high rainfall forecasted.



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Table 10 Sediment and Erosion Control Mitigation Measures

Category	Mitigation Measure
Erosion and sediment control measures	6. The contractor shall have a precautionary approach to erosion and sediment control. Put sediment control measures into place before starting any works that may result in sediment mobilization or cause erosion. Construction is not to start until sediment and erosion control measures are in place and deemed functional by the EM.
	7. When project activities have the potential to release sediment, erosion and sediment control measures (e.g., erosion control fabric, plastic sheeting, silt fences, gravel check dams, etc.) will be installed by the contractor.
	8. Stockpiled erodible materials shall be covered (e.g., straw, mulch, geotextile) to limit exposed erosion potential.
	9. Blast rock stockpiles will be contoured to limit erosion and covered and/or revegetated following construction as needed to limit erosion potential.
	10. Where necessary, exposed soils and ditches may require seeding with a native mix, as a form of sediment and erosion control.
	11. Erosion and sediment control measures will remain in place and be maintained throughout all construction activities and weather conditions, and will only be removed once construction is complete, ground conditions have stabilized.

5.5 VEGETATION MANAGEMENT

The proposed radar sites are located in areas where ecological communities of conservation concern and vascular plant species of conservation concern may occur as described in Section 4.0. Since the presence of plant species of conservation concern could not be confirmed because of the timing of the site reconnaissance, a pre-disturbance survey by a QEP is recommended before construction activities commence if work continues into the spring/summer. Table 11 outlines mitigation measures that should be implemented to reduce the disturbance of sensitive ecological communities and protect existing vegetation.



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Table 11 Vegetation Mitigation Measures

Category	Mitigation Measure
Access	1. Limit the area that will be disturbed to extent possible. Where possible use pre-existing trails, roads or cut lines as access routes.
Laydown	2. Construction materials will not be stored on vegetated areas, unless approved by the EM.
Clearing	3. Consider reducing tree clearing by locating project infrastructure in areas previously cleared for the temporary helipads.
	4. Cleared material will not be placed within 30 m of a watercourse or wetland, or placed on sensitive vegetation such as rock outcrops.
	5. Large diameter slash material will either be burned/chipped on site, or removed from site and disposed of at an acceptable disposal location (e.g., landfill).
Rare plants	6. If a previously unidentified rare plant is found prior to or during construction, those areas will be flagged and avoided where possible. If not possible, then a QEP will determine appropriate mitigation.
Revegetation	7. Areas cleared in support of project construction (i.e., access areas) will be restored to original condition, or enhanced.
Denny Island	8. Avoid effects to old forest by planning project activities (i.e., vegetation clearing and construction of project infrastructure) outside of the limits of old forest on Denny Island.

5.6 INVASIVE PLANT AND WEED MANAGEMENT

The Project has the potential to introduce and spread invasive terrestrial species. Mitigation and management measures to reduce, prevent and control invasive species and weeds during the Project are described in Table 12. Throughout this section the term “invasive plants” also refers to the general term “weeds”, whereas “noxious weeds” refers specifically to invasive plants that fall under the BC *Weed Control Act* (WCA). For the purposes of this section invasive plants and noxious weeds will be referred to collectively as “Invasive Plants”.



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Table 12 Invasive Species and Weed Control Management Measures

Category	Management Measure
Equipment	1. Equipment, vehicles and machines will arrive to site clean, paying special attention to undercarriages, tracks, tires and blades prior to arrival at the project site. Reduce the probability of introducing noxious weeds to the sites by cleaning equipment of vegetation debris and soil prior to transport to the sites
	2. Equipment and machines used to remove invasive species will be washed.
Clearing	3. Removal of invasive species, if present in areas requiring clearing, will require special attention to contain the vegetation and prevent its spread.
Material	4. Imported fill material must be free of invasive species.
	5. Imported fill material must meet the Canadian Council of Ministers of the Environment Canadian Soil Quality Guidelines for Commercial/Industrial Land Use and sample analysis should be documented from an independent Canadian Association of Laboratory Accreditation Inc. accredited laboratory
Disposal	6. Removed invasive species must be transported to an appropriate disposal facility approved by CCG.
Revegetation	7. Use only high-quality seed-lots for revegetation
Inspection	8. Inspect work areas during construction for establishment of invasive species and remove or chemically control as necessary to prevent establishment and spread.
Monitoring	9. Monitor the radar sites for noxious weeds following construction. If noxious weeds are discovered during monitoring, create and implement a management plan to comply with the BC <i>Weed Control Act</i> .



