



**Public Works and Government
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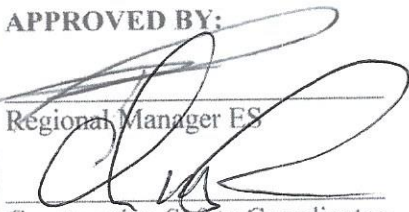
Specifications for

KEL,SET (Reay) Creek Remediation


Sidney, BC

Project No. R.087575.005 2020May

APPROVED BY:



Regional Manager ES 2020/04/22
Date



Construction Safety Coordinator 2020/04/22
Date

TENDER:



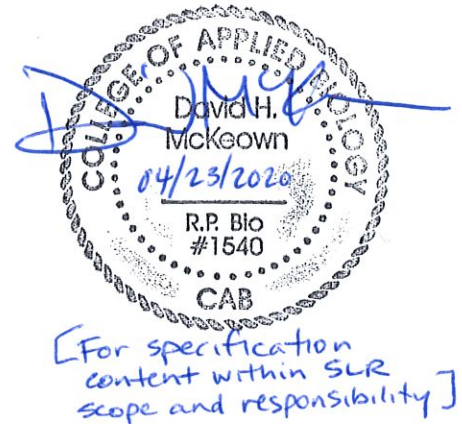
Project Manager 2020 April 22
Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#219 – 800 Burrard Street, Vancouver, B.C. V6Z 0B9

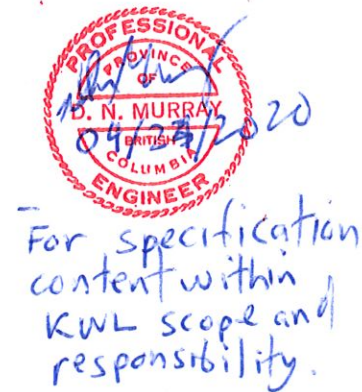


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Drawing No.	Drawing Title
G-001	KEL,SET (Reay) Creek Pond Site Plan, Key Plan, & Drawing List
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Annex No.	Annex Title
A	Water Management Information
B	Tree Removal and Retention Information
C	Site Photographs
D	Existing Conditions and Environmental Quality Information
E	Environmental Mitigation Strategy
F	Permits and Authorizations

Annexes are for reference purposes only.

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Not Used.

1.4. Work Covered by Contract

1.4.1. Work to be performed under the Contract includes, but is not limited to, the following items, including all ancillary Work, covered further in the Contract:

1.4.1.1. Site access restrictions are as follows:

Construction Site is located on Town of Sidney property. Construction limit at centreline of Westbrook Drive from Northbrook Drive to entrance to Reay Creek Park access trail. Contractor responsible for Town of Sidney permits (eg. work in road allowance or right of way permit), insurance and notification as applicable to the work.

Contractor to allow access for Town of Sidney and their representatives to dam at downstream end of KEL,SET (Reay) Creek Pond.

1.4.1.2. Construction activities will also require access to lands managed by the Victoria Airport Authority (VAA) to the west of Canora Road as shown in Drawings for water diversion, laydown, stockpiling, and water management purposes. Neighbouring or sensitive sites restrictions are as follows:

1.4.1.2.1. No use of BC Aviation Museum parking lot nor Mary's Bleue Moon Cafe parking lot is allowed.

1.4.1.2.2. Common roadways and site access, including Norseman Road, Northbrook Drive and west-bound lane of Westbrook Drive to be kept clear at all times. Approval for temporary access, if required, along north-bound lane of Canora Road as shown in Drawings to be obtained by Contractor through Town of Sidney. Traffic control to be provided by Contractor as required. No weekend work permitted that encumbers Norseman Road.

1.4.1.2.3. Cycling/pedestrian path along Canora Road to be kept clear at all times. Contractor to provide traffic control for vehicles and equipment crossing cycling/pedestrian path.

1.4.1.2.4. Access to neighbouring private properties adjacent to KEL,SET (Reay) Creek Pond not included or approved under current Contract with exception of north extent of 2026 Bowcott Place up to extent of natural pond boundary.

- 1.4.1.2.5. Access to areas of KEL,SET (Reay) Creek downstream of dam for water management purposes only in accordance with Drawings.
- 1.4.1.3. Classes of Soil based on Environmental Quality Criteria are:
 - 1.4.1.3.1. Waste Quality
 - 1.4.1.3.2. Non-Contaminated Quality
- 1.4.1.4. Contractor to retain Qualified Environmental Professional(s) with background in contaminated sites, environmental protection and fisheries resources to supervise and conduct quality control monitoring for the duration of the Work. Qualified Environmental Professional(s) to be present at site for duration of Work.
- 1.4.1.5. Contractor to retain Qualified Professional with a background in hydrology, hydraulics, and water treatment to prepare, implement and operate Water Management Plan and associated infrastructure and facilities.
- 1.4.1.6. Qualified Environmental Professional and Qualified Professional may be the same individual if all designated experience and qualifications can be met.
- 1.4.1.7. Work is to be carried out in isolation of stream flows. Work areas to be kept dry. Maintain 100% of downstream flows and prevent dewatering of downstream habitat. Water Management Plan to be prepared by Contractor's Qualified Professional for water diversion, dewatering and seepage water control, handling, treatment and discharge including during storm events. Continuous monitoring of water diversion infrastructure including over night and weekends is required. Contractor responsible for immediate corrections if deficiencies or malfunctions are observed.
- 1.4.1.8. Install and maintain fish exclusion barriers around work site. Perform fish and wildlife salvage by appropriately Qualified Environmental Professional prior to start of construction work. Contractor's Qualified Environmental Professional to submit a Fish Salvage and Relocation Plan as part of the Environmental Protection Plan for acceptance by the Departmental Representative. Contractor responsible for permits.
- 1.4.1.9. Soil classification based on insitu testing; exsitu testing may be required as directed by the Departmental Representative.
- 1.4.1.10. Treatment of Contaminated Water Onsite. To be detailed in Water Management Plan prepared by Contractor's Qualified Professional. Contractor responsible for discharge permits and associated fees.
- 1.4.1.11. Treatment of Contaminated Water Offsite. Contractor responsible for transport and treatment. Contractor takes ownership of all material leaving site.
- 1.4.1.12. Excavation of Contaminated Soil as per Drawings. Contractor solely responsible for excavating to Contaminated Material Limits. Excavation Limits on Drawings based on a nominal 1:1 slope for volume estimating purposes only; actual shoring and/or slope requirements responsibility of the Contractor. Excavation along upstream face of existing dam to be conducted as per Drawings and under supervision of Contractor's qualified geotechnical professional.

- 1.4.1.13. Selective trimming and/or removal of select trees in accordance with tree removal and retention requirements. Contractor to retain a certified arborist to conduct a hazard tree assessment and assess tree clearing and pruning requirements to complete the Work. Contractor responsible for permits and associated fees. Trees identified for retention to be clearly marked.
- 1.4.1.14. Invasive plant species removal in areas shown in Drawings and as determined by Contractor for clearing and grubbing for site access requirements or as directed by the Departmental Representative and off-site disposal at a permitted facility. Selection of access areas to be combined with areas requiring invasive plant species removal wherever possible. Clearing and grubbing areas for site access anticipated to be approximately 250 – 300 m². Contractor to clearly mark boundaries of clearing and grubbing areas to avoid unnecessary encroachment on areas to be retained.
- 1.4.1.15. Transportation of Contaminated Soil to Stockpile Management Area. Contractor to prepare Traffic Management Plan and Contaminated Sites Transportation Plan. Canora Road centre-line demarcates boundary between Town of Sidney and District of North Saanich. Contractor responsible for permits and approvals from all authorities having jurisdiction along transportation routes.
- 1.4.1.16. Temporary stockpiling of Contaminated Soil prior to transportation to facilities including seepage water management in accordance with Water Management Plan prepared by Contractor's Qualified Professional.
- 1.4.1.17. Transportation of Contaminated Soil to facilities. Contractor takes ownership of all material leaving site
- 1.4.1.18. Treatment of Contaminated Soil at Contractor's discretion, specifically metals and polycyclic aromatic hydrocarbons (PAHs) contaminated soil.
- 1.4.1.19. Disposal of Contaminated Soil. All material identified as Contaminated on the Site must be disposed of at a Disposal Facility, including material that has been Treated.
- 1.4.1.20. Backfilling excavated slopes with clean, washed and polished imported granular material for slope stability at direction of Contractor's qualified geotechnical engineer and in accordance with Drawings or as directed by the Departmental Representative.
- 1.4.1.21. Supply and installation of large woody debris habitat structures as shown in Drawings or as directed by Departmental Representative.
- 1.4.1.22. Supply and installation of planting benches as shown in Drawings or as directed by the Departmental Representative. Place topsoil over planting benches as shown in Drawings.
- 1.4.1.23. Grading, scarifying, installing temporary erosion and sedimentation control measures at toe of slopes, and preparing disturbed areas for restoration planting to be conducted by others.
- 1.4.1.24. Re-introduction of water to the pond area following completion of remedial activities. Re-filling of pond to be conducted while maintaining water diversion infrastructure with slow release of creek water to pond area and

control of erosion and sedimentation. Details of pond re-filling to be included in Contractor's Water Management Plan for approval by the Departmental Representative.

1.5. Location

1.5.1. The Site location is shown on Drawings.

1.6. Project/Site Conditions

- 1.6.1. Contractor must provide personnel and equipment with appropriate experience for site conditions, including experience in remediating site-specific Contaminated Material in sensitive riparian and aquatic environments and water management and treatment. Contractor to provide specialized material handling, health and safety, and environmental protection procedures, and must have knowledge of appropriate regulations. Contractor to retain appropriately Qualified Professional(s) to oversee Work.
- 1.6.2. Work at Site involves Work with Contaminated Material. Complete list of anticipated contaminants and concentration levels on the Site available separately in Appendices and/or Drawings.
- 1.6.3. Existing condition on the Site identified according to Drawings. Annexes provided for reference purposes only.

1.7. Other Contracts

- 1.7.1. Other contracts are currently in progress at Site.
- 1.7.2. Other contracts are:
- 1.7.2.1. Environmental and other consultants.
- 1.7.2.2. Site users as identified in Contract Documents.
- 1.7.3. Further contracts may be awarded while the Contract is in progress.
- 1.7.4. Cooperate with other contractors in carrying out their respective works and carry out directions from Departmental Representative.
- 1.7.5. Coordinate Work with that of other contractors. If any part of Work under the Contract depends for its proper execution or result upon Work of another contractor, report promptly to Departmental Representative, in writing, any defects which can interfere with proper execution of this Work.

1.8. Contractor's Use of Site

- 1.8.1. Use of Site:
- 1.8.1.1. For the sole benefit of Canada.
- 1.8.1.2. Exclusive and only for completion of the execution of Work.
- 1.8.1.3. Assume responsibility of Prime Contractor and control for assigned premises for performance of this Work.
- 1.8.1.4. Be responsible for coordination of all Work activities onsite, including the Work of other contractors engaged by the Departmental Representative.
- 1.8.2. Unless otherwise indicated, there are no pre-existing arrangements for access or encroachment on neighbouring properties with exception of north extent of 2026

- Bowcott Place up to extent of natural pond boundary. Offsite access, occupancy, or encroachment is the responsibility of the Contractor.
- 1.8.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
 - 1.8.4. Do not unreasonably encumber Site with material or equipment.
 - 1.8.5. Accommodate common areas with other Site users, including roadways.
 - 1.8.6. Segregate Contractor's work area from common areas to prevent unintentional multiple employer worksite, as required.

1.9. Existing Permits

- 1.9.1. Existing Permits and Authorizations are included in the Annexes:
 - 1.9.1.1. Department of Fisheries and Oceans Canada Fisheries Act Letter of Advice (File No.: 20-HPAC-00044).
 - 1.9.1.2. British Columbia Water Sustainability Act Section 11 Changes In and About a Stream Notification (File No.: 1004722).
- 1.9.2. Contractor assumes responsibility for relevant portions of existing permits.
- 1.9.3. Changes to existing permits must be accepted by Departmental Representative. Changes to existing permits responsibility of Contractor, including resubmission to regulators as determined by the Contractor's Qualified Professional. Contractor assumes all responsibility for changed permits.
- 1.9.4. Permits required other than the existing permits responsibility of Contractor.

1.10. Schedule Requirements

- 1.10.1. Work to be initiated: as soon as practical.
- 1.10.2. Pre-Mobilization Submittals: at least 10 Working Days prior to mobilization to Site, Submit all documents required for mobilization, including at a minimum the Contractor's site-specific project Health and Safety Plan and emergency procedures.
- 1.10.3. Site Works: Final Completion no later than 2020 November 15. In-water Works to be performed between 2020 June 15 and 2020 September 15.
- 1.10.4. Completion of the Work: no later than 2020 December 31. Includes all final Submittals including as-built documents, the Certificate of Completion, and the Statutory Declaration at Final Completion.

1.11. Hours of Work

- 1.11.1. Restrictive as follows:
 - 1.11.1.1. Working Days are Monday to Saturday with exception of Work along Norseman Road to be Monday to Friday.
 - 1.11.1.2. Working Hours are 07:00 to 19:00 Monday to Friday; 08:00 to 19:00 Saturday.
- 1.11.2. Work outside of Working Days and Working Hours is at Department Representative's sole discretion and must be accepted in writing by Departmental Representative by Submission.

- 1.11.3. Be responsible for Site outside of Working Days and Working Hours and have a continuous presence on Site as required, in accordance with the Contract, or as directed by the Departmental Representative, to ensure:
 - 1.11.3.1. Protection of health and safety for potentially hazardous activities (eg deep open excavations).
 - 1.11.3.2. Site security for Sites in urban environments.
 - 1.11.3.3. Maintenance of environmental monitoring and protection measures for Sites in urban environments or with sensitive neighbouring properties.

1.12. Security Clearances

- 1.12.1. Not Used.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

- 1.2.1. Advisory: notices, instructions, or directions issued by the Departmental Representative to the Contractor.
- 1.2.2. Certificate of Completion: see General Conditions.
- 1.2.3. Change Order: PWGSC form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.
- 1.2.4. Classification: material (including soil and water) categorized into different classes based on Environmental Quality Criteria. Includes Hazardous Waste Quality, Waste Quality, Non-Contaminated Quality. Sub-classification based on specific parameters as identified in Contract. Re-classification must have approval of Departmental Representative.
- 1.2.5. Confirmation Samples: soil and sediment samples collected from the base and walls of the excavation by the Departmental Representative to confirm that the remedial objectives for the Work have been met.
- 1.2.6. Contaminated Material: material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) exceed the levels specified in policies and regulations. Includes Hazardous Waste Quality and Waste Quality. Does not include Non-Contaminated Quality material. Relevant regulations, unless otherwise in accordance with the Contract or as directed by the Departmental Representative, include:
- 1.2.6.1. Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines*, the CCME *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in Soil*, and the Federal Contaminated Sites Action Plan (FCSAP) *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites*.
- 1.2.6.2. *BC Hazardous Waste Regulation*, *BC Contaminated Sites Regulation*, and *BC Approved Water Quality Guidelines*.
- 1.2.6.3. *Yukon Special Waste Regulation*, *Yukon Contaminated Sites Regulation*.
- 1.2.7. Contaminated Soil Extents: lateral and vertical extents of Contaminated Soil to be remediated to meet remediation objectives. Does not include Topsoil, Overburden, or other Non-Contaminated Quality Soil excavated incidentally. Extents, including contaminants and concentrations, on Drawings are approximate and may vary based on field observations or Confirmation Samples.
- 1.2.8. Contaminated Water Treatment Plant: a temporary onsite or existing offsite facility located in Canada that is designed, constructed and operated for the

- handling or processing of Contaminated Water in such a manner as to change the physical, chemical or biological character or composition of the water to lower than the site-specific remedial objective, Discharge Approval, and in compliance with all regulations.
- 1.2.9. Contemplated Change Notice: PWGSC form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.
 - 1.2.10. Contract: see General Conditions.
 - 1.2.11. Contract Amount: see General Conditions.
 - 1.2.12. Contractor: see General Conditions.
 - 1.2.13. Departmental Representative: see General Conditions.
 - 1.2.14. Discharge Approval: permit, certificate, approval, license, or other required form of authorization issued by appropriate federal agency, province, territory, or municipality having jurisdiction and authorizing discharge.
 - 1.2.15. Disposal Facility: an offsite facility specifically used to introduce Contaminated Material into the environment for the purpose of final burial.
 - 1.2.16. 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 humankind; or degrade environment aesthetically, culturally and/or historically.
 - 1.2.17. Environmental Protection: prevention, control, mitigation, and restoration of pollution and habitat or environmental disruption during construction. Control of Environmental Pollution and Damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; vibrations; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
 - 1.2.18. Environmental Protection Plan: plan developed by the Contractor to ensure Environmental Protection and prevent Environmental Pollution and Damage identifying all environmental risks and mitigation measures, including: personnel requirements, emergency contacts, Environmental Protection methods, procedures, and equipment, and emergency response including a Spill Control Plan.
 - 1.2.19. Environmental Quality Criteria: numerical material criteria used on Site based on Standards and/or Guidelines specified by the Canadian Council of Ministers of the Environment and/or BC *Contaminated Sites Regulation* or Yukon *Contaminated Sites Regulation*, as applicable, using appropriate Land Use and Site-specific Factors.
 - 1.2.20. Excavation Extents: lateral and vertical extents of Soil to be excavated to meet Contaminated Soil Extents. Includes Overburden. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples.
 - 1.2.21. Extension of Time: see General Conditions.

- 1.2.22. Extension of Time on Contracts: PWGSC form requesting an Extension of Time.
- 1.2.23. Facility Authority:
 - 1.2.23.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.2.23.2. For facilities on First Nation reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.2.23.3. For facilities on First Nations land in Canada subject to the First Nation Land Management Act regime: the relevant First Nation Council. Documentation must be provided that the facility is on land subject to the First Nation Land Management Act regime.
 - 1.2.23.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
- 1.2.24. Final Completion: see General Conditions.
- 1.2.25. Final Excavation Limits: lateral and vertical extents of excavation as determined by Contractor's Qualified Professional Surveyor. Includes Contaminated Soil, Topsoil, Overburden, or other Non-Contaminated Quality Soil excavated incidentally including Temporary Sloping and Shoring.
- 1.2.26. Hazardous Waste Quality: Contaminated material which meets the applicable Regulatory definition of Hazardous Waste.
- 1.2.27. Land Treatment Facility (LTF): equivalent of Soil Treatment Facility.
- 1.2.28. Landfill Facility: an offsite facility specifically used to introduce Non-Contaminated Quality Soil into the environment for the purpose of final burial.
- 1.2.29. Master Plan: baseline schedule determined by Contractor compliant with Schedule Requirements. Duration for any portion of the Work based on Master Plan.
- 1.2.30. Materials Source Separation Program: consists of a series of ongoing activities to separate reusable and recyclable waste into categories from other types of waste at point of generation.
- 1.2.31. National Master Specifications: the Specifications are subdivided in accordance with the current 6 digit National Master Specifications System; the first 2 digits are the Division, the last 4 digits are the Section. A Division may consist of the Work of more than 1 Subcontractor; responsibility for determining which Subcontractor provides the labour, material, equipment and services required to complete the Work rests solely with the Contractor
- 1.2.32. Non-Contaminated Quality: material that does not exceed applicable Environmental Quality Criteria.
- 1.2.33. Onsite Soil Treatment Facility (Onsite STF): a facility constructed and operated on property under the control of PWGSC specifically used to bioremediate Contaminated Soil originating only from federal Sites.
- 1.2.34. Overburden: Non-Contaminated Quality Soil excavated incidentally as required above or adjacent to Contaminated Soil. Includes Topsoil.

- 1.2.35. Oversize Debris: Waste that is required to be excavated and is: larger than 1 cubic metre or larger than 2 metres in one dimension, cannot be removed with a typical excavator with bucket, and requires the use of special equipment (e.g., saws, hydraulic cutters, excavator hammers, vibratory pile extractors). Includes bedrock, boulders, pilings, pipes, building structures, and concrete foundations.
- 1.2.36. Prime Contractor: see General Conditions “Contractor”, BC Occupational Health and Safety Regulations “Prime Contractor”, and Yukon Occupational Health and Safety Act “Constructor”.
- 1.2.37. Progress Payment: see General Conditions.
- 1.2.38. Progress Survey: Survey conducted using equipment such as tape measurements, non-differential GPS, theodolite, or truck counts. Not a survey conducted by a Qualified Professional Surveyor.
- 1.2.39. PWGSC: Public Works and Government Services Canada (also known as PSPC: Public Services and Procurement Canada). Representative of Canada with control of the Site.
- 1.2.40. Qualified Professional: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations).
Includes:
- 1.2.40.1. Association of the Chemical Profession of British Columbia.
- 1.2.40.2. British Columbia College of Applied Biology.
- 1.2.40.3. British Columbia Institute of Agrologists.
- 1.2.40.4. Engineers and Geoscientists British Columbia.
- 1.2.40.5. Engineers Yukon.
- 1.2.41. Qualified Professional Surveyor: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations).
Includes:
- 1.2.41.1. Association of British Columbia Land Surveyors.
- 1.2.41.2. Association of Canada Lands Surveyors.
- 1.2.41.3. Applied Science Technologists & Technicians of British Columbia registered in Site Improvements Surveys.
- 1.2.41.4. Engineers and Geoscientists British Columbia.
- 1.2.42. Quote: Quotation for Design Change or Additional Work. Contractor’s cost proposal issued to the Departmental Representative as per the relevant

- Contemplated Change Notice. May be either a Lump Sum Arrangement or a Unit Price Arrangement.
- 1.2.43. Remediation by Excavation: complete excavation of Contaminated Soil and incidental Non-Contaminated Quality Soil to the Site boundaries for the purpose of remediating the Site to meet numerical standards. Includes full treatment and disposal. Does not include risk assessment or risk management of material onsite. Does not include encapsulation or solidification in place.
 - 1.2.44. Request For Information: notice or other communication issued by the Contractor to the Departmental Representative.
 - 1.2.45. Sewage: liquid waste which is not suitable for direct discharge to the environment, and which must be either treated offsite or discharged to a sanitary sewer. Includes water from hand basin, shower, personal hygiene facilities, or other liquid waste from sanitary facilities.
 - 1.2.46. Site: work area available to Contractor according to Drawings. Does not include shared or public areas, including common roads.
 - 1.2.47. Soil: unconsolidated mineral or organic material, rock, fill, and sediment deposited on land, and other solid material excavated incidentally. Includes Topsoil and Overburden. Excludes cleared and grubbed vegetation, litter, rubbish, debris, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, and asphalt and other waste material.
 - 1.2.48. Soil Treatment Facility: facility for bioremediating contaminated soil. Includes Treatment Cells, Staging Cells, and ancillary Access Roads.
 - 1.2.49. Special Waste: equivalent of Hazardous Waste.
 - 1.2.50. Subcontractor: see General Conditions.
 - 1.2.51. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, license, or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.
 - 1.2.52. Substantial Performance: see General Conditions.
 - 1.2.53. Superintendent: see General Conditions
 - 1.2.54. Supplier: see General Conditions.
 - 1.2.55. Topsoil: Overburden excavated incidentally above Contaminated Soil Extents that is a surface organic layer to facilitate vegetation growth.
 - 1.2.56. Transfer/Interim Storage Facility: an offsite facility specifically used to transfer or short term storage Contaminated Soil during offsite transport.
 - 1.2.57. Treat: handling or processing of Contaminated Material in such a manner as to change the physical, chemical or biological character or composition of Contaminated Material such that it becomes Non-Contaminated Quality and is suitable for final Discharge or Disposal. Treatment includes filtering, bioremediation, thermal desorption, and incineration. Treatment does not include blending, mixing, or dilution. Material sent to a Treatment Facility must be Treated as follows:

- 1.2.57.1. Water must be Treated to meet requirements of a valid and subsisting Discharge Approval held by the Treatment Facility.
- 1.2.57.2. Soil must be Treated to meet (i) less than Waste Quality and (ii) requirements of the subsequent Disposal Facility.
- 1.2.58. Treatment Facility: an offsite facility specifically used to treat Contaminated Soil or Contaminated Water. Treatment Facility may treat soil, sediment, or water. All material Treated at a Treatment Facility must be considered Contaminated Material until final Discharge or Disposal.
- 1.2.59. Waste Quality: material that exceeds applicable Environmental Quality Criteria but is not Hazardous Waste.
- 1.2.60. Wastewater: Non-Contaminated Quality Water that is not Sewage.
- 1.2.61. Work: see General Conditions.

1.3. Action and Informational Submittals

- 1.3.1. Permits: at least 10 Working Days prior to mobilization to Site, Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.
- 1.3.2. Daily Work Records: at the end of each shift Submit daily Work records, during onsite Work. Include:
 - 1.3.2.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.
 - 1.3.2.2. Description of Work performed.
 - 1.3.2.3. Current Site conditions.
 - 1.3.2.4. General information including: date, time shift started and ended, Subcontractor(s) onsite, Health and Safety items, and Environmental Protection items.
 - 1.3.2.5. Signature of Superintendent.
- 1.3.3. Cash Flow: with each Progress Payment, Submit a cash flow forecast. Include:
 - 1.3.3.1. Calculation of planned cost versus actual cost and schedule forecasting and cash flow projections on a monthly basis, indicating anticipated value of future Progress Payments, for each Description of Work identified in the Unit Price Table.
 - 1.3.3.2. Progress Payments will not be processed until cash flow has been accepted by the Departmental Representative.
- 1.3.4. Coordination Meeting Minutes and Drawings: at least 5 Working Days prior to relevant Work commencing, Submit final meeting minutes and drawings from coordination with Subcontractors.
- 1.3.5. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:
 - 1.3.5.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.
 - 1.3.5.2. Subcontractors responsible for review, inspection and testing.
 - 1.3.5.3. Schedule of submittals of review, inspection and testing results.

- 1.3.6. Review, Inspection, and Testing Results: within 5 Working Days of receipt, Submit all results of reviews, inspection, and testing performed as part of the Work, including laboratory reports and sampling chains of custody.
- 1.3.7. Weigh Scale Certification: at least 5 Working Days prior to use, Submit a copy of the Measurement Canada, Weigh Scale Certification for any onsite or offsite weigh scale used during excavation, transportation, treatment or disposal.
- 1.3.8. Weigh Scale Slips: within 10 Working Days of measurement, Submit all onsite and offsite weigh scale slips for material.

1.4. Laws and Regulations

- 1.4.1. Generally, provincial, territorial and municipal laws, regulations, bylaws and other requirements do not apply to federal lands, works or undertakings. Soil, sediment, water or other materials that are removed from federal lands may become subject to provincial, territorial or municipal laws and regulations.
- 1.4.2. Provincial, territorial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial, territorial or municipal laws and regulations apply on Federal lands, activities or undertakings.

1.5. Green Requirements

- 1.5.1. Use only environmentally responsible green materials/products with no Volatile Organic Compounds (VOC) emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality – subject of acceptance of Submittal of Materials Safety Data Sheet (MSDS) Product Data.
- 1.5.2. Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.
- 1.5.3. Adhere to waste reduction requirement for reuse or recycling of waste materials, not including soil or water, thus diverting materials from Landfill Facility.

1.6. Smoking Environment

- 1.6.1. Smoking on the Site is not permitted.

1.7. System of Measurement

- 1.7.1. The metric system of measurement (SI) will be employed on the Contract.

1.8. Documents Required

- 1.8.1. Maintain 1 copy each of the following posted at the job Site:
 - 1.8.1.1. General Conditions.
 - 1.8.1.2. Drawings.
 - 1.8.1.3. Specifications.

- 1.8.1.4. Addenda or other modifications to Contract.
- 1.8.1.5. Change orders.
- 1.8.1.6. Current Work schedule.
- 1.8.1.7. Reviewed and final Shop Drawings Submittals.
- 1.8.1.8. One set of record Shop Drawings and Specifications for “as-built” purposes.
- 1.8.1.9. Field and laboratory test reports.
- 1.8.1.10. Reviewed and accepted Submittals.
- 1.8.1.11. Health and Safety documents, including all daily toolbox meetings, Notice of Project, and utility clearances.
- 1.8.1.12. Environmental Protection Plan.
- 1.8.1.13. Final Meeting Minutes, Agendas and associated attachments.
- 1.8.1.14. Permits and other approvals.

1.9. Setting out of Work

- 1.9.1. Assume full responsibility for and execute complete layout of Work to locations, lines and elevations according to Drawings.
- 1.9.2. Provide devices needed to layout and construct Work.
- 1.9.3. Provide such services and devices in accordance with the Contract to facilitate Departmental Representative’s inspection of Work.
- 1.9.4. The Drawings are intended to provide general arrangement and layout of the Work. Final limits of excavation, location of habitat structures and area of planting may be altered to fit site conditions as directed by the Departmental Representative.

1.10. Works Coordination

- 1.10.1. Coordinate Work of Subcontractors.
 - 1.10.1.1. Designate one person to be responsible for review of Contract and Shop Drawings and managing coordination of Work.
- 1.10.2. Convene meetings between Subcontractors whose Work interfaces and ensure awareness of areas and extent of interface required.
 - 1.10.2.1. Provide each Subcontractor with complete Drawings and Specifications for Contract, to assist them in planning and carrying out their respective work.
 - 1.10.2.2. Develop coordination drawings when required, illustrating potential interference between Work of various trades and distribute to affected parties.
 - 1.10.2.3. Facilitate meeting and review coordination drawings. Ensure Subcontractors agree and sign off on coordination drawings.
 - 1.10.2.4. Publish minutes of each meeting.
 - 1.10.2.5. Submit a copy of coordination drawings and meeting minutes as directed by the Departmental Representative.
- 1.10.3. Submit Shop Drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- 1.10.4. Work coordination:

- 1.10.4.1. Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
- 1.10.4.2. Ensure that each trade provides all other trades reasonable opportunity for Final Completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.
- 1.10.4.3. Ensure disputes between Subcontractors are resolved.
- 1.10.5. Failure to coordinate Work is responsibility of Contractor.

1.11. Record Keeping

- 1.11.1. Advisory: Contractual correspondence from the Departmental Representative to the Contractor. Does not include Change Documents. To be sequentially numbered. Include cross references to applicable Request For Information. The status of the Contractor, including the function of Prime Contractor, must not change by reason of any Advisory.
- 1.11.2. Request For Information: Contractual correspondence from Contractor to the Departmental Representative. Includes Submittals. Does not include Change Documents. Must be sequentially numbered. Include cross references to applicable Advisory. Status of the Contractor, including the function of Prime Contractor, must not change by reason of any Request For Information.
- 1.11.3. Maintain adequate records to support information provided to Departmental Representative including keeping up to date records in PWGSC web-based project-specific file sharing service.
- 1.11.4. Maintain asbestos waste shipment records or other Hazardous Waste Manifests for minimum of 3 years from date of shipment or longer period required by applicable law or regulation.
- 1.11.5. Maintain bills of lading for minimum of 300 Working Days from date of shipment or longer period required by applicable law or regulation.

1.12. Change Documents

- 1.12.1. Change Documents do not relieve Contractor of any obligation.
- 1.12.2. Change Documents do not change the Contractor's responsibility for methods, means and sequences.
- 1.12.3. Change Documents do not change by any reason the status of the Contractor, including the function of Prime Contractor or as supervisor.
- 1.12.4. Change Documents include:
 - 1.12.4.1. Change Order: There may be a change to the Contract Amount by reason of any Change Order. No Extension of Time for completion of the Work by reason of any Change Order.
 - 1.12.4.2. Contemplated Change Notice: No increase to the Contract Amount by reason of any Contemplated Change Notice. No Extension of Time for completion of the Work by reason of any Contemplated Change Notice.

- 1.12.4.3. Extension of Time on Contracts: There may be a change to the completion of the Work by reason of an Extension of Time on Contracts. No increase to the Contract Amount by reason of any Extension of Time on Contracts.
- 1.12.4.4. Quote: No increase to the Contract Amount by reason of any Quote. No Extension of Time for completion of the Work by reason of any Quote.

1.13. Inspection

- 1.13.1. Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Site, allow access to such Work whenever it is in progress. Work at locations other than Site includes offsite Facilities.
- 1.13.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or applicable law.
- 1.13.3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- 1.13.4. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

2. PART 2 - PRODUCTS

2.1. Asbestos Containing Materials Prohibition

- 2.1.1. Any material containing any degree of asbestos is banned from use in any and all sites, designs and projects.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

MOBILIZATION AND DEMOBILIZATION

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Pre-Mobilization Submittals will be paid in accordance with lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, and other Submittals in accordance with the Contract or required and accepted by the Departmental Representative as in accordance with the Contract prior to mobilization to Site. Also includes Preconstruction Condition Survey and Preconstruction As-Built Documents.
- 1.1.2. Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Site.
- 1.1.3. Site Preparation will be paid in accordance with lump sum price established to prepare the Site for planned construction works. Includes as required: clearing and grubbing, invasive plant species removal and disposal from work areas, water diversion, dewatering and associated infrastructure and equipment, demolition, temporary removal of existing infrastructure, utility location, rerouting, and protection, and construction of temporary onsite access roads. Also includes removal of any incidental or generated material.
- 1.1.4. Standby Time will be paid in accordance with unit rate price established for time when construction Work is unable to proceed and that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of the Departmental Representative in providing any information or in doing any act that the Contract expressly requires the Departmental Representative. Measurement as recorded time by Departmental Representative. Includes machinery and labour standby costs. Does not include items covered by Site Facilities Operation. Standby Time may be pro-rated based on hours of work. Make all efforts to minimize impacts due to delays caused by the Departmental Representative, including re-sequencing Work. Provide documentation of a sufficient description of the facts and circumstances of the occurrence to enable the Departmental Representative to determine whether or not the Standby Time is justified. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work for reviews, sampling, or other work conducted by the Departmental Representative that have time allowances in accordance with the Contract.
- 1.1.5. Site Restoration will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use according to Drawings. Includes re-establishment of pre-existing infrastructure, final grading, topsoil reuse or provide and placement, revegetation, habitat structure and planting bench installation, reinstatement of pond, and deconstructing and removal from Site all temporary facilities and removal of any incidental or generated material.