5.7 WILDLIFE PROTECTION

Activities associated with this Project, such as vegetation clearing and equipment operation, have the potential to directly or indirectly affect wildlife. Table 13 presents the mitigation measures that should be implemented to avoid or limit adverse effects on wildlife.

Table 13 Wildlife Mitigation Measures

Category	Mitigation Measure
Pre-disturbance survey	1. Prior to construction, areas to be cleared will be inspected by a QEP for wildlife features. The most likely wildlife features to be encountered are related to birds (e.g., bald eagle nests, nest cavities, stick nests in trees, marbled murrelet nests). Mitigation measures to address birds and bird nests are detailed in this table. In the unlikely event other wildlife features (e.g., mineral lick, den) are identified during this survey, the QEP will consult with the EM on appropriate mitigation measures (e.g., setbacks).
Birds and bird nests	2. The contractor is not permitted to fall trees without approval from the EM and the applicable regulatory agency.
	3. Nests of eagles, peregrine falcons, gyrfalcons, ospreys, and herons are protected year-round under the BC <i>Wildlife Act</i> , even when unoccupied. If such a nest is identified during the pre-construction survey, the QEP will consult with the EM on appropriate mitigation measures (e.g., avoidance).
	4. Reduce potential effects to migratory birds (i.e., incidental take), plan project activities (i.e., vegetation clearing and construction) to occur outside of the primary nesting period for breeding birds. <ul style="list-style-type: none"> a. The Mount Collinson and Seymour Narrows sites are in the A1 Nesting Zone which has a general nesting period of March 31 through August 7 (all habitats) (ECCC 2018b). b. The Denny Island and Safety Mountain sites are in the A2 Nesting Zone, which has a primary nesting period of April 11 to August 8 (all habitats) (ECCC 2018b). Migratory bird nests are protected under the federal <i>Migratory Birds Convention Act</i> while they are being used for breeding, nesting, roosting or rearing young. If vegetation clearing and/or timber removal/repair must occur during the primary migratory bird nesting period as identified above, then a “nest sweep” will be completed. The construction site and a 30-m zone around the construction site (where practical) will be inspected by a QEP for active bird nests no more than seven days before disturbance is to begin, otherwise another nest sweep must be undertaken. Where active bird nests are identified, a buffer zone will be established (see Buffer Zones category).
5. Once construction has begun, if a nest is encountered within the construction site or adjacent to the construction site (even after the end of the primary migratory bird nesting period), the nest will be evaluated by a QEP to determine species and/or if it is active. After the evaluation, the QEP will consult with the EM on appropriate mitigation measures (e.g., establishment of a buffer zone).	
Buffer zones	6. Where active bird nests are identified, a circular ‘buffer zone’ will be established around the nests and marked (e.g., with flagging tape). The required buffer distance varies by species, habitat type, and setting, and will be developed with input from the QEP based on provincial and federal guidelines, and the QEP’s opinion. Buffers will be at least 5 m (radius) and will remain in place while the nest is active. The QEP will also determine how long a setback will remain in place.
	7. Construction activities will be limited within buffer zones and must be approved by the EM and regulators (if necessary).