MOBILIZATION AND DEMOBILIZATION

- 1.1.6. Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment and personnel associated with the Works from the Site. Includes decontaminating all equipment prior to removal from Site.
- 1.1.7. Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, Postconstruction Condition Survey, Postconstruction Qualified Professional summary report, and final As-Built Documents as directed by the Departmental Representative.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Preconstruction As-Built Documents: at least 5 Working Days prior to commencing any disturbance, Submit drawings identifying all infrastructure, including utilities, on the Site. Update drawings as directed by the Departmental Representative.
- 1.3.2. Preconstruction Condition Survey: at least 5 Working Days prior to commencing any disturbance, Submit a report by Contractor's Qualified Professional Surveyor documenting property lines, original site grades (surface elevations), geotechnical conditions and condition of buildings, utilities, roadways, pathways, landscaping, significant vegetation, and other infrastructure both onsite and adjacent sites that may be potentially impacted by the Work. Separate reports required for each individual property.
- 1.3.3. Breakdown of Lump Sum Prices: at least 5 Working Days prior to submitting the first Progress Payment, Submit a breakdown of the Contract lump sum prices including labour, material and time, in detail as directed by the Departmental Representative and aggregating Contract Amount.
- 1.3.4. As-Built Documents: within 10 days of completing site Work, provide Drawings showing all Work, including infrastructure, utilities, excavation limits, backfill material limits and compaction, final grades, and any other improvements or reinstatements.
- 1.3.5. Postconstruction Condition Survey: within 10 days of completing site Work, Submit a report by Contractor's Qualified Professional Surveyor documenting property lines, original site grades (surface elevations) and condition of buildings, utilities, roadways, pathways, landscaping, significant vegetation, and other infrastructure both onsite and adjacent sites that may be potentially impacted by the Work. Separate reports required for each individual property.
- 1.3.6. Closeout Documents: within 20 Working Days of Final Completion of Site Restoration, Submit Completion Documents.

1.4. Mobilization and Demobilization

- 1.4.1. Move all personnel, equipment, supplies, and incidentals to and from the Site.

MOBILIZATION AND DEMOBILIZATION

1.5. Site Preparation

- 1.5.1. Protection of features:
 - 1.5.1.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations.
 - 1.5.1.2. Protect natural and man-made features required to remain undisturbed. Protect existing trees from damage unless otherwise required or located in an area to be occupied by new construction.
 - 1.5.1.3. Protect buried utilities that are required to remain undisturbed or in continuous operation during the Work, as identified on Drawings.
 - 1.5.1.4. Protect features from surface water damage by temporary structures to divert flow as appropriate.
- 1.5.2. Protection of Monitoring Wells
 - 1.5.2.1. Protect all monitoring wells unless specifically confirmed by Departmental Representative.
 - 1.5.2.2. Protect all monitoring wells outside area of surface disturbance, including Contaminated Soil Extents.
 - 1.5.2.3. Protect monitoring wells within area of surface disturbance, including Contaminated Soil Extents, as identified in Contract Documents.
 - 1.5.2.4. Replace protected monitoring damaged by Work using methods, means, and sequences as directed by the Departmental Representative at Contractor's expense.
 - 1.5.2.5. Decommission monitoring wells within area of surface disturbance, including Contaminated Soil Extents, or as otherwise agreed to by Departmental Representative. Decommission in accordance with methods in BC *Groundwater Protection Regulation* or the Yukon Environment *Protocol 7: Groundwater Monitoring Well Installation, Sampling and Decommissioning*, as appropriate.
- 1.5.3. Security and Safety:
 - 1.5.3.1. Provide safety measures to ensure worker and public safety.
 - 1.5.3.2. Ensure Site is secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as appropriate. Provide onsite personnel security 24 hours/ day 7 days/week as appropriate or in accordance with Contract.
 - 1.5.3.3. Site including all construction areas should be secured with locked fencing fitted with screens, temporary hoarding and security personnel as required.

1.6. Existing Conditions and Services

- 1.6.1. Preconstruction Condition Survey to be completed by Contractor's Qualified Professional Surveyor and Contractor's qualified geotechnical engineer as appropriate.

MOBILIZATION AND DEMOBILIZATION

- 1.6.2. Size, depth and location of existing utilities and structures as provided in Contract documents are for guidance only. Completeness and accuracy are not guaranteed.
- 1.6.3. Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative. All utilities entering Site must be confirmed prior to subsurface disturbance (ie do not rely on as-built documents). As appropriate, confirm locations of buried utilities by independent utility locator and using hand test excavations or hydrovac methods.
- 1.6.4. Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.
- 1.6.5. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting existing utilities.
- 1.6.6. Where Work requires temporarily breaking, rerouting, or connecting into existing utilities, obtain permission from both users and utility companies of intended interruption of services, and carry out Work at times determined by the authorities having jurisdiction.
- 1.6.7. Submit schedule to and obtain approval for any shutdown or closure of active service. Adhere to schedule accepted by Departmental Representative and provide notice to affected parties.
- 1.6.8. Provide temporary services as required to maintain critical systems.
- 1.6.9. Where unknown utilities are encountered, immediately verbally notify Departmental Representative and confirm findings in writing.

1.7. As-Built Documents

- 1.7.1. The Departmental Representative will provide paper copies of the Construction Documents as per the Special Instructions to Bidders. Electronic copies of data and drawings in their native format are available on request.
- 1.7.2. Postconstruction Condition Survey to be completed by Contractor's Qualified Professional Surveyor.
- 1.7.3. As Work progresses, maintain accurate records to show all deviations from the Contract. Note changes as they occur on as-built Specifications, Drawings and Shop Drawings.
- 1.7.4. Drawings and Shop Drawings: legibly mark each item to record actual construction, including:
 - 1.7.4.1. Measured locations of internal utilities and appurtenances referenced to visible and accessible features of construction.
 - 1.7.4.2. Field changes of dimension and detail.
 - 1.7.4.3. Changes made by change orders.
 - 1.7.4.4. Details not on original Drawings.
 - 1.7.4.5. References to related Shop Drawings and modifications.
- 1.7.5. Contract Specifications: legibly mark each item to record actual workmanship of construction, including:

MOBILIZATION AND DEMOBILIZATION

- 1.7.5.1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- 1.7.5.2. Changes made by addenda and change orders.
- 1.7.6. As-built information:
 - 1.7.6.1. Record changes in red ink.
 - 1.7.6.2. Mark on 1 set of Drawings, Specifications and Shop Drawings at Final Completion of project and, before final inspection, neatly transfer notations to second set.
 - 1.7.6.3. Submit 1 set in editable AutoCAD file format with all as-built information.
 - 1.7.6.4. Submit all sets as directed by the Departmental Representative.
- 1.7.7. As required, surveying to be completed by Contractor's Qualified Professional Surveyor for as-built documents.

1.8. Pre-existing Stockpile or Onsite Soil Treatment Facility Preparation

- 1.8.1. As required, prior to working soil in pre-existing stockpile or Onsite Soil Treatment Facility:
 - 1.8.1.1. Remove vegetation that could potentially damage liner, including roots.
 - 1.8.1.2. Inspect berms. Grade or place material to maintain height and integrity of berms.
 - 1.8.1.3. Inspect granular base protective layer of liner. Grade base layer to allow uniform slope to sump. Notify Departmental Representative if less than 0.5m thick at any location.
 - 1.8.1.4. Inspect visually liner for damage, including both the base and the berms. Excavate protective base layer in suspect areas (eg depressions that may be due to piping through a liner hole or areas where previous excavations may have led to a liner tear) to inspect liner for damage. Notify Departmental Representative of any significant damage.
 - 1.8.1.5. Make good repairs of any pre-existing damage to liner, both berms and base. Be prepared to repair a minimum of 10 square meters of liner or as shown on Drawings.
 - 1.8.1.6. Pump any collected or sump water from pre-existing stockpile or Onsite Soil Treatment Facility. Treat or otherwise discharge water as required according to Contract or as directed by Departmental Representative.
 - 1.8.1.7. Grade surface of soil to allow stockpiling or bioremediation activities.

1.9. Onsite Access Roads

- 1.9.1. Maintain onsite access roads as follows:
 - 1.9.1.1. Obtain permission to use existing onsite access roads or to construct temporary roads.
 - 1.9.1.2. Maintain and clean roads for duration of Work, keep dry and free of mud.
 - 1.9.1.3. Repair damage incurred from use of roads.
 - 1.9.1.4. Provide photographic documentation of roads used by construction vehicles before, during and after Work.

MOBILIZATION AND DEMOBILIZATION

- 1.9.1.5. Clean onsite access roads as directed by the Departmental Representative.

1.10. Site Restoration

- 1.10.1. Final site grades must be within 5 cm of pre-existing grades before Work commenced, unless otherwise specified.
- 1.10.2. Re-establish pre-existing drainage, unless otherwise specified.
- 1.10.3. Re-establish topsoil reusing existing stripped topsoil. If insufficient existing topsoil, import additional topsoil as required. Imported topsoil must, at a minimum, contain: between 50% and 70% sand, less than 25% silt and clay, and between 4% and 15% organic matter (dry weight basis) unless otherwise identified according to Drawings. Gradation of mineral (non-organic) portion of imported topsoil to have particle size diameter (d_{85}) > 0.6 mm. Imported topsoil to be sterile and free of invasive plant seeds.
- 1.10.4. Clean permanent access roads of contamination resulting from project activity as required or as directed by Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 1.10.5. Upon Final Completion of Work, remove Non-Contaminated Quality Soil and Debris, trim slopes, and correct defects as directed by the Departmental Representative.
- 1.10.6. Protect newly graded areas from traffic and erosion and maintain free of trash or debris until demobilization is completed and accepted by the Departmental Representative.
- 1.10.7. Reinstate pre-existing utilities and other infrastructure to original location and condition, meeting current standards, codes, and other requirements, unless otherwise identified according to Drawings or as directed by the Departmental Representative. Contractor responsible for reinstating disturbed areas within manicured park areas including infrastructure and sodding.
- 1.10.8. Reinstate surface to pre-existing conditions, including surface material (eg vegetation, gravel, pavement), unless otherwise identified according to Drawings or as directed by the Departmental Representative.
- 1.10.9. Revegetation planting and seeding with native species of all disturbed areas within riparian zones and aquatic planting benches to be conducted by others unless otherwise identified according to Drawings.
- 1.10.9.1. Re-introduce water to the pond area following completion of remedial activities. Re-filling of pond to be conducted while maintaining water diversion infrastructure with slow release of creek water to pond area and control of erosion and sedimentation. Details of pond re-filling to be included in Contractor's Water Management Plan for approval by the Departmental Representative. Downstream flows to be maintained during pond re-filling to avoid dewatering of downstream habitat.
- 1.10.10. Remove temporary water diversion infrastructure at completion of project including coffer dams, dissipation devices, and other infrastructure. If alterations

MOBILIZATION AND DEMOBILIZATION

to the natural streambed were required to install infrastructure, rehabilitate impacted areas to pre-construction conditions and configurations.

1.11. Completion Documents

- 1.11.1. Submit as directed by the Departmental Representative, a written certificate that the following have been performed:
 - 1.11.1.1. Work has been completed, and inspected and accepted by the Departmental Representative, in accordance with the Contract.
 - 1.11.1.2. Treatment and Disposal of treatable soils have been completed and Disposal of all other soils has been completed.
 - 1.11.1.3. Damage has been repaired, deficiencies have been completed, missing items have been provided, and non-conformance has been corrected, in the opinion of the Departmental Representative.
 - 1.11.1.4. Contractor's Qualified Professional report documenting backfilling has met all requirements of the Contract.
 - 1.11.1.5. Contractor's Qualified Professional summary report documenting pond reinstatement, including habitat features installation, restoration and replanting activities, and water reintroduction to pond has met all requirements of the Contract.
- 1.11.2. Defective products will be rejected, regardless of previous inspections. Replace defective products.
- 1.11.3. Prepare all documentation required as part of any permits or other authorizations obtained or otherwise the responsibility of the Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Preconstruction Meeting Minutes: within 2 Working Days of the Preconstruction Meeting, Submit meeting minutes.

1.3.2. Progress Meeting Minutes: within 2 Working Days of a Progress Meeting, Submit meeting minutes. Submit revised minutes within 2 Working Days of receiving comments by Departmental Representative.

1.3.3. Information for Progress Meetings: at least 2 Working Days prior to scheduled Progress Meetings, Submit all information in accordance with the Contract for Progress Meetings. Include:

1.3.3.1. Agenda for the proposed Progress Meeting.

1.3.3.2. Updated Project Schedule.

1.3.3.3. Copies of transport manifests and disposal receipts for all materials removed from Site.

1.3.3.4. Other information as directed by the Departmental Representative or relevant to agenda for upcoming progress meeting.

1.3.4. Final Site Inspection: within 2 Working Days of the Final Site Inspection, Submit meeting minutes.

1.3.5. Closeout Meetings: within 2 Working Days of the Closeout Meeting, Submit meeting minutes.

1.4. Administrative

1.4.1. Schedule and administer project meetings throughout the progress of the Work weekly and at the call of the Departmental Representative.

1.4.2. Prepare agenda for meetings.

1.4.3. Submit written notice with agenda of each meeting 2 Working Days in advance of meeting date as directed by the Departmental Representative.

1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as directed by Departmental Representative.

1.4.5. Preside at meetings.

1.4.6. Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

1.4.7. Maintain records of meeting minutes for a minimum of 2 years after Work is completed.

- 1.4.8. Representative of Contractor, Subcontractor(s) and Supplier(s) attending meetings must be qualified and authorized to act on behalf of party each represents.

1.5. Preconstruction (Kickoff) Meeting

- 1.5.1. Within 5 Working Days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.
- 1.5.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.5.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.5.4. Agenda to include:
 - 1.5.4.1. Appointment of official representative of participants in the Work, including Contractor's Superintendent and Departmental Representative.
 - 1.5.4.2. Schedule of Work including Master Plan.
 - 1.5.4.3. Schedule of Submittals including premobilization Submittals including Insurance, Contract Security, Health and Safety Plan, and Environmental Protection Plan.
 - 1.5.4.4. Requirements for temporary facilities.
 - 1.5.4.5. Site security, Health and Safety, Environmental Protection, coordination with other Site users including consultants and other contractors.
 - 1.5.4.6. Change orders, procedures, approvals required, administrative requirements.
 - 1.5.4.7. Monthly Progress Payments, administrative procedures, hold backs.
 - 1.5.4.8. Appointment of inspection and testing agencies or firms.
 - 1.5.4.9. List of Subcontractor(s).

1.6. Progress Meetings

- 1.6.1. During course of Work schedule progress meetings weekly subject to approval by Departmental Representative.
- 1.6.2. Contractor, Superintendent, major Subcontractor(s) involved in Work, and Departmental Representative are to be in attendance.
- 1.6.3. Agenda to include:
 - 1.6.3.1. Review and acceptance of minutes of previous meeting.
 - 1.6.3.2. Review health and safety, including incidents, near misses, and corrective measures.
 - 1.6.3.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
 - 1.6.3.4. Review contractual compliance.
 - 1.6.3.5. Review regulatory compliance.
 - 1.6.3.6. Review communications, problems or concerns with community.
 - 1.6.3.7. Review of Work progress since previous meeting.
 - 1.6.3.8. Field observations, problems, conflicts.

- 1.6.3.9. Updated progress schedule detailing activities planned over next 2 week period. Include review of progress with respect to previously established dates for starting and stopping various stages of Work.
- 1.6.3.10. Problems which impede construction schedule.
- 1.6.3.11. Corrective measures and procedures to regain projected schedule.
- 1.6.3.12. Revision to construction schedule.
- 1.6.3.13. Progress schedule, during succeeding Work period.
- 1.6.3.14. Review submittal schedules: expedite as required.
- 1.6.3.15. Maintenance of quality standards.
- 1.6.3.16. Quantities of material transported, treated, and disposed.
- 1.6.3.17. Review proposed changes for effect on construction schedule and on Final Completion date.
- 1.6.3.18. Other business.
- 1.6.4. Submit draft Progress Meeting Minutes for review and comment by Departmental Representative. Incorporate comments into final Progress Meeting Minutes.

1.7. Toolbox Meetings

- 1.7.1. During the course of the Work, schedule daily toolbox (tailgate) meetings at the start of each Work shift. Multiple meetings are required if the Contractor works multiple shifts within a 24-hour period.
- 1.7.2. All on Site workers to attend, including Contractor, Superintendent, major Subcontractor(s), and environmental consultants. Departmental Representative may attend.
- 1.7.3. Agenda to include:
 - 1.7.3.1. Planned Work activities and environmental considerations for that shift, including hazards, mitigation measures, and emergency procedures.
 - 1.7.3.2. Review previous relevant incident or near-miss reports, both from Site and other Sites.
 - 1.7.3.3. Coordination activities, and roles and responsibilities, required between Contractor, Subcontractor(s), Departmental Representative, other contractor(s) including environmental consultant, site users, and protection of general public and offsite resources.
 - 1.7.3.4. Health and Safety items, including PPE requirements.
 - 1.7.3.5. Environmental Protection items, including emergency equipment.

1.8. Final Site Inspection

- 1.8.1. Within 5 Working Days of completion of Site Works but prior to Demobilization, request a meeting on Site to review the Site.
- 1.8.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.

- 1.8.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.8.4. Agenda to include:
 - 1.8.4.1. Inspect removal of all temporary equipment, materials, supplies, and facilities.
 - 1.8.4.2. Inspect final surface grades.
 - 1.8.4.3. Inspect final vegetation.
 - 1.8.4.4. Inspect permanent facilities for performance and damage.
 - 1.8.4.5. Document all damage, deficiencies, missing items, and non-conformance.
- 1.8.5. If required, and in the opinion of the Departmental Representative, perform another Final Site Inspection after resolving all documented damage, deficiencies, missing items, and non-conformance.

1.9. Closeout Meeting

- 1.9.1. Within 10 Working Days of completion of the Work, request a meeting to review the project.
- 1.9.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.9.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.9.4. Agenda to include:
 - 1.9.4.1. Review Certificate of Completion.
 - 1.9.4.2. Review final payment.
 - 1.9.4.3. Identify lessons learned.
 - 1.9.4.4. Perform Contractor Performance Evaluation Report Form.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Master Plan: within 10 Working Days after Contract award, Submit a Master Plan.
- 1.3.2. Schedule of Interruption of Services: at least 5 Working Days prior to any shutdown or closure of active utilities or facilities Submit a schedule identifying type of service and dates of shutdown or closure.
- 1.3.3. Project Schedule and Updates: with Progress Payment, Submit a Project Schedule updated as appropriate. Progress Payment submission is incomplete without an updated Project Schedule acceptable to Departmental Representative.