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Table 13 Wildlife Mitigation Measures

Category	Mitigation Measure
Feeding, attractants, and hazards	8. Feeding of wildlife will not be permitted.
	9. Meals, food waste, garbage, and other attractants (e.g., oil containers) will be securely stored in vehicles or bear-resistant containers to prevent attraction of wildlife.
	10. Construction materials (e.g., cables, wires, fencing) will be properly stored to avoid potential hazards for wildlife.
Dead, sick, injured animals	11. If dead, sick or injured animals are observed, report to the EM directly (verbally or by radio, as soon as possible).
Potentially hazardous wildlife	12. In the unlikely event elk, cougar or black bear are observed at the construction site do not approach the animal. Contact the EM directly (verbally or by radio), as soon as possible, for additional direction. If elk, cougar or black bear presence becomes an ongoing concern for construction personnel, the EM will consult with the British Columbia Conservation Officer Service (1-877-952-7277 [Report all poachers and polluters, RAPP, 24-hour hotline]) .
Seymour narrows	13. At the Seymour Narrows location where wetted habitat was identified, reduce potential effects to amphibians by avoiding project activities (i.e., vegetation clearing and construction) in wetlands that contain amphibian egg masses or tadpoles during the amphibian breeding period (mid-April to mid-August) and in habitats where amphibian movement is observed during the post-breeding dispersal period (mid-July to mid-September).
Seymour narrows pre-construction amphibian surveys	14. At the Seymour Narrows location where wetted habitat was identified, if project activities overlap with the amphibian breeding or post-breeding dispersal periods, engage a QEP to undertake pre-construction amphibian surveys. The surveys will: 1) determine the presence of amphibian eggs, tadpoles, juveniles, or adults; and 2) determine whether salvage or other mitigation measures are required.

5.8 ARCHAEOLOGICAL AND HERITAGE RESOURCE PROTECTION

In the event that an archaeological or heritage site is encountered during construction, the archaeological standards and practices (including implementation of a chance find protocol) in place for private and Crown lands should be followed.

Evidence of what is thought to be an archaeological or heritage resource may include 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
- Old industrial, ranching, and other remains of possible heritage significance
- Mature western red cedar with well-defined bark scars
- Human remains



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If an archaeological or heritage resource is encountered during construction, the work must be stopped in the vicinity of the find and the EM will notify the CCG project manager. From there, the CCG project manager or their delegate will contact the BC Archaeological Branch and/or a professional archaeologist immediately.

At the Mount Collinson site, one area of low to moderate potential was identified adjacent to the likely CMT 1, near an area of standing water. Additional investigations, which may include coring the tree with an increment borer or examining a cookie of the tree if felled, is recommended to confirm if modifications are cultural, and to determine the scar age. Further, it is recommended that shovel testing of the area occur should the bark-strip be confirmed as cultural. No mitigation measures or further work beyond the chance find protocol is required for the Denny Island, Safety Mountain, or Seymour Narrows sites.

5.9 WASTE CONTROL

Waste from project activities has the potential to adversely affect the aquatic and terrestrial environments; therefore, the mitigation measures outline in Table 14 will be implemented:

Table 14 Waste Control Mitigation Measures

Category	Mitigation Measure
Waste	1. Waste or any miscellaneous unused materials will be recovered for disposal in a designated facility. Under no circumstances will materials be deliberately thrown into the aquatic or terrestrial environment.
	2. Meals, food waste, garbage, and other attractants (e.g., oil containers) will be securely stored in vehicles or bear-resistant containers to prevent attraction of wildlife.
	3. All On-site personnel will make best efforts to prevent debris from entering the environment.
	4. Litter in the form of coffee cups, lunch wrappers, cigarette butts, and other such items will be stored and secured in such a way as to prevent attracting wildlife and starting wildfires.
	5. Construction debris/waste will be collected, transported and disposed of off-site and in accordance with applicable legislation, guidelines and best management practices.
Portable Toilets	6. Portable toilets, if required, will be located a minimum of 30 m from any waterbody or plant species of concern. Sewage from portable toilets will be disposed of in an approved sewage disposal facility on an as-needed basis.
Hazardous Waste	7. Although hazardous waste is not anticipated for this Project, it should be noted that sorbent materials or soils saturated with hydrocarbons (greater than or equal to 3% by weight) are classified as hazardous waste under the British Columbia <i>Environmental Management Act</i> and must be managed accordingly.
	8. Used petroleum products, including their empty containers, will be collected and transported to a licensed recycling facility in approved storage containers following applicable regulations.