1.4. Requirements

- 1.4.1. Ensure Master Plan and detail Project Schedules are practical and are compliant with Schedule Requirements.
- 1.4.2. Plan to complete Work in accordance with prescribed milestones and time frame.
- 1.4.3. Limit activity durations to maximum of approximately 10 Working Days, to allow for progress reporting.
- 1.4.4. Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- 1.4.5. Include Work sequencing description and schedule:
 - 1.4.5.1. Work Sequencing description must describe methods, means, and sequences to perform each major task.
 - 1.4.5.2. Work Sequencing schedule must show on a Gantt chart, start, end and dependencies of each major task and also indicates Work to be performed in sequence and in parallel.
 - 1.4.5.3. Major tasks include all items identified on Unit Price Table.

1.5. Master Plan

- 1.5.1. Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- 1.5.2. Departmental Representative will review and return revised schedules within 5 Working Days.
- 1.5.3. Revise impractical schedule and resubmit within 5 Working Days.

- 1.5.4. Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6. Project Schedule

- 1.6.1. Develop detailed Project Schedule as updates to Master Plan.
- 1.6.2. Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - 1.6.2.1. Dates of commencement and completion of Work for each Description of Work identified on the Unit Price Table.
 - 1.6.2.2. Dates of Submittals including Shop Drawings, product data, MSDS sheets and samples.
 - 1.6.2.3. Dates of inspection and testing.
 - 1.6.2.4. Final Completion date within the time period in accordance with the Contract, including Amendments.

1.7. Project Schedule Reporting

- 1.7.1. Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
- 1.7.2. Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8. Project Meetings

- 1.8.1. Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current accepted dates shown on baseline schedule.
- 1.8.2. Weather related delays with their remedial measures will be discussed and negotiated

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Shop Drawings: at least 5 Working Days prior to commencing applicable Work, Submit Shop Drawings signed by a Contractor's Qualified Professional.

1.4. General

- 1.4.1. Submission details to be commensurate for type of Work and Site conditions. Details depend on Work performed and Contractor's methods, means, and sequences.
- 1.4.2. Contractor's responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative's review of Submittals.
- 1.4.3. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.
- 1.4.4. Contractor's responsibility for deviations in Submittals from requirements of Contract is not relieved by the Departmental Representative's review of Submittals unless Departmental Representative gives written acceptance of specific deviations.
- 1.4.5. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit.
- 1.4.6. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those directed by the Departmental Representative.
- 1.4.7. Do not proceed with Work until relevant Submittals are finalized and have been accepted.
- 1.4.8. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to Submit in ample time is responsibility of Contractor.
- 1.4.9. Review Submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- 1.4.10. Verify field measurements and affected adjacent Work are coordinated.
- 1.4.11. The Departmental Representative's request for corrections, changes or additional information required for contractor submittals due to missing or

misinterpreted information outlined within the specification or contradiction to a permit, regulation, act or law will not result in an increase to the Contract Amount nor an Extension of Time for completion of the Work.

1.4.12. Keep one final copy of each Submittal onsite.

1.5. Submission Requirements

1.5.1. Coordinate each Submittal with the requirements of the Work and the Contract. Individual Submittals will not be reviewed until:

1.5.1.1. Submittals are complete.

1.5.1.2. All related information is available.

1.5.2. Allow 10 Working Days for Departmental Representative's review of each Submittal, unless otherwise specified. No Standby Time charges or increases to Contract Amount or Extension of Time for Departmental Representative's review.

1.5.3. All Submittals are to be sent to Departmental Representative in duplicate as a hardcopy and in electronic format compatible with Departmental Representative's software. Electronic format to be uploaded to PWGSC web-based file sharing service.

1.5.4. Submittals must include:

1.5.4.1. Date and revision dates.

1.5.4.2. Project title and number.

1.5.4.3. Name and address of:

1.5.4.3.1. Subcontractor.

1.5.4.3.2. Supplier.

1.5.4.3.3. Manufacturer.

1.5.4.4. Signature of Superintendent, certifying approval of Submittals, verification of field measurements and in accordance with the Contract.

1.5.4.5. Contractor's Qualified Professional to sign and seal Submittals in accordance with the Contract or as required by the nature of the Submittal. Submittals to include at a minimum 1 hard copy of original ink sealed document.

1.5.4.6. Details of appropriate portions of Work as applicable.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Contaminated Soil and Water Management Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Soil and Contaminated Water Management onsite for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. To be prepared by Contractor's Qualified Professional(s). Include

1.3.1.1. Personnel and equipment decontamination.

1.3.1.2. Segregation of different Classifications.

1.4. Sequencing and Scheduling

1.4.1. Commence Work involving contact with Contaminated or potentially Contaminated Soil or Water after all applicable Environmental Protection procedures (including those identified in Contaminated Soil and Water Management Plan, Environmental Protection Plan, Environmental Mitigation Strategy and permits) and facilities (including those identified in Site Layout) are operational and accepted by Departmental Representative.

1.4.2. Plan work sequencing and traffic patterns to prevent contamination of clean areas due to traffic or debris.

1.5. Drums

1.5.1. Provide, maintain, and operate drum staging pad as required.

1.5.2. Construct drum staging pad with sump capable of collecting leachate and rain runoff. Place impermeable liner that contours over top of berm, and collects leachate and runoff from staging pad which is conducted solely to sump on staging pad. Leachate is Contaminated Water.

1.5.3. Storage of solid or liquid waste: 200 L steel drums meeting Transportation of Dangerous Goods Act, closable lids, complete with labels for marking contents and date filled.

1.6. Personnel Decontamination Facility

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.6.1. Provide an area or areas close to the workers' changing facilities to enable workers and other personnel leaving areas such as exclusion area to remove deleterious and Contaminated Soils from boots, clothing and skin surfaces.
- 1.6.2. Be responsible for ensuring that all materials, chemicals, protective clothing, wash water and deleterious materials are collected, treated and disposed of in accordance with applicable environmental standards and regulations.
- 1.6.3. Personnel Decontamination Facility to be available for use by persons other than the Contractor's workers and Subcontractors, including federal employees, other contractor(s), and environmental agencies. Provide use of facilities to other persons.

1.7. Equipment Decontamination Facility

- 1.7.1. Prior to commencing Work involving equipment contact with potentially Contaminated Soil, construct equipment decontamination facilities to accommodate the largest potentially contaminated equipment onsite.
- 1.7.2. Collect and contain equipment decontamination wastewater and sediment. Transfer collected wastewater and sediment to treatment facilities accepted by Departmental Representative.

1.8. Equipment Decontamination

- 1.8.1. At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated.
- 1.8.2. If required, as directed by the Departmental Representative, use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in clean area before removing from Site or travelling on clean areas. Perform assessment as directed by the Departmental Representative to determine effectiveness of decontamination.
 - 1.8.2.1. Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
 - 1.8.2.2. Collect decontamination wastewater and sediment which accumulate in decontamination location. Treat collected wastewater as Contaminated Water. Manage decontamination sediment as Waste Quality.
- 1.8.3. In the opinion of the Departmental Representative, each piece of equipment must be inspected by the Departmental Representative after decontamination and prior to travel on clean areas or demobilization from Site. Perform additional decontamination as required in the opinion of the Departmental Representative.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.8.4. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.9. Progress Decontamination

- 1.9.1. Decontaminate equipment after working in potentially contaminated Work areas and prior to subsequent Work or travel on clean areas.

1.10. Final Decontamination

- 1.10.1. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially Contaminated Soil prior to demobilization from Site.

1.11. Contaminated Soil and Water Management

- 1.11.1. Remove all Contaminated Soil and Water within Work areas in accordance with the Contract and as directed by the Departmental Representative. Remove Non-Contaminated Quality Soil and Water incidental to the Work or as directed by the Departmental Representative.
- 1.11.2. Material and Water will be Classified by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization. Departmental Representative responsible for Classification. Contractor cannot re-Classify material.
- 1.11.3. Handle (including Excavate, Transport, Treat, and Dispose) material separately into the classifications in accordance with the Contract or as directed by the Departmental Representative. Take necessary precautions to avoid mixing of different classifications. Do not blend, or mix and dilute, different material Classifications.
- 1.11.4. Contractor responsible for Transportation, Treatment, and Disposal based on Classification by Departmental Representative. Contractor responsible for material blended, or mixed and diluted, based on re-Classification by Departmental Representative. No increases to Contract Amount or Extension of Time due to material blended, or mixed and diluted.
- 1.11.5. Material characterization (eg sampling and testing) of parameters additional to information provided in Contract as required by the Contractor (eg for Transportation, Treatment Facility or Disposal Facility purposes) responsibility of Contractor.
- 1.11.6. Material segregation additional to Contract as required for Transportation, Treatment Facility or Disposal Facility responsibility of Contractor.

1.12. Soil Stockpile Construction

- 1.12.1. Stockpile material within work area in locations identified by Departmental Representative.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.12.2. Provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout.
- 1.12.3. Segregate Contaminated Soil into separate Classifications, and segregate Contaminated Soil from Non-Contaminated Quality Soil, into separate stockpiles to prevent cross-contamination.
- 1.12.4. Prevent precipitation into Stockpiles from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable cover during periods of Work stoppage including at end of each Working Day and as directed by the Departmental Representative.
- 1.12.5. Securely fasten covers over stockpiled material until material is loaded for transport.
- 1.12.6. Store excavated Non-Contaminated Quality Soil only on Non-Contaminated Quality surface areas. Ensure no contact between Non-Contaminated Quality Soil and Contaminated Soil.
- 1.12.7. Store excavated Contaminated Soil in temporary stockpiles.
 - 1.12.7.1. Install impermeable liner (eg asphalt or minimum 20 mil (0.5mm) polyethylene) below proposed stockpile locations to prevent contact between stockpile material and ground.
 - 1.12.7.2. Cover stockpiled material when not being worked or sampled to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material. Cover to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off.
 - 1.12.7.3. Prevent Non-Contaminated Quality Water, including surface runoff water, from coming into contact with Contaminated Soil stockpiles.
 - 1.12.7.4. Separate Contaminated Water from Non-Contaminated Quality Water within stockpile area and collect and divert to Contaminated Water Treatment Plant as required.
- 1.12.8. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization for Classification as directed by the Departmental Representative.
- 1.12.9. Assist Departmental Representative in collection of stockpile samples for exsitu characterization. Ex-situ characterization may take up to 5 Working Days, not counting the day the sample is collected. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Samples results provided within 5 Working Days, not counting the day the sample is collected.
- 1.12.10. Do not remove Contaminated Soil from stockpiles until exsitu characterization completed and as directed by Departmental Representative.

1.13. Stockpile or Onsite Soil Treatment Facility Loading

- 1.13.1. Place Contaminated Soil in Stockpiles or Onsite Soil Treatment Facility in locations and thicknesses according to Contract.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.13.2. Soil cannot be placed within 1.5m of the berms or sump to maintain adequate drainage and to avoid damaging the liner or geotextile material
- 1.13.3. Mechanical equipment cannot work within 1.5m of the sump or berms.
- 1.13.4. Trucks are only to operate in Stockpiles or Onsite Soil Treatment Facility when there is a minimum of 1m of soil present or as directed by the Departmental Representative. Trucks should minimize or eliminate turning while in facility. Trucks cannot dump directly on liner but only on areas with 1m of soil present and the dumped soil must remain 1.5m from the sump and berms when placed.
- 1.13.5. Tracked equipment is only to operate in Stockpiles or Onsite Soil Treatment Facility when there is a minimum of 0.5m of soil present or as directed by the Departmental Representative.
- 1.13.6. Be responsible for, and make good repairs of, any damage to Stockpiles or Onsite Soil Treatment Facility caused by placement or amendment.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

HEALTH AND SAFETY FOR CONTAMINATED SITES

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites.

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Submit to Departmental Representative Submittals listed for review.

1.3.2. Work affected by Submittal must not proceed until review is complete.

1.3.3. Submit the following:

1.3.3.1. Health and Safety Plan.

1.3.3.2. Copies of reports or directions issued by federal and provincial health and safety inspectors.

1.3.3.3. Copies of incident and accident reports.

1.3.3.4. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

1.3.3.5. Emergency Procedures.

1.3.3.6. Notice of Project.

1.3.4. The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 Working Days after receipt of the plan.

1.3.5. If changes are required, revise the plan as appropriate and resubmit to Departmental Representative within 5 Working Days.

1.3.6. Submittal of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It will not:

1.3.6.1. Be construed to imply approval by the Departmental Representative.

1.3.6.2. Be interpreted as a warranty of being complete, accurate and legislatively compliant.

1.3.6.3. Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.4. References

1.4.1. Government of Canada:

1.4.1.1. Canada Labour Code - Part II.

1.4.1.2. Canada Occupational Health and Safety Regulations.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.4.2. National Building Code of Canada (NBC):
 - 1.4.2.1. Part 8, Safety Measures at Construction and Demolition Sites.
- 1.4.3. Canadian Standards Association (CSA) as amended:
 - 1.4.3.1. CSA Z797-2009 Code of Practice for Access Scaffold.
 - 1.4.3.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
 - 1.4.3.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
- 1.4.4. National Fire Code of Canada 2010 (as amended):
 - 1.4.4.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
 - 1.4.4.2. FCC No. 302, Standard for Welding and Cutting.
- 1.4.5. American National Standards Institute (ANSI):
 - 1.4.5.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- 1.4.6. Province of British Columbia (as appropriate):
 - 1.4.6.1. Workers Compensation Act Part 3-Occupational Health and Safety.
 - 1.4.6.2. Occupational Health and Safety Regulation.
- 1.4.7. Yukon Territory (as appropriate):
 - 1.4.7.1. Occupational Health and Safety Act.
 - 1.4.7.2. Workers' Compensation Act.
 - 1.4.7.3. Occupational Health and Safety Regulation

1.5. Regulatory Requirements

- 1.5.1. Comply with codes, acts, bylaws, standards and regulations applicable to the performance of the Work in accordance with the Contract to ensure safe operations at Site.
- 1.5.2. In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will direct on the course of action to be followed.

1.6. Worker's Coverage

- 1.6.1. Comply fully with the relevant Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
- 1.6.2. Maintain Workers coverage as required by relevant acts and regulations during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.7. Compliance with Regulations

- 1.7.1. PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of

HEALTH AND SAFETY FOR CONTAMINATED SITES

the Workers' Compensation Act or the Occupational Health and Safety Regulations.

- 1.7.2. It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the Work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.8. Responsibility

- 1.8.1. Assume responsibility as the Prime Contractor for Work under this Contract.
- 1.8.1.1. Be responsible for health and safety of persons onsite, safety of property onsite and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.
- 1.8.1.2. Comply with and enforce compliance by employees with safety requirements of Contract, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9. Health and Safety Coordinator

- 1.9.1. The Health and Safety Coordinator must:
- 1.9.1.1. Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the Site to perform Work.
- 1.9.1.2. Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
- 1.9.1.3. Be on Site during execution of Work.

1.10. General

- 1.10.1. Provide safety barricades and lights around Site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- 1.10.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Site:
- 1.10.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.11. Project/Site Conditions

- 1.11.1. Work at Site will involve contact with contaminants identified in Specifications and environmental reports.

1.12. Work Permits

- 1.12.1. Obtain specialty permits related to project before start of Work.

1.13. Filing of Notice

- 1.13.1. The Prime Contractor must complete and submit a Notice of Project as required by Provincial or Territorial authorities.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.13.2. Provide copies of all notices to the Departmental Representative.

1.14. Health and Safety Plan

- 1.14.1. Conduct a site-specific hazard assessment based on review of Contract, required Work, and project Site. Identify any known and potential health risks and safety hazards.
- 1.14.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - 1.14.2.1. Primary requirements:
 - 1.14.2.1.1. Contractor's safety policy.
 - 1.14.2.1.2. Identification of applicable compliance obligations.
 - 1.14.2.1.3. Definition of responsibilities for project safety/organization chart for project.
 - 1.14.2.1.4. General safety rules for project.
 - 1.14.2.1.5. Job-specific safe work procedures.
 - 1.14.2.1.6. Inspection policy and procedures.
 - 1.14.2.1.7. Incident reporting and investigation policy and procedures.
 - 1.14.2.1.8. Occupational Health and Safety Committee/Representative procedures.
 - 1.14.2.1.9. Occupational Health and Safety meetings.
 - 1.14.2.1.10. Occupational Health and Safety communications and record keeping procedures.
 - 1.14.2.2. Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the Work.
 - 1.14.2.3. List hazardous materials to be brought onsite as required by Work.
 - 1.14.2.4. Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
 - 1.14.2.5. Identify personal protective equipment (PPE) to be used by workers.
 - 1.14.2.6. Identify personnel and alternates responsible for site safety and health.
 - 1.14.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
- 1.14.3. Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
- 1.14.4. Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- 1.14.5. Departmental Representative's review: the review of Health and Safety Plan by Public Service and Procurement Canada (PWGSC) will not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract.

1.15. Emergency Procedures

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.15.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (ie names/telephone numbers) of:
 - 1.15.1.1. Designated personnel from own company.
 - 1.15.1.2. Regulatory agencies applicable to Work and as per legislated regulations.
 - 1.15.1.3. Local emergency resources.
 - 1.15.1.4. Departmental Representative and site staff.
- 1.15.2. Include the following provisions in the emergency procedures:
 - 1.15.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - 1.15.2.2. Evacuate all workers safely.
 - 1.15.2.3. Check and confirm the safe evacuation of all workers.
 - 1.15.2.4. Notify the fire department or other emergency responders.
 - 1.15.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - 1.15.2.6. Notify Departmental Representative and Site staff.
- 1.15.3. Provide written rescue/evacuation procedures as required for, but not limited to:
 - 1.15.3.1. Work at high angles.
 - 1.15.3.2. Work in confined spaces or where there is a risk of entrapment.
 - 1.15.3.3. Work with hazardous substances.
 - 1.15.3.4. Underground work.
 - 1.15.3.5. Work on, over, under and adjacent to water.
 - 1.15.3.6. Workplaces where there are persons who require physical assistance to be moved.
- 1.15.4. Design and mark emergency exit routes to provide quick and unimpeded exit.
- 1.15.5. Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.16. Hazardous Products

- 1.16.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- 1.16.2. Where use of hazardous and toxic products cannot be avoided:
 - 1.16.2.1. Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as required.
 - 1.16.2.2. As required, in conjunction with Departmental Representative, schedule to carry out Work during "off hours" when tenants have left the building.
 - 1.16.2.3. Provide adequate means of ventilation as required.

1.17. Unforeseen Hazards

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- 1.17.1. Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the Work, immediately stop Work and notify the Departmental Representative verbally and in writing.

1.18. Posted Documents

- 1.18.1. Post legible versions of the following documents onsite:
 - 1.18.1.1. Health and Safety Plan.
 - 1.18.1.2. Sequence of Work.
 - 1.18.1.3. Emergency procedures.
 - 1.18.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - 1.18.1.5. Notice of Project.
 - 1.18.1.6. Floor plans or Site plans.
 - 1.18.1.7. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the Site for review by employees and workers.
 - 1.18.1.8. Workplace Hazardous Materials Information System (WHMIS) documents.
 - 1.18.1.9. Material Safety Data Sheets (MSDS).
 - 1.18.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- 1.18.2. Post all Material Safety Data Sheets (MSDS) onsite, in a common area, visible to all workers and in locations accessible to tenants when Work of this Contract includes construction activities adjacent to occupied areas.
- 1.18.3. Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as accepted by the Departmental Representative.

1.19. Meetings

- 1.19.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
- 1.19.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
 - 1.19.2.1. Sign-in of all attendees.
 - 1.19.2.2. Planned Work activities and environmental considerations for that shift.
 - 1.19.2.3. Hazards associated with these Work activities, including environmental hazards (eg potential for hypothermia, heat exhaustion, heat stroke).
 - 1.19.2.4. Appropriate job-specific safe work procedures.
 - 1.19.2.5. Required personal protective equipment (PPE).
 - 1.19.2.6. Appropriate emergency procedures.
 - 1.19.2.7. Review recent accidents on Site, including near misses.
- 1.19.3. Retain records of all health and safety meetings onsite during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

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1.20. Correction of Non-Compliance

- 1.20.1. Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- 1.20.2. Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- 1.20.3. The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time.
- 1.20.4. Correct non-compliance.

1.21. Hazardous Occurrence Investigation and Reporting

- 1.21.1. Hazard includes:
 - 1.21.1.1. Any source of potential damage, harm or adverse effects on life, health, property or environment at work. It refers to any biological, chemical, ergonomic, physical, psychosocial and safety factor that is reasonably likely to cause harm or damage to humans, other organisms, or the environment in the absence of its control. Sometimes a hazard is referred to as being the actual harm or the health effect it caused rather than the hazard. For example the disease tuberculosis might be called a hazard by some but in general the tuberculosis-causing bacteria would be considered the "hazard" or "hazardous biological agent". Exposure to tuberculosis would be the hazardous incident. For types of Hazards refer to Annex 3 of the Standard on Hazard Prevention Program.
- 1.21.2. Hazardous Occurrence includes:
 - 1.21.2.1. An event occurring at a PWGSC managed building or worksite, or through the course of an employee's work that results in, or has the potential to result in, a fatality, injury, illness, exposure to a hazardous substance or property damage or an escapement of a hazardous material. For the purpose of investigating, recording and reporting hazardous occurrences, the following are included under this term: disabling injuries, minor injuries and near-misses.
- 1.21.3. Hazardous Occurrence Investigation and Reporting Procedures:
 - 1.21.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.
 - 1.21.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.
 - 1.21.3.3. Indicates corrective measures that have been taken since the occurrence.
 - 1.21.3.4. Requires the appointment of a qualified investigator.
 - 1.21.3.5. Provides recommendations for additional corrective measures, if required.
- 1.21.4. Fatal or Serious Accidents Procedures:
 - 1.21.4.1. Call emergency number to advise the police organization having jurisdiction to secure the scene and investigate the matter.

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- 1.21.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.
- 1.21.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.
- 1.21.4.4. Unless authorized to do so, do not allow anyone to remove or in any way interfere with or disturb any wreckage, article or thing related to the incident except to the extent necessary to: save a life, prevent injury or relieve human suffering in the vicinity; maintain an essential public service; or prevent unnecessary damage to or loss of property.

1.22. Utility Clearance

- 1.22.1. Contractor is solely responsible for utility clearance.
- 1.22.2. Contractor will not rely upon Drawings or other information provided with utility locations.

1.23. Personal Protective Equipment Program

- 1.23.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing as appropriate:
 - 1.23.1.1. Donning and doffing procedures.
 - 1.23.1.2. PPE selection based upon Site hazards.
 - 1.23.1.3. PPE use and limitations of equipment.
 - 1.23.1.4. Work mission duration, PPE maintenance and storage.
 - 1.23.1.5. PPE decontamination and disposal.
 - 1.23.1.6. PPE inspection procedures prior to, during, and after use.
 - 1.23.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - 1.23.1.8. Medical surveillance requirements for personnel assigned to work at Site.
 - 1.23.1.9. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - 1.23.1.10. Site control measures employed at Site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
 - 1.23.1.11. Decontamination procedures for both personnel and equipment.
 - 1.23.1.12. Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing

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weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.

- 1.23.1.13. Written respiratory protection program for project activities.
- 1.23.1.14. Procedures dealing with heat and/or cold stress.
- 1.23.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.24. Offsite Contingency and Emergency Response Plan

- 1.24.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
- 1.24.2. Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

1.25. Personnel Health, Safety, and Hygiene

- 1.25.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- 1.25.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
- 1.25.3. Personal Protective Equipment:
 - 1.25.3.1. Ensure all site personnel are furnished with appropriate PPE.
 - 1.25.3.2. Unless identified otherwise in site-specific health and safety plan, minimum PPE to include: industrial protective headwear, high-visibility safety apparel, and protective footwear.
 - 1.25.3.3. Ensure that safety equipment and protective clothing is kept clean and maintained.
- 1.25.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - 1.25.4.1. Ensure industrial protective headwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.2. Ensure high-visibility safety apparel is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.3. Ensure protective footwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.4. Dispose of or decontaminate PPE worn onsite at end of each workday.
 - 1.25.4.5. Decontaminate reusable PPE before reissuing.
 - 1.25.4.6. Ensure site personnel have passed respirator fit test prior to entering potentially volatile contaminated work areas, as appropriate.
 - 1.25.4.7. Ensure facial hair does not interfere with proper respirator fit.
- 1.25.5. Respiratory Protection:

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- 1.25.5.1. Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
- 1.25.5.2. Develop, implement, and maintain respirator program.
- 1.25.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
- 1.25.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
- 1.25.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
- 1.25.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
- 1.25.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
- 1.25.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
- 1.25.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - 1.25.7.1. Suitable containers for storage and disposal of used disposable PPE.
 - 1.25.7.2. Potable water and suitable sanitation facility.
- 1.25.8. Emergency and First-Aid Equipment:
 - 1.25.8.1. Locate and maintain emergency and first-aid equipment in appropriate location onsite including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
- 1.25.9. Site Communications:
 - 1.25.9.1. Identify, provide and implement appropriate dedicated communication devices for Site and post emergency numbers near dedicated devices.
 - 1.25.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
 - 1.25.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
 - 1.25.9.4. Furnish selected personnel with 2-way radios.
 - 1.25.9.5. Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

2. PART 2 - PRODUCTS

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2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

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1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Non-Contaminated Quality Soil Transport and Disposal will be paid in accordance with unit rate price established for weight of material disposed. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal. Includes Treatment or any other processing of material required by Disposal Facility but not required by the Contract.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Environmental Protection Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Contractor's Qualified Environmental Professional to prepare and submit a plan for approval by the Departmental Representative detailing protection of the environment in accordance with the project Environmental Mitigation Strategy, Department of Fisheries and Oceans Canada approval (20-HPAC-00044), and identified mitigation measures.
Include:
- 1.3.1.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.
- 1.3.1.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.
- 1.3.1.3. Communications identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team including Superintendent; Departmental Representative and alternate, and other contractor(s) and individuals as directed by the Departmental Representative; and federal, provincial, and municipal emergency contacts.
- 1.3.1.4. Work Area showing proposed activity in each portion of areas, such as exclusion zone(s), decontamination zone(s) and clean zone(s), and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.
- 1.3.1.5. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.

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- 1.3.1.6. Historical, Archaeological, Cultural Resources, Biological Resources and Valued Habitat Protection identifying methods, means, and sequences for preventing, monitoring, and controlling protection of historical, archaeological, cultural resources, biological resources and valued habitat. Include procedures if previously unknown historical, archaeological, cultural, and biological resources are discovered during Work. Includes Species At Risk.
- 1.3.1.7. Non-Contaminated Quality Soil and Water Management including onsite handling to manage Solid Waste, Sewage, and Wastewater. Water Management Plan to be prepared by Contractor's Qualified Professional for approval by Departmental Representative.
- 1.3.1.8. Non-Contaminated Quality Soil Transport and Disposal including transportation frequency and identifying offsite disposal facilities to manage Solid Waste. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the disposal of relevant Non-Contaminated Material.
- 1.3.1.9. Traffic Control including signage and traffic control personnel for Site ingress and egress. Vehicles and vehicle traffic must comply with all federal, provincial, and municipal laws and regulations.
- 1.3.1.10. Noise Control identifying methods, means, and sequences for preventing, monitoring, and controlling noise for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: noise does not comply with appropriate levels, or if there are public complaints.
- 1.3.1.11. Vibration Control identifying methods, means, and sequences for preventing, monitoring, and controlling vibration for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; in accordance with the Contract; in accordance with recommendations from the Contractor's Qualified Professional. Include thresholds and procedures if: vibration does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.
- 1.3.1.12. Vapours, Dust, and Particulate Control identifying methods, means, and sequences for preventing, monitoring, and controlling vapours, dust and other airborne particulates for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: vapours, dust, and particulates do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.
- 1.3.1.13. Spill Control identifying methods, means, and sequences for preventing, monitoring, and controlling spills for compliance with: applicable permits,

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- certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Identify reporting requirements for spills. Identify locations and contents of spill kits.
- 1.3.1.14. Erosion and Sediment Control identifying methods, means, and sequences for preventing, monitoring, and controlling onsite surface water, erosion and sedimentation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Includes erosion and sedimentation control for water diversion discharge, other discharges, and during pond re-filling including dissipation devices at discharge points to reduce erosion and sedimentation resulting from discharges. Includes temporary erosion and sedimentation control along toe of slopes within disturbed riparian areas in preparation for restoration planting to be performed by others.
- 1.3.1.15. Work in or Adjacent to Waterways Control, as required, identifying methods, means, and sequences for preventing, monitoring, and controlling work in or adjacent to waterways for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include measures for protection of fish and wildlife during Work in or Adjacent to Waterways including isolation and dewatering of work zones and monitoring. Contractor's Qualified Environmental Professional to perform fish and wildlife salvage and relocation in accordance with Contractor obtained permits. Personnel conducting fish salvage operations to have appropriate electrofishing certification and experience conducting fish salvage operations in similar environments. Contractor's Qualified Environmental Professional to prepare Fish Salvage and Relocation Plan for acceptance by the Departmental Representative. Includes means, methods and equipment for salvage and relocation efforts and measures to reduce or eliminate fish stranding and displacement and monitoring requirements. Contractor to identify suitable downstream habitat quality and quantity for relocation prior to fish salvage. Fish salvage to be conducted prior to flow bypass and dewatering. Passive measures (eg., minnow traps, seining, etc.) to be conducted first. Perform regular surveys for stranded fish during dewatering.
- 1.3.1.16. Monitoring requirements for general compliance with Environmental Protection Plan, permits and approvals.
- 1.3.1.17. Environmental Protection Plan must be signed and sealed by Contractor's Qualified Professional, as required by potential impact to environment by Contractor's methods, means and sequences.
- 1.3.2. Submit amended Environmental Protection Plan if there are changes to the assumed site conditions, changes to the Work procedures, or in the event that

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any methods and procedures are inadequate as directed by the Departmental Representative.

- 1.3.3. Submit Spill and Response Report for all Spills. Include: description of spill (location, time, quantity and quality), notifications (including copies of any reports forwarded to regulatory agencies), and describe any remediation activities (time, quantity, quality, and fate of spill impacted material). Include environmental analytical results for spill or other environmental testing.
- 1.3.4. After hours work: at least 5 Working Days prior to commencing after hours work Submit a schedule showing requested dates, times, and reasons for after hours work. Approval will only be granted for reasons valid, if request can be reasonably accommodated by other contractors and Site users, and third parties are not adversely affected, in the sole opinion of the Departmental Representative.
- 1.3.5. Attend environmental awareness training provided by Departmental Representative.

1.4. Contractor's Qualified Professional

- 1.4.1. Contractor to retain appropriately Qualified Professional(s) with background in contaminated sites, environmental protection and monitoring, and fisheries resources. Qualified Professional to be present at site for duration of work.
- 1.4.2. Contractor to engage appropriately Qualified Professional(s) with background in hydrology, hydraulics and water treatment for water management activities.
- 1.4.3. Perform design, construction, monitoring, reporting, and other required tasks under the supervision of the Contractor's Qualified Professional applicable to the performance of the Work.

1.5. Cleaning

- 1.5.1. Maintain cleanliness of Work and surrounding Site including roadways to comply with federal, provincial, and municipal fire and safety laws, ordinances, codes, and regulations applicable to the performance of the Work.
- 1.5.2. Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.
- 1.5.3. Ensure cleanup of the Work areas each day and after Final Completion of Work.

1.6. Site Clearing and Plant Protection

- 1.6.1. Minimize stripping of Topsoil and vegetation. Use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction.
- 1.6.2. Restrict tree and plant removal to areas in accordance with the Contract or as directed by the Departmental Representative. To greatest extent practicable, prune or top the vegetation instead of grubbing/uprooting. Protect all other trees and plants onsite and offsite. Tree and plant removal to be conducted under

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- supervision of Contractor's Qualified Professional. Contractor responsible for permits and associated fees.
- 1.6.3. Develop a Site Access Plan detailing areas of access and egress to excavation areas and including equipment types and methods to limit riparian vegetation clearing for approval by the Departmental Representative.
 - 1.6.4. Limit vegetation removal and retain riparian areas intact to extent practicable. Appropriate equipment types and sizes to be utilized for work within riparian zones to limit disturbance to extent practicable. Site clearing within riparian zones is anticipated to be approximately 250 – 300 m². Contractor to clearly mark trees to be retained and boundaries of clearing and grubbing areas to avoid unnecessary encroachment on areas to be retained.
 - 1.6.5. Retain a Certified Arborist to conduct a hazard tree assessment and assess tree clearing and pruning requirements to complete the Work.
 - 1.6.6. Designated significant trees that are removed shall be replaced by others with native tree plantings at a 2:1 ratio.
 - 1.6.7. Salvage all trees and plants to be removed in accordance with the Contract or as directed by the Departmental Representative.
 - 1.6.8. Wrap salvaged trees in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
 - 1.6.9. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage unless otherwise indicated in Drawings. Avoid unnecessary traffic, dumping and storage of materials over root zones.
 - 1.6.10. Remove invasive plant material in areas shown in Drawings and as designated by Contractor for clearing and grubbing for disposal at an approved offsite location. Selection of access areas to be combined with areas requiring invasive plant species removal wherever possible.
 - 1.6.11. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
 - 1.6.12. Critical wildlife species may inhabit the riparian corridors within the construction area. Wildlife survey and salvage operations will be required prior to removal of vegetation or trees within the construction area. The Contractor shall coordinate work to accommodate wildlife surveys or salvage operations to be carried out by Environmental Consultant retained by the owner. The Contractor is responsible for providing a minimum of 48 hours notice to the Departmental Representative of the commencement of any vegetation clearing activities. The limits of the removal of vegetation or timing of the removal of vegetation may have to be altered should it be determined that construction activities may be harmful to critical wildlife species. Work immediately surrounding active bird nests identified by owner's Environmental Consultant may be delayed until nest is vacated.

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- 1.6.13. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation. Replanting and re-vegetation activities with native species suitable for the site to be conducted by others.
- 1.6.14. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- 1.6.15. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

1.7. Archaeological

- 1.7.1. Attend archaeological awareness training provided by Departmental Representative.
- 1.7.2. Abide by Chance Find Procedures developed by Departmental Representative, as appropriate.

1.8. Species At Risk

- 1.8.1. Protect all Species At Risk, including meeting all federal, provincial, and municipal laws and regulations.
- 1.8.2. Modify Work procedures, including stopping Work, as instructed by Contractor's Qualified Professional or Departmental Representative to protect Species At Risk.