6.0 ENVIRONMENTAL MONITORING AND REPORTING

6.1 GENERAL ENVIRONMENTAL MONITORING

The EM will verify that all ongoing project components are monitored against this EMP, any additional construction-specific plans and applicable regulatory and legal requirements. The EM will be responsible for environmental monitoring related to any subcontractor activities as well as the prime contractor's activities. In addition, the EM will confirm with the contractor(s) that any new on-site personnel understand their environmental responsibility and requirements of the EMP. If this EMP is followed, the potential for environmental effects and adverse environmental effects are low.

The appropriate frequency of site visits by a dedicated CCG EM will be determined prior to construction start-up and will be based on any regulatory requirements and higher-risk activities. When a CCG EM is not on site the contractor will be responsible for environmental monitoring.

The CCG project manager and EM will have authority to alter work methodology and/or issue stop work orders to prevent environmental effects and/or adverse environmental effects, whether probable, imminent, or occurring. Once corrective actions have been implemented and deemed appropriate by the EM, suspended project activity will be allowed to resume under the EM's guidance.

6.2 REPORTING

The EM is responsible for keeping notes of site activities for each site visit and will prepare one monitoring report at the end of construction. This report will be submitted as a draft to the CCG project manager for review and comment. Once the EM has addressed the project manager's comments, the EM will finalize the report.

The monitoring report should include, at minimum:

- Construction activities
- Monitoring period
- Mitigation measures and activities that have been implemented or recommended
- Non-compliances and environmental incidents
- Presence of wildlife observed in the work area
- Photographs
- Overall compliance or non-compliance with the EMP and/or regulatory permits/authorizations

Non-compliances and incidents will be reported to the CCG project manager (and regulators where required) as soon as possible and within 24 hours of occurrence.

In the event of non-compliance or an incident, the event must be reported to CCG project manager. Non-compliances include non-compliance with this EMP, project-specific mitigation plans or project permits/authorizations/legislation (e.g., spills).



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The non-compliance and incident reports should include:

- Reporting person's name and telephone number
- Date and time of the non-compliance or incident, including major steps (such as when the incident occurred, when did response occur)
- Location of non-compliance or incident (coordinates if available)
- Description and cause of the non-compliance or incident (if a spill—including type, source and quantity of material)
- Receiving environment description
- Names of other persons or government agencies notified
- Description of the response and when it occurred
- If a spill, percent of material recovered
- Details of further action required
- Recommendations for preventative/mitigation measures

Non-compliances and incidents must be resolved immediately by the CCG project manager, the EM and the contractor(s), with the CCG project manager as the top authority. When a non-compliance or incident occurs, remedial actions must be taken as soon as possible (i.e., as soon as the site is safe).

6.3 EMERGENCY CONTACTS

Emergency contacts for the Project are provided in Table 15. Updated phone numbers for project personnel should be obtained prior to construction.

Table 15 Emergency Contact List for Project

Contact	Phone Number
The CCG project manager: Clint Hoffman	Office: (250) 413-2834 Mobile: (250) 686-0016
Contractor contact: TBD	Office: Mobile:
CCG environmental monitor: Robin Connelly	Office: (250) 363-8727 Mobile: (250) 580-8382
Provincial emergency program, 24 hours spill reporting	1-800-663-3456
DFO, violations and reporting, Report All Poachers and Polluters (RAPP), 24 hours hotline	1-877-952-RAPP (7277)
Medical emergency	Use 911
WorkSafeBC	1-866-621-7233



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7.0 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 the undersigned.

Regards,

Stantec Consulting Ltd.