1.9. Non-Contaminated Quality Soil and Water Management

- 1.9.1. Solid waste
 - 1.9.1.1. Remove all Non-Contaminated Quality Soil within Work areas in accordance with the Contract and as directed by the Departmental Representative.
 - 1.9.1.2. Remove surplus materials and temporary facilities from Site.
 - 1.9.1.3. Do not burn or bury any waste onsite.
 - 1.9.1.4. Do not discharge wastes into streams or waterways.
 - 1.9.1.5. Do not dispose of volatile or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 1.9.1.6. Dispose of all Non-Contaminated Quality Soil at a Landfill Facility.
- 1.9.2. Sewage
 - 1.9.2.1. Store Sewage from toilet facilities with wastewater from handbasins, and/or showers, for ultimate disposal.
 - 1.9.2.2. Provide, operate, and maintain Sewage storage tanks to store Sewage.
 - 1.9.2.3. Transport and dispose of Sewage at a Disposal Facility, or discharge to municipal sanitary sewer system in compliance with Municipal requirements, as accepted by Departmental Representative.

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- 1.9.2.4. Discharges: comply with applicable discharge limitations and requirements; do not discharge Sewage to Site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain approval prior to discharge of Sewage.
- 1.9.3. Wastewater
 - 1.9.3.1. Dewater various parts of Work including, excavations, structures, foundations, stockpile management area, and Work areas, unless otherwise specified or directed by Departmental Representative.
 - 1.9.3.2. Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.
 - 1.9.3.3. Direct surface waters that have not contacted potentially Contaminated Material to surface drainage systems.
 - 1.9.3.4. Control surface drainage including ensuring that gutters are kept open, wastewater is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.
 - 1.9.3.5. Dispose of Wastewater in manner not injurious to public health or safety, to the environment, to onsite or offsite property, or to any part of Work completed or under construction.
 - 1.9.3.6. Control disposal or runoff of Wastewater containing suspended materials or other harmful substances in accordance with local authority requirements and Contractor obtained permits.
 - 1.9.3.7. Ensure pumped Wastewater into waterways, sewer or drainage systems is free of suspended materials. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas in accordance with Contract water management requirements.
 - 1.9.3.8. Obtain permits to discharge Wastewater to environment or municipal system (sewer, ditches). Contractor responsible for applicable discharge fees.
 - 1.9.3.9. Do not discharge water which may have come in contact with potentially Contaminated Soil or otherwise be Contaminated directly offsite to the environment or to municipal system unless treated as required and testing indicates concentrations meet applicable Contractor obtained discharge permit limits and requirements.

1.10. Non-Contaminated Quality Soil Transport and Disposal

- 1.10.1. Assume ownership of, and be responsible for, Non-Contaminated Quality Soil once it is loaded on a vehicle, barge, or other vessel for Transport. Assume ownership of, and be responsible for, Non-Contaminated Quality Soil Disposed.
- 1.10.2. Transport material as soon as practical; do not unreasonably stockpile onsite.
- 1.10.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.

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- 1.10.4. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.
- 1.10.5. Stabilize material as necessary.
- 1.10.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Non-Contaminated Quality Soil.
- 1.10.7. Barges must be inspected by an independent Marine Surveyor for stability and safety.
- 1.10.8. Non-Contaminated Quality Soil Disposal: dispose all Non-Contaminated Quality Soil, at Landfill Facility provided by Contractor and accepted by the Departmental Representative.
- 1.10.9. Landfill Facility must:
 - 1.10.9.1. Be an existing offsite facility located in Canada or the United States.
 - 1.10.9.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.
 - 1.10.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by the BC government or the Yukon government, as appropriate, for the Disposal of relevant Non-Contaminated Quality Soil.
 - 1.10.9.4. Comply with requirements of acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.
- 1.10.10. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 1.10.11. Material sent to a Landfill Facility must be permanently stored at that facility.
- 1.10.12. If proposed Landfill Facility is not acceptable to Departmental Representative, provide an alternate Landfill Facility that is acceptable.

1.11. Public Traffic

- 1.11.1. Where applicable, traffic to include pedestrian traffic.
- 1.11.2. Ensure pedestrians have safe and unencumbered access in public areas. Provide traffic control personnel wherever Contractor's activities (including vehicle crossings) impedes sidewalks, pathways, bike paths, roadways, or other public routes, or elsewhere as required or as directed by Departmental Representative.
- 1.11.3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- 1.11.4. Comply with requirements of acts, regulations and bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out

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Work or haul materials or equipment. Canora Road centre-line demarcates boundary between Town of Sidney and District of North Saanich. Contractor responsible for permits and approvals from all authorities having jurisdiction along transportation routes.

- 1.11.5. Comply with current version of WorkSafeBC Occupational Health and Safety Regulation *Part 18 Traffic Control* or Yukon Workers' Compensation Health and Safety Board Occupational Health and Safety Act and Regulations *Public Way 1.46 and 1.47*, as appropriate.
- 1.11.6. Comply with current version of BC Ministry of Transportation and Infrastructure *2015 Interim Traffic Management Manual for Work on Roadways*.
- 1.11.7. Obtain all necessary permits or other authorizations regarding traffic control, including access and road usage.
- 1.11.8. Provide and maintain road access and egress to property fronting Site and in other areas in accordance with the Contract, except where other means of road access exist that are accepted.
- 1.11.9. Prevent tracking or spilling of debris or material onto private and public roads.
- 1.11.10. Immediately sweep or scrape up debris or material on private and public roads.
- 1.11.11. Clean public roads within a minimum 200 m radius of the Site entrance or as required at least once per shift, or as directed by Departmental Representative.
- 1.11.12. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.12. Noise, Vibration, Vapours, and Dust Control

- 1.12.1. Maintain acceptable levels not injurious or objectionable to worker safety, public health, the environment, and equipment and infrastructure.
- 1.12.2. Comply with applicable municipal bylaws and other applicable requirements unless otherwise specified or directed by Departmental Representative; Contractor's Qualified Professional may determine lower acceptable levels.
- 1.12.3. Maximum levels allowed at site boundaries to prevent nuisance, unless otherwise accepted by Departmental Representative:
 - 1.12.3.1. Noise: 65 dBA.
 - 1.12.3.2. Vibration: 0.315 m/s^2 (based on ISO 2631-1).
 - 1.12.3.3. Dust PM_{10} : $50 \mu\text{g/m}^3$.
- 1.12.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative have been implemented.

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- 1.12.5. Specific procedures to prevent dust:
 - 1.12.5.1. Cover or wet down relevant Work to prevent vapours and blowing dust and debris, including temporary roads, excavations, and stockpiles. In urban environments or if sensitive neighbouring properties (eg residences) provide full time coverage or wetting down.
 - 1.12.5.2. Covers to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off. Use fresh (non-saline) water for dust and particulate control.
 - 1.12.5.3. Use appropriate covers on vehicles, including trucks, barges, and trains, hauling vapour-generating or fine or dusty material. Use watertight vehicles to haul wet materials.

1.13. Spill Control

- 1.13.1. Pollution includes spills or other releases from Contractor's activities that could potentially contaminate soil, sediment, water, and atmosphere from discharge of hazardous, deleterious or regulated substances, including from equipment and material handling.
- 1.13.2. Prevent spills or releases.
 - 1.13.2.1. Maintain temporary erosion and pollution control features.
 - 1.13.2.2. Do not store fuel onsite other than tanks forming part of the equipment.
 - 1.13.2.3. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
 - 1.13.2.4. Control emissions from equipment and plant to meet applicable authorities' emission requirements.
 - 1.13.2.5. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.
- 1.13.3. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.
- 1.13.4. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.
 - 1.13.4.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.
 - 1.13.4.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.
 - 1.13.4.3. Spill kits are to be in close proximity to machinery.
 - 1.13.4.4. During the Work there are to be trained and qualified personnel knowledgeable in spill prevention, containment and cleanup procedures available that are ready to deploy spill kits when necessary.
- 1.13.5. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- 1.13.6. Promptly report spills and releases potentially causing damage to environment to:

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- 1.13.6.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
- 1.13.6.2. Contractor emergency response team including Superintendent.
- 1.13.6.3. Departmental Representative and other contractor(s) and individuals as directed by the Departmental Representative.
- 1.13.7. Departmental Representative can collect samples for chemical analyses prior to, during, and upon Final Completion of Work to monitor potential pollution caused by Contractor's activities. Assist Departmental Representative in collection of samples.
- 1.13.8. Remediation of soil, sediment or water contaminated by Contractor's activities.
 - 1.13.8.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite at the cost of the Contractor.
 - 1.13.8.2. Remediation includes excavation, pumping, testing, transport, treatment and disposal as appropriate for the type of contamination incurred, and at a minimum in accordance with the Contract.
 - 1.13.8.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
 - 1.13.8.4. Remediate as directed by the Departmental Representative.
 - 1.13.8.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.
- 1.13.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative have been implemented.

1.14. Erosion and Sediment Control

- 1.14.1. Implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures shall be overseen by Contractor's Qualified Professional and should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear.
- 1.14.2. Install effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
- 1.14.3. Manage water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system. Control and monitor erosion and sedimentation within waterbodies during water diversion discharge to downstream locations and during re-filling of pond following remedial

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- activities. Includes use of dissipation devices at discharge points and monitoring of turbidity levels in receiving water bodies. Avoid and monitor for warm water surge to waterbodies resulting from discharges.
- 1.14.4. Implement site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
 - 1.14.5. Contain and stabilize waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
 - 1.14.6. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
 - 1.14.7. Repair erosion and sediment control measures and structures if damage occurs.
 - 1.14.8. Remove non-biodegradable erosion and sediment control materials once site is stabilized.
 - 1.14.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated limits or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.15. Work In or Adjacent to Waterways

- 1.15.1. Approvals and Practices:
 - 1.15.1.1. As required, comply with Fisheries Act Approval, B.C. Water Sustainability Act notification conditions, and other relevant authorizations, permits and approvals and in accordance with the Contract.
 - 1.15.1.2. Restrict Work as described in, and follow requirements in, Contract including Environmental Mitigation Strategy, Contractor's Environmental Protection Plan, or similar documents. Variations allowed only if recommended by Contractor's Qualified Professional and accepted by Departmental Representative.
 - 1.15.1.3. Follow practices described in *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada/Ministry of Environment, Lands and Parks, 1993 September) and *Measures to avoid causing harm to fish and fish habitat including aquatic species at risk* (Fisheries and Oceans Canada, 2018 December 14).
 - 1.15.1.4. Follow practices described in *Standards and Best Practices for Instream Works* (BC Ministry of Environment, 2004 March).
- 1.15.2. Timing
 - 1.15.2.1. Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
 - 1.15.2.2. Minimize duration of in-water work.

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- 1.15.2.3. All instream work shall be carried out in isolation of the streamflow. The Contractor is responsible to divert flow including storm flows around the work area and maintain streamflow downstream of the site. Water diversion infrastructure to be designed by a Qualified Professional retained by the Contractor and be constructed in accordance with the design. The Contractor shall be responsible for and make good at his own expense, any damage caused by water, failure of any part of the water control works, failure of equipment, inadequacy of equipment, omissions or commissions in his performance of the work. Cofferdams (if applicable) shall be lined to prevent erosion and leaking. Use only materials free of silt or other fine sediment. Unlined or uncontained earthen berms should not be used for cofferdams. Continuous monitoring of water diversion infrastructure including over night and weekends is required. Additional equipment and supplies (eg. additional pumps, isolation materials, erosion and sedimentation control devices) shall be maintained at the site to address higher flow events or if implemented mitigation measures are unsuccessful. Conduct instream work during periods of low flow to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- 1.15.2.4. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 1.15.3. Site Selection
 - 1.15.3.1. Design and plan activities and works in wetland and waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
 - 1.15.3.2. Design and construct approaches to wetland and waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation to extent possible. Design a Site Access Plan detailing areas of access and egress to Waterways and including equipment types and methods to limit riparian vegetation clearing for approval by the Departmental Representative.
 - 1.15.3.3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
 - 1.15.3.4. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.
- 1.15.4. Shoreline/bank Re-vegetation and Stabilization
 - 1.15.4.1. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting. Coordinate with Departmental Representative to conduct pre-clearing nesting bird surveys prior to vegetation clearing.

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- 1.15.4.2. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed or as directed by the Departmental Representative.
- 1.15.4.3. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site. Restore areas from compaction and rutting, grade and eliminate uneven areas and low spots, ensure positive drainage, scarify graded surfaces to minimum of 100 mm, and amend soils as necessary in preparation of restoration planting to be conducted by others.
- 1.15.4.4. Restore bed and banks of the waterbody to their original contour and gradient or as indicated in Drawings; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- 1.15.4.5. Install temporary erosion and sedimentation control measures along toe of slopes in preparation of restoration planting activities to be conducted by others.
- 1.15.4.6. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- 1.15.4.7. Re-introduce water to the pond area following completion of remedial activities. Re-filling of pond to be conducted while maintaining water diversion infrastructure with slow release of creek water to pond area and control of erosion and sedimentation. Details of pond re-filling to be included in Contractor's Water Management Plan for approval by the Departmental Representative.
- 1.15.4.8. Remove all construction materials from site upon project completion.
- 1.15.4.9. Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed Species At Risk.
- 1.15.4.10. Contractor to restore disturbed manicured park areas and return to pre-existing condition in accordance with local authority requirements.
 - 1.15.4.10.1. All infrastructure removed or moved is to be reinstated to pre-existing conditions.
 - 1.15.4.10.2. Wherever disturbance to existing manicured lawn occurs, areas to be sodded in accordance with Master Municipal Construction Document guidelines.
 - 1.15.4.10.3. All sod and imported topsoil as may be required shall be free of invasive and/or noxious broadleaf weeds, grasses including but not limited to poa annua, disease, fungi, detrimental nematodes and detrimental insects.

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- 1.15.4.10.4. Sodded areas to be watered with potable water free of impurities and fertilized with synthetic slow release fertilizer as required. Contractor to ensure adequate water and fertilizer is applied to maintain sodded areas ensuring vigorous growth and healthy state is achieved until final completion of Work.
- 1.15.5. Aquatic Life Protection
 - 1.15.5.1. Ensure that all in-water activities, or associated in-water structures, do not interfere with aquatic life passage, constrict the channel width, or reduce flows, or result in the stranding or death of aquatic life.
 - 1.15.5.2. Contractor's Qualified Professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
 - 1.15.5.3. Any capture and relocation of an endangered or threatened aquatic Species At Risk will require approval from Department of Fisheries and Oceans.
- 1.15.6. Water Intake or Outlet Pipe Screening:
 - 1.15.6.1. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.
 - 1.15.6.2. Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
 - 1.15.6.3. Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
 - 1.15.6.4. The screen face should be oriented in the same direction as the flow.
 - 1.15.6.5. Ensure openings in the guides and seals are less than the opening criteria to make "fish tight".
 - 1.15.6.6. Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
 - 1.15.6.7. Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
 - 1.15.6.8. Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
 - 1.15.6.9. Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
 - 1.15.6.10. Provision should be made for the removal, inspection, and cleaning of screens.

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- 1.15.6.11. Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
- 1.15.6.12. Pumps should be shut down when fish screens are removed for inspection and cleaning.
- 1.15.7. Explosives:
 - 1.15.7.1. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
 - 1.15.7.2. Do not use explosives where SARA-listed aquatic species, their residences or critical habitat occur, without review by Department of Fisheries and Oceans.
- 1.15.8. Operation of Machinery
 - 1.15.8.1. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.
 - 1.15.8.2. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody. Minimize vehicle and equipment activity on exposed surfaces during and immediately after wet weather.
 - 1.15.8.3. Limit machinery fording of the watercourse to a one-time event (ie over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
 - 1.15.8.4. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (eg dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (eg swamp mats, pads) if minor rutting is likely to occur during fording.
 - 1.15.8.5. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
 - 1.15.8.6. Do not ford, place crossing materials or operate machinery on the bed of a waterbody where SARA-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION



1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Site Facilities - Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all infrastructure in accordance with the Contract. Includes temporary structures and facilities, environmental protection, stockpile areas, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities.
- 1.1.2. Site Facilities - Operation will be paid in accordance with lump sum price established to operate and maintain all infrastructure between mobilization and demobilization. Includes temporary structures and facilities, environmental protection, stockpile areas, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities. Also includes ongoing services including administration, overhead, project management, security, surveying, noise monitoring, vibration monitoring, utilities, project meetings, inspections, progress Submittals, traffic control, health and safety, Environmental Protection, cleaning, and operation during inclement weather. Also includes living out allowances, travel and room and board. Lump sum may be pro-rated based on duration in Master Plan for Extension of Time.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Site Layout: within 10 Working Days after Contract award and prior to mobilization to Site, Submit Site Layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor. Include:
 - 1.3.1.1. Equipment and personnel decontamination areas.
 - 1.3.1.2. Means of ingress, egress and temporary traffic control.
 - 1.3.1.3. Equipment and material staging areas.
 - 1.3.1.4. Stockpile areas and construction details, including base preparation and water control features.
 - 1.3.1.5. Exclusion areas, contaminant handling areas, and other areas identified in Contractor's site-specific Health and Safety Plan and Environmental Protection Plan.
 - 1.3.1.6. Grading, including contours, required to construct temporary facilities.
 - 1.3.1.7. Location of all temporary facilities including: Onsite Contaminated Water Treatment Plant, truck wash and decontamination units, office trailers, modular camp structures, parking, storage, environmental monitoring

stations, above ground and underground utilities, roads, and other temporary facilities.

- 1.3.2. Signs: at least 5 Working Days prior to posting, Submit any signs viewable by public.

1.4. Utilities

- 1.4.1. Utilities not identified as being available on Site must be supplied at the Contractor's expense. Provide supplied utilities for entire work force, including Subcontractors and Departmental Representative and their consultants

1.5. Fire Protection

- 1.5.1. Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.6. Access and Delivery

- 1.6.1. Only the designated entrance in accordance with the Contract can be used for access to Site.
 - 1.6.1.1. Maintain for duration of Contract.
 - 1.6.1.2. Make good damage resulting from Contractor's use.
- 1.6.2. Use of the Site will be granted to the Contractor through the Departmental Representative.

1.7. Installation and Removal

- 1.7.1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- 1.7.2. Identify areas which have to be graveled or otherwise treated to prevent tracking of mud.
- 1.7.3. Indicate use of supplemental or other staging area.
- 1.7.4. Provide construction facilities in order to execute work expeditiously.
- 1.7.5. Provide temporary utilities in order to execute Work expeditiously.
- 1.7.6. Remove from Site all such Work after use.

1.8. Site Storage/Loading

- 1.8.1. Confine work and operations of employees in accordance with the Contract. Do not unreasonably encumber premises with products.
- 1.8.2. Storage space must be limited to the Site.
- 1.8.3. Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9. Construction Parking

- 1.9.1. Parking of private vehicles will not be permitted on Site, unless otherwise agreed to by Departmental Representative.

1.9.2. Provide and maintain adequate access to project site.

1.10. Security

- 1.10.1. Be responsible for security of site and contents of site after working hours and during holidays. Provide onsite security personnel as appropriate and in accordance with the Contract.
- 1.10.2. Control access to Site and maintain a log of all personnel onsite. No non-Work visitors allowed without prior written consent of Departmental Representative.

1.11. Departmental Representative and Consultant Offices

- 1.11.1. Provide office facilities for the exclusive use of the Departmental Representative and their consultants with the following minimum intent, modified as per the Contract, or as directed by the Departmental Representative:
 - 1.11.1.1. Two work stations within factory fabricated modular units.
 - 1.11.1.2. Work stations must include; 1 desk (minimum size 120 cm x 50 cm, minimum height 70 cm), 1 swivel desk chair (minimum load requirement 100 kg), 1 bookshelf (minimum 3 shelves with a minimum shelf height of 32 cm), 1 locking filing cabinet (minimum dimensions 50 cm x 39 cm x 60 cm), 1 garbage can, and 1 recycling bin.
 - 1.11.1.3. Building envelope: watertight construction.
 - 1.11.1.4. Completed building: exterior to interior minimum sound attenuation of STC 30.
 - 1.11.1.5. Building interior environment: heated and cooled to maintain temperature of 20 degrees C minimum to 25 degrees C maximum with relative humidity of 35% to 60%.
 - 1.11.1.6. Provide ventilation and outdoor air as per ASHRAE 62.1 – 2010 Standard.
 - 1.11.1.7. Building lighting: maintain measured lighting level of 200 lx at 1500 mm above finished floor, after building finishes and painting complete.
 - 1.11.1.8. Thermal performance of window units: Maximum heat transfer rate (U-value) not to exceed 2.0 W/m²K.
 - 1.11.1.9. Regularly collect refuse and recyclables and keep the office clean and properly maintained with heat and light.
 - 1.11.1.10. Provide private washroom facilities in offices in accordance with the Contract, complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
 - 1.11.1.11. The work stations and contents must be for the sole use of the Departmental Representative and their consultant(s) for the duration of the Work and may, if necessary, be used concurrently with other inspection agencies.
- 1.11.2. Installation:
 - 1.11.2.1. Install level and plumb.
 - 1.11.2.2. Install stairs.
 - 1.11.2.3. Adjust doors and windows for smooth operation.

- 1.11.3. Provide a minimum of 2 parking spaces for Departmental Representative and their consultants adjacent to offices.

1.12. Equipment, Tools and Materials Storage

- 1.12.1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- 1.12.2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.13. Sanitary Facilities

- 1.13.1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- 1.13.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.14. Construction Signage

- 1.14.1. Provide and erect 3 project signs within 10 Working Days of mobilization in locations designated by Departmental Representative. Project signs must, unless otherwise directed by Departmental Representative, include: name of Client, name of Project, and information contact number in both official languages using graphic symbols to CAN/CSA-Z321. Project signs to be a minimum of 1200 x 2400mm.
- 1.14.2. Contractor signage must be accepted by Departmental Representative.
- 1.14.3. Contractor signage must include at a minimum:
 - 1.14.3.1. Name of Contractor.
 - 1.14.3.2. Emergency contact number.
 - 1.14.3.3. Personal Protective Equipment requirements.
 - 1.14.3.4. Other pertinent safety warnings (eg “open excavation”).
- 1.14.4. Maintain accepted signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Departmental Representative.

1.15. Onsite Traffic

- 1.15.1. Where applicable, traffic to include pedestrian traffic.
- 1.15.2. Provide access and temporary relocated roads as necessary to maintain traffic.
- 1.15.3. Maintain and protect traffic on affected roads during construction period.
- 1.15.4. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- 1.15.5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

- 1.15.6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.
- 1.15.7. Construct access and haul roads necessary.
- 1.15.8. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic must be avoided.
- 1.15.9. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- 1.15.10. Dust control: adequate to ensure safe operation at all times.
- 1.15.11. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- 1.15.12. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- 1.15.13. Provide snow removal during period of Work.
- 1.15.14. Remove, upon completion of work, haul roads designated by Departmental Representative.

1.16. Truck Wash and Decontamination Units

- 1.16.1. Provide, install and operate truck wash, including the installation of a water supply, or as directed by the Departmental Representative:
 - 1.16.1.1. No vehicles which have come in contact with Contaminated Material must leave the Site without passing through the truck wash.
 - 1.16.1.2. The truck wash must provide, at a minimum, the ability to wash truck tires and load boxes to a minimum height of 1.7 m.
 - 1.16.1.3. Truck wash must have a solid separation tank and all solids collected must be classified as Contaminated Soil and disposed of at a Disposal Facility.
 - 1.16.1.4. Recycle or treat as Contaminated Water truck wash water.
- 1.16.2. Alternatives to a truck wash, including isolating truck traffic from contact with contaminated material, may be accepted by the Departmental Representative. Alternatives will not be accepted if, in the opinion of the Departmental Representative, the alternatives are not adequately designed or performing.
- 1.16.3. Provide personnel decontamination units (minimum of 2) for use by hazardous material, testing and inspection personnel working in areas of hazardous materials and for general clean-up of personal protective equipment to remove Contaminated Material. Provide decontamination units for work force
 - 1.16.3.1. At least one personnel decontamination unit must have overhead shower capability.
 - 1.16.3.2. The personnel decontamination units to be available to Departmental Representative and their consultants.
 - 1.16.3.3. The personnel decontamination units are subject to acceptance of Departmental Representative.
- 1.16.4. The truck wash and personnel decontamination units must be maintained in good working order during onsite Work.

- 1.16.5. The truck wash and personnel decontamination units must be removed from the Site during Site Decommissioning.

1.17. Clean-Up

- 1.17.1. Remove construction debris, waste materials, packaging material from work site daily.
- 1.17.2. Clean dirt or mud tracked onto paved or surfaced roadways.
- 1.17.3. Store materials resulting from demolition activities that are salvageable.
- 1.17.4. Stack stored new or salvaged material not in construction facilities.

1.18. Storage Tanks

- 1.18.1. Abide by the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations for stored petroleum products and allied petroleum products tank system located on federal or Aboriginal land, or within federal jurisdiction as described in the regulations.
- 1.18.2. Temporary storage tanks subject to the regulations must be registered with Environment Canada.
- 1.18.3. Mobile tanks subject to the regulations must be certified to be mobile.
- 1.18.4. Storage tanks to meet the following minimum requirements:
 - 1.18.4.1. Corrosion protection.
 - 1.18.4.2. Secondary containment.
 - 1.18.4.3. Containment sumps, if applicable.
 - 1.18.4.4. Overfill protection.
- 1.18.5. All components of tank system must bear certification marks indicating that they conform to the standards set out in the regulations.
- 1.18.6. Product transfer area must be designed to contain spills.
- 1.18.7. Prepare an emergency plan.
- 1.18.8. Prior to first filling, storage tanks must:
 - 1.18.8.1. Be registered.
 - 1.18.8.2. Be certified and marked.
 - 1.18.8.3. Transfer area be constructed.
 - 1.18.8.4. Emergency plan in place.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

CONTAMINATED SITES WATER TREATMENT ONSITE

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Contaminated Water Treatment Onsite-Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample contaminated or potentially Contaminated Water. Includes provision for dewatering of Contaminated Water from excavation and stockpile management area. Includes provision of Onsite Contaminated Water Treatment Plant.
- 1.1.2. Contaminated Water Treatment Onsite-Operation will be paid in accordance with the lump sum price established to process Contaminated Water onsite. Includes all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample Contaminated or potentially Contaminated Water. Includes operation of dewatering of Contaminated Water from excavation and stockpile management area. Includes treating Non-Aqueous Phase Liquids. Includes operation of Onsite Contaminated Water Treatment Plant and discharge piping. Includes analytical testing to demonstrate compliance with Contract. Lump sum may be pro-rated based on duration in Master Plan for Extension of Time.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Contaminated Water Treatment Provision Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Water Treatment Plant Provision for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Includes onsite infrastructure. Must be signed by Contractor's Qualified Professional.
- 1.3.2. Provide copies of all correspondence with Discharge Approval authority, including:
 - 1.3.2.1. Copy of Discharge Approval including: approval from authority having jurisdiction, discharge criteria, and sampling requirements (including substances and other parameters, and frequency).
 - 1.3.2.2. Copy of test results forwarded to Discharge Approval authority.
 - 1.3.2.3. Copy of changes to Discharge Approval, including orders to cease discharge.
- 1.3.3. Onsite Contaminated Water Treatment Plant Testing:
 - 1.3.3.1. Within 5 Working Days of conducting initial operations testing, and prior to operating or discharge, Submit results of initial operations test.

CONTAMINATED SITES WATER TREATMENT ONSITE

- 1.3.3.2. Within 5 Working Days of sampling Submit sampling results of operational (recurrent) testing.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Water Transport

- 3.1.1. Assume ownership of, and be responsible for Contaminated Water once it enters the Onsite Contaminated Water Treatment Plant

3.2. Contaminated Water Treatment Onsite

- 3.2.1. Contaminated Water Treatment Plant to be installed prior to commencement of excavation activities.
- 3.2.2. Design Requirements:
 - 3.2.2.1. Design and Operating Criteria: design Contaminated Water Treatment Plant capable of treating Contaminated Water generated from dewatering excavations and Work areas to meet Discharge Approval requirements, capable of removing oil, suspended solids, particulates, and asbestos fibers, and filter water through 5-micron particulate filter prior to discharge.
 - 3.2.2.2. Ensure that discharges from Site are in compliance with applicable permit requirements and limitations.
 - 3.2.3. Initial Testing: determine performance of Contaminated Water Treatment Plant provided by Contractor as follows prior to commencing excavation:
 - 3.2.3.1. Test run with potable water to ensure it is operating currently and no leaks are occurring.
 - 3.2.3.2. Performance verification (contaminant removal) of Contaminated Water treated, stored, tested, assessed, and accepted by Departmental Representative prior to discharge.
 - 3.2.3.3. Provide access for independent collection of treated stored water samples by the Departmental Representative.
 - 3.2.4. Operational Testing:
 - 3.2.4.1. Operate Contaminated Water Treatment Plant using experienced, qualified personnel and in accordance with manufacturer's instructions and procedures as Submittals by Contractor.
 - 3.2.4.2. Collect, analyze, and assess samples as required by Contractor's Qualified Professional.

CONTAMINATED SITES WATER TREATMENT ONSITE

- 3.2.4.3. Provide access for independent collection of samples by the Departmental Representative.
- 3.2.4.4. On basis of analytical results by Contractor or Departmental Representative obtained from samples collected at the discharge point, cease discharge and make system modifications required for effluent to satisfy effluent criteria as directed by the Departmental Representative or Discharge Approval authority.
- 3.2.5. Discharge to environment only in compliance with the Discharge Approval, the Discharge Approval authority, Departmental Representative, and Contractor's Qualified Professional.
- 3.2.6. Decommissioning/Dismantling:
 - 3.2.6.1. Decontaminate and remove salvageable components of Contaminated Water Treatment Plant including treatment system, pumps, piping, and electrical equipment.
 - 3.2.6.2. Dispose of non-salvageable equipment and materials at Disposal Facility accepted by the Departmental Representative. Decontaminate salvageable equipment as required prior to demobilization from Site.

END OF SECTION

CONTAMINATED SITES WATER TREATMENT OFFSITE

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Contaminated Water Treatment Offsite-Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample contaminated or potentially Contaminated Water. Includes dewatering of Contaminated Water from excavation and stockpile management area. Includes provision of bulk storage tanks and loading facilities for Offsite Water Treatment Facility.
- 1.1.2. Contaminated Water Treatment Offsite-Operation will be paid in accordance with the lump sum price established to process Contaminated Water offsite. Includes all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample Contaminated or potentially Contaminated Water. Includes operation of dewatering of Contaminated Water from excavation and stockpile management area. Includes treating Non-Aqueous Phase Liquids. Includes Transport and Treatment at Offsite Contaminated Water Treatment Facility. Includes analytical testing to demonstrate compliance with Contract. Lump sum may be pro-rated based on duration in Master Plan for Extension of Time.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Contaminated Water Treatment Provision Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Water Treatment Plant Provision for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Includes onsite infrastructure.
- 1.3.2. Offsite Contaminated Water Treatment Facility Plan: at least 10 days prior to transporting material to a Treatment Facility, Submit documentation describing Treatment Facility. Include for each Treatment Facility:
- 1.3.2.1. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Treatment of relevant Contaminated Material.
- 1.3.2.2. Letter from Contractor's Qualified Professional that the Treatment Facility is appropriate for the nature, type, concentration, and quantity of Contaminated Material to be Treated in accordance with any authorization and complies with appropriate government requirements of a general nature (eg BC Landfill Criteria).

CONTAMINATED SITES WATER TREATMENT OFFSITE

- 1.3.2.3. Letter from Treatment Facility that they can accept within the schedule in Contract Documents the nature, type, concentration, and quantity of Contaminated Material to be Treated at the Facility, signed by an authorized representative of the Facility.
- 1.3.3. Certificate of Treatment: within 30 Working Days of treatment at Offsite Contaminated Water Treatment Facility Facility, Submit documentation verifying that materials have been treated by Contractor. Include:
 - 1.3.3.1. Issued by the Treatment Facility.
 - 1.3.3.2. On company letterhead.
 - 1.3.3.3. Name and location of facility where the material is being treated.
 - 1.3.3.4. Date and weight for each shipment received and total volume received at the offsite facility.
 - 1.3.3.5. Date and volume for each treatment event and total volume treated at the offsite facility.
 - 1.3.3.6. Treatment methodology.
 - 1.3.3.7. Laboratory certificates demonstrating Treatment objectives were met.
 - 1.3.3.8. Disposition of treated material.
 - 1.3.3.9. Signed by identified authorized treatment company representative.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Water Transport

- 3.1.1. Assume ownership of, and be responsible for Contaminated Water once it is loaded on a vehicle, barge, or other vessel for transport or once it enters the Offsite Contaminated Water Treatment Plant.

3.2. Contaminated Water Treatment Offsite

- 3.2.1. Assume ownership of, and be responsible for, Contaminated Material treated offsite.
- 3.2.2. Contaminated Material Treatment - Offsite: treat at Treatment Facility provided by Contractor and accepted by the Departmental Representative.
- 3.2.3. Offsite Treatment Facility must:
 - 3.2.3.1. Be an existing offsite facility located in Canada or the United States.
 - 3.2.3.2. Be designed, constructed and operated for the handling or processing of Contaminated Material for the purposes of Treatment.

CONTAMINATED SITES WATER TREATMENT OFFSITE

- 3.2.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the treatment of relevant Contaminated Material.
- 3.2.3.4. Comply with requirements of acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.
- 3.2.4. Treat material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 3.2.5. Water sent to an offsite Treatment Facility must subsequently be discharged in compliance with a Discharge Approval.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Test Pitting will be paid in accordance with unit rate price established for time to excavate a test pit, temporarily stockpile excavated material adjacent to test pit, and backfill with excavated material using machine tamping. Measurement as recorded time by Departmental Representative.
- 1.1.2. Oversize Debris Removal will be paid in accordance with unit rate price established for time to remove oversize material from excavation. Does not include Transport or Disposal of debris. Measurement as recorded time by Departmental Representative.
- 1.1.3. Excavation will be paid in accordance with unit rate price established for volume of material removed to excavate to Contaminated Soil Extents according to Drawings. Includes temporary sloping and shoring design, provision, installation, removal, supervision, and inspection. Includes all onsite handling, loading, hauling, unloading and stockpiling, including hauling to Onsite Soil Treatment Facility as required. Interim Excavation volume as recorded insitu Excavation volume using Progress Survey. Final Excavation volume as recorded insitu Excavation volume using Contractor's Qualified Professional Surveyor, based on difference between Preconstruction Condition Survey and Final Excavation Limits.
- 1.1.4. Measurement as recorded insitu Excavation volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final excavation volume extents (As-Built). Insitu volume is simple dimensions of excavation and does not consider exsitu bulking (expansion or swell) and insitu compaction (densifying) factors.
- 1.1.5. Backfill–Imported will be paid in accordance with unit rate price established per weight for material imported for Backfill for Excavation. Includes Contractor's analytical testing and inspections to demonstrate compliance with Contract, provision, all onsite and offsite handling, loading, hauling, unloading, placing, grading and compacting. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.
- 1.1.6. Backfill–Overburden will be paid in accordance with unit rate price established for volume of Overburden material suitable for reuse as Backfill for Excavation. Includes all onsite handling, loading, hauling, unloading and stockpiling. Measurement as recorded insitu Excavation volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final excavation extents (As-Built). Insitu volume is simple dimensions of excavation and does not consider exsitu bulking (expansion or swell) and insitu compaction (densifying) factors.
- 1.1.7. Backfill–Owner Supplied will be paid in accordance with unit rate price established for volume of material supplied by PWGSC from sources according

CONTAMINATED SITES EXCAVATION

to Contract for Backfill for Excavation. Includes all onsite and offsite handling, loading, hauling, unloading and stockpiling. Measurement as recorded insitu Excavation volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final excavation extents (As-Built). Insitu volume is simple dimensions of excavation and does not consider exsitu bulking (expansion or swell) and insitu compaction (densifying) factors.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Excavation and Backfilling Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Excavation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include:

1.3.1.1. Excavation Temporary Slope and Shoring Design must be signed and sealed by Contractor's Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.