Reviewed by:

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References

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8.0 REFERENCES

- Banner, A., W.H. MacKenzie, J. Pojar, A. MacKinnon, S.C. Saunders, and H. Klassen. 2014. A field guide to ecosystem classification and identification for Haida Gwaii. Land Management Handbook 68. Province of BC, Victoria, BC.
- ECCC (Environment and Climate Change Canada). 2018a. Avoiding Harm to Migratory Birds: Overview. Last updated May 25, 2017. Available online at: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/overview.html>. Accessed November 2018.
- ECCC. 2018b. Nesting Periods. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#_zoneA_calendar. Accessed November 2018.
- GeoBC. 2018. iMap BC. Available at: <https://maps.gov.bc.ca/ess/hm/imap4m/>. Accessed September 2018.
- MWLAP (Ministry of Water, Land and Air Protection). 2002. A Field Guide to Fuel Handling, Transportation and Storage. 3rd Edition. Available online at: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf. Accessed November 2018.
- Stantec (Stantec Consulting Ltd.). 2018. Environmental Overview Assessment in Support of the Development of Canadian Coast Guard Radar Sites, British Columbia. November 15, 2018.
- WTSP (Wildlife Tree Stewardship Program). 2018. Nest Tree Report. The Community Mapping Network. Available at: <http://www.cmnmaps.ca/wits/>. Accessed September 2018.



APPENDIX A

Recordable Levels for Spills of Certain Substances

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Appendix A Recordable Levels For Spills of Certain Substances
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Appendix A RECORDABLE LEVELS FOR SPILLS OF CERTAIN SUBSTANCES

Item	Substance spilled	Specified amount
1	Class 1, Explosives as defined in section 2.9 of the Federal Regulations	Any quantity that could pose a danger to public safety or 50 kg
2	Class 2.1, Flammable Gases, other than natural gas, as defined in section 2.14 (a) of the Federal Regulations	10 kg
3	Class 2.2 Non-Flammable and Non-Toxic Gases as defined in section 2.14 (b) of the Federal Regulations	10 kg
4	Class 2.3, Toxic Gases as defined in section 2.14 (c) of the Federal Regulations	5 kg
5	Class 3, Flammable Liquids as defined in section 2.18 of the Federal Regulations	100 L
6	Class 4, Flammable Solids as defined in section 2.20 of the Federal Regulations	25 kg
7	Class 5.1, Oxidizing Substances as defined in section 2.24 (a) of the Federal Regulations	50 kg or 50 L
8	Class 5.2, Organic Peroxides as defined in section 2.24 (b) of the Federal Regulations	1 kg or 1 L
9	Class 6.1, Toxic Substances as defined in section 2.27 (a) of the Federal Regulations	5 kg or 5 L
10	Class 6.2, Infectious Substances as defined in section 2.27 (b) of the Federal Regulations	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
11	Class 7, Radioactive Materials as defined in section 2.37 of the Federal Regulations	Any quantity that could pose a danger to public safety and an emission level greater than the emission level established in section 20 of the "Packaging and Transport of Nuclear Substances Regulations"
12	Class 8, Corrosives as defined in section 2.40 of the Federal Regulations	5 kg or 5 L
13	Class 9, Miscellaneous Products, Substances or Organisms as defined in section 2.43 of the Federal Regulations	25 kg or 25 L
14	waste containing dioxin as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
15	leachable toxic waste as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
16	waste containing polycyclic aromatic hydrocarbons as defined in section 1 of the hazardous Waste Regulation	5 kg or 5 L
17	waste asbestos as defined in section 1 of the Hazardous Waste Regulation	50 kg
18	waste oil as defined in section 1 of the Hazardous Waste Regulation	100 L



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Item	Substance spilled	Specified amount
19	waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation	5 kg or 5 L
20	PCB Wastes as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
21	waste containing tetrachloroethylene as defined in section 1 of the Hazardous Waste Regulation	50 kg or 50 L
22	biomedical waste as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
23	A hazardous waste as defined in section 1 of the Hazardous Waste Regulation and not covered under items 1 – 22	25 kg or 25 L
24	A substance, not covered by items 1 to 23, that can cause pollution	200 kg or 200 L
25	Natural gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas

SOURCE: British Columbia *Environmental Management Act*. Spill Reporting Regulation. 2008.
Available at: http://www.bclaws.ca/civix/document/id/loo96/loo96/46_263_90