1.3.1.2. Methods, means, and sequences for excavation dewatering and heave protection.

1.3.1.3. Support of structures design.

1.3.1.4. Procedures for excavations adjacent to utilities or other structures if the excavation has the potential to impact utilities or other structures.

1.3.1.5. Backfilling requirements. Meet or exceed requirements in accordance with the Contract and any other codes, bylaws, rules and regulations applicable to the performance of the Work. Backfilling requirements includes Imported Backfill and Owner Supplied Backfill.

1.3.1.6. Backfilling design for utilities or other infrastructure to be reinstated or new.

1.3.1.7. Monitoring and inspection requirements, including frequency or milestones when Contractor's Qualified Professional must inspect Works.

1.3.1.8. Excavation and Backfilling Plan must be signed and sealed by Contractor's Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.

1.3.2. Import Backfill Material Quality: at least 5 Working Days prior to bringing material onsite, Submit documentation signed and sealed by Contractor's Qualified Professional verifying that material is acceptable for import and intended use. Include:

1.3.2.1. Preliminary Site Investigation-Stage 1 performed by Contractor's Qualified Professional for each import source.

1.3.2.2. Grain-size distribution information.

1.3.2.3. Chemical analyses for Potential Contaminants of Concern, including metals.

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- 1.3.2.4. Testing to be performed by Contractor's Qualified Professional at sufficient frequency to characterize all Imported Backfilled. Test using appropriate guidelines and practices.
- 1.3.3. Import Backfill Samples: at least 10 Working Days prior to bringing material to Site, Submit samples of Imported Backfilled.
 - 1.3.3.1. Samples to be representative of all Imported Backfilled. Sample frequency subject to acceptance by Departmental Representative.
 - 1.3.3.2. Submit sufficient sample size to allow geotechnical and environmental quality testing as directed by Departmental Representative.
- 1.3.4. Temporary Hoarding and Fencing: at least 5 Working Days prior to installation, Submit a description of temporary hoarding and fencing.
- 1.3.5. Monitoring and Testing Results: within 5 Working Days of sampling, Submit all monitoring and testing results. Include procedures, frequency of sampling, Quality Assurance and Quality Control testing and documentation to be provided. Provide monitoring and testing results, including any assessments performed by Contractor's Qualified Professional. Include:
 - 1.3.5.1. Backfill testing results, including geotechnical and environmental quality, confirming results meet requirements in Contract and Excavation Plan.
 - 1.3.5.2. Compaction testing results, confirming results meet requirements in Contract and Excavation Plan.

1.4. Sequencing for Free Phase Products

- 1.4.1. When floating free phase substance (NonAqueous Phase Liquids) is present, remove free phase from saturated soil or sediment without further contaminating soil, sediment or groundwater prior to commencing other construction Work.
- 1.4.2. Collect free phase product (NAPL), load, and transport to a Treatment Facility.

2. PART 2 - PRODUCTS

2.1. Materials

- 2.1.1. Short term temporary liners and covers to be a minimum of 4 mil plastic.
- 2.1.2. Erosion and sediment control materials to meet the following minimum requirements:
 - 2.1.2.1. Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebars driven through bale 300 mm to 450 mm into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.
 - 2.1.2.2. Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.

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- 2.1.2.3. Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
- 2.1.2.4. Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.
- 2.1.3. Gradations to be within limits specified when tested to ASTM C117-13 (Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing) and ASTM C136-06 (Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates). Sieve sizes to SCC CAN/CGSB-8.1-88 (Sieves, Testing, Woven Wire, Inch Series) and CAN/CGSB-8.2-M88 (Sieves, Testing, Woven Wire, Metric Series).
- 2.1.4. Import fill materials to meet the following minimum geotechnical requirements:
 - 2.1.4.1. For uplands material: import fill materials must be granular aggregate composed of inert, clean, tough, durable particles of crushed rock, gravel and sand capable of withstanding the deleterious effects of exposure to water, freeze-thaw, handling, spreading and compacting. The aggregate particles must be uniform in quality and free from clay lumps, wood and free from an excess of flat or elongated pieces. Imported backfill total silt and clay content not to exceed 15% by mass or as required by Contract unless otherwise accepted by Departmental Representative.
 - 2.1.4.2. For waterways work: import fill materials must be well graded mixture of clean rounded to sub-rounded gravel and sand less than 50 mm in diameter with minimal silt content (i.e., double washed and polished to remove fine silts and sediments to <2% prior to delivery to site). Clean rounded to sub-rounded gravel and sand backfill can either be natural or premixed to the following gradation limits:

Sieve Size (mm)	% Passing by Mass	
	Lower Limit	Upper Limit
50.0	100	100
37.5	95	100
25.0	86	95
19.0	80	90
9.5	60	75
2.36	15	35
1.18	4	18
0.60	2	11
0.30	0	4
0.15	0	2

- 2.1.5. Import fill materials to meet the following minimum environmental quality requirements for the site:

CONTAMINATED SITES EXCAVATION

- 2.1.5.1. Import fill materials must originate from a clean source, and be the lesser of the Canadian Council of Ministers of the Environment Soil Quality Guidelines for Residential Land Uses, and the British Columbia Contaminated Sites Regulation Schedule 3.1 Urban Park (PL) for the top 3 m and CSR Schedule 3.1 Commercial (CL) below 3 m or as required by Contract unless otherwise accepted by Departmental Representative.
- 2.1.5.2. Import fill material that is cobble sized or larger (> 64mm) brought onsite must be tested by the Contractor for Acid Rock Drainage (ARD) and Metals Leaching (ML) potential using Acid Base Accounting (ABA) for assessment of ARD potential and more specifically using the Modified Sobek Test Method. The potential for metals leaching must use Shake Flask Extraction (SFE) Method for analysis of metals leaching. See guidance document *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials* MEND Report 1.20.1, Natural Resources Canada, Price 2009.
- 2.1.5.3. Any import fill material which has a discrete sample exceeding the environmental quality requirements specified must be removed from the Site and replaced at Contractor's expense, including relevant placed material, as directed by the Departmental Representative. An alternate source of backfill must be provided, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 2.1.5.4. Environmental quality requirements may be modified by the Departmental Representative taking into consideration background concentrations, commercially available material, and site-specific factors and/or land use.
- 2.1.6. Import fill material additional testing:
 - 2.1.6.1. Perform additional testing as directed by the Departmental Representative to confirm suitability.
 - 2.1.6.2. Facilitate testing by the Departmental Representative to confirm suitability.
- 2.1.7. Asphalt, as required, must, at minimum, meet the specifications for: Upper Course #1 mix-type as specified in Section 32 12 16, Hot Mix Asphalt Concrete Paving; of the current version of the *BC Master Municipal Construction Document (2009) Platinum Edition*.

3. PART 3 - EXECUTION

3.1. Examination

- 3.1.1. Site Verification of Conditions:
 - 3.1.1.1. Contractor to determine condition of existing Site and requirements to make the Site suitable for Work.

3.2. Site Preparation and Operation

- 3.2.1. Site Preparation and operation includes construction, operation and maintenance for the duration of the Work,

- 3.2.2. Remove and dispose all surficial Non-Contaminated Quality Soil at a Landfill to allow access for Work.
- 3.2.3. Clearing and grubbing of the Site to allow access for Work.
 - 3.2.3.1. Clearing consists of removing Non-Contaminated Quality Soil vegetation above existing ground surface to facilitate Work. Includes: cutting off trees and brush vegetative growth, felled trees, previously uprooted trees and stumps. Clearing to be conducted under supervision of Contractor's certified arborist. Clearing and grubbing areas for site access anticipated to be approximately 250 – 300 m². Contractor to clearly mark boundaries of clearing and grubbing areas to avoid unnecessary encroachment on areas to be retained. Dispose of Non-Contaminated Quality Soil at a Landfill.
 - 3.2.3.2. Grubbing consists of excavation of Non-Contaminated Quality Soil below existing ground surface to facilitate Work. Includes: stumps, roots, boulders and rock fragments. Dispose of Non-Contaminated Quality Soil at a Landfill.
- 3.2.4. Remove obstructions, ice and snow, from surfaces to be worked.
- 3.2.5. Stripping of Overburden
 - 3.2.5.1. Commence Overburden stripping of areas according to Drawings after stripping of Topsoil.
 - 3.2.5.2. Strip Overburden to depths according to Drawings. Do not mix Overburden with other soils.
 - 3.2.5.3. Stockpile Overburden as directed by Departmental Representative.
 - 3.2.5.4. Segregate and stockpile Topsoil separately from other Overburden.
 - 3.2.5.5. Testing of Overburden may be required if suspected of being Contaminated. Contaminated Overburden will be considered Contaminated Soil.
 - 3.2.5.6. Reuse Overburden as Backfill as directed by Departmental Representative and agreed to by Contractor's Qualified Professional. Dispose of unused Overburden as Non-Contaminated Quality Soil as directed by Departmental Representative.
 - 3.2.5.7. Reuse suitable Topsoil as final grading surface, as accepted by Departmental Representative. Dispose of unsuitable or unused Topsoil as directed by Departmental Representative, and replace with suitable imported topsoil.
- 3.2.6. Security and Safety:
 - 3.2.6.1. Ensure Excavations are secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as required and specified.

3.3. Import Fill Material Characterization

- 3.3.1. Sample, analyse, and compare to Contract requirements all import fill material for each backfill material type and for each import source for grain-size distribution and chemical analyses for Potential Contaminants of Concern at the following frequency:
 - 3.3.1.1. Two random samples for the first 1,000 m³.

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- 3.3.1.2. One random samples for every subsequent (or portion thereof) 1,000 m³ up to 10,000 m³.
- 3.3.1.3. One random samples for every subsequent (or portion thereof) 10,000 m³.
- 3.3.2. Sampling frequency must be increased as directed by the Departmental Representative for each of the following:
 - 3.3.2.1. If the import source does not have a Preliminary Site Investigation-Stage 1 performed by the Contractor's Qualified Professional with no Areas of Potential Environmental Concern. Sample frequency increases to at least 1 random sample for every 500 m³.
 - 3.3.2.2. If any sample collected does not meet requirements according to Contract.
- 3.3.3. Provide two random samples representative of each class and source of imported fill material samples to the Departmental Representative. Samples may be tested for geotechnical and environmental quality by Departmental Representative. Import fill material testing may take up to 5 Working Days not including day of sample provision.
- 3.3.4. Do not import fill material until Departmental Representative has completed and analysed testing. Testing and analysis will depend on parameters. Testing will be performed at industry regular (standard) turnaround times (i.e. not priority, emergency, same day or other rush turnaround times).
- 3.3.5. Departmental Representative will inspect import fill material brought onsite, and will not allow import of fill material that varies from Submittal samples.

3.4. Onsite Access Roads

- 3.4.1. Construct, operate and maintain the onsite access roads as required.
- 3.4.2. Design of temporary onsite access roads to be signed and sealed by Contractor's Qualified Professional.
- 3.4.3. Contractor's Qualified Professional to confirm that the temporary onsite access roads allow for the safe transport of materials and equipment.
- 3.4.4. Construction of the onsite access roads may require the removal of historic infrastructure.
- 3.4.5. Any temporary access, detour and haul roads associated with the project must be constructed to accommodate all required uses and be maintained throughout the course of construction operations in a safe, environmentally sound manner.
- 3.4.6. Location, alignment, design and construction of all detour, access and haul roads subject to the acceptance of the Departmental Representative.
- 3.4.7. Employ suitable measures to maintain quality, visibility, and safe conditions in the use of access, detour and haul roads associated with the Work.

3.5. Excavation Temporary Sloping and Shoring

- 3.5.1. Design, provide, install, remove, supervise, and inspect appropriate sloping or shoring to allow excavation of Contaminated Soil Extents according to Drawings or as directed by Departmental Representative.

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- 3.5.2. Drawings show nominal slopes and excavation limits for volume estimating purposes only and are not for construction. Contractor's Qualified Professional to determine safe and optimal slopes and excavation limits.
- 3.5.3. Design Requirements:
 - 3.5.3.1. Design must be completed by, and is the sole responsibility of, the Contractor's Qualified Professional. All Shop Drawings of sloping and shoring design to be signed and sealed by Contractor's Qualified Professional.
 - 3.5.3.2. Act as sloping or shoring structures for excavations as well as for stability of foundations and infrastructure during remediation excavation.
 - 3.5.3.3. Allow excavation of all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Allow excavation of additional Contaminated Soil beyond Contaminated Soil Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples.
 - 3.5.3.4. Provide a safe working environment for personnel and equipment within the excavation area, including collection of confirmatory samples or other work that may be required at the base of the excavation.
 - 3.5.3.5. Additional design requirements as determined by the Contractor's Qualified Professional.
 - 3.5.3.6. Additional sloping or shoring may be required to extend excavation beyond Contaminated Soil Extents according to Drawings. Revise Temporary Sloping and Shoring design as required by Contractor's Qualified Professional.
 - 3.5.3.7. Temporary shoring cannot have any tiebacks or supports which extend beyond the project Site boundary.
 - 3.5.3.8. Temporary shoring must not flex or bend when exposed while excavations are occurring on the Site.
 - 3.5.3.9. Sloping and shoring structures are temporary structures only. Resistance to seismic loads will be at the sole discretion of the Contractor's Qualified Professional. Be responsible for any failures and resultant costs should the temporary sloping or shoring fail due to a seismic event during the construction period.
 - 3.5.3.10. Temporary sloping and shoring designs to be completed in accordance with methods in current version of Canadian Foundation Engineering Manual.
- 3.5.4. Installation:
 - 3.5.4.1. Installation must be supervised by, and is the sole responsibility of, the Contractor's Qualified Professional. All inspection reports of sloping and shoring to be signed and sealed by Contractor's Qualified Professional.
 - 3.5.4.2. All installation activities must take place on the Site. No staging or construction activities are to take place on adjacent properties.
- 3.5.5. Maintain side slopes of excavations in safe condition by appropriate methods and in accordance with relevant regulations.
- 3.5.6. During backfill operation:

CONTAMINATED SITES EXCAVATION

- 3.5.6.1. Unless otherwise identified according to Drawings or as directed by the Departmental Representative, remove temporary shoring from excavations.
- 3.5.7. Temporary sloping and shoring excavated material:
 - 3.5.7.1. Material excavated for sloping or shoring may be re-used as backfill to replace material removed as accepted by Contractor's Qualified Professional and Departmental Representative.
 - 3.5.7.2. Material excavated for sloping or shoring that is accepted for backfilling must follow procedures in accordance with requirements of Contractor's Qualified Professional and meet Contract Documents.
 - 3.5.7.3. Material excavated for sloping or shoring not accepted must be removed from Site.

3.6. Dewatering and Heave Protection

- 3.6.1. Keep excavations free of water while Work is in progress unless otherwise identified according to Drawings or as directed by the Departmental Representative.
- 3.6.2. Provide to Departmental Representative details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- 3.6.3. Plan for excavation below groundwater table to avoid quick conditions or heave.
- 3.6.4. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- 3.6.5. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- 3.6.6. Keep excavations, staging pads, and other Work areas free from water. Provide standby equipment to ensure continuous operation of dewatering system.
- 3.6.7. Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions. Continuous monitoring of water diversion infrastructure including over night and weekends is required.
- 3.6.8. Separate Contaminated Water from Non-Contaminated Quality Water and collect and divert to Contaminated Water Treatment Plant as required.

3.7. Excavation

- 3.7.1. Notify Departmental Representative at least 5 Working Days in advance of excavation operations.
- 3.7.2. Excavate to lines, grades, elevations and dimensions according to Drawings or as directed by Departmental Representative using methods, means, and sequences as determined by Contractor's Qualified Professional.
- 3.7.3. Excavate all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Excavate additional Contaminated Soil beyond Contaminated Soil Extents in order to result in no

CONTAMINATED SITES EXCAVATION

- residual contamination at the Site based on field observations or Confirmation Samples.
- 3.7.4. Drawings show nominal Contaminated Soil Extents for volume estimating purposes only. Contractor's methods, means, and sequences should allow for variations in actual extents, contaminants, and concentrations.
 - 3.7.5. Excavation must not interfere with bearing capacity of adjacent foundations and infrastructure.
 - 3.7.6. Machine cut banks and slopes.
 - 3.7.7. Protect bottom of excavations from excessive traffic.
 - 3.7.8. Grade excavation top perimeter or implement alternate measures identified by Contractor's Qualified Professional to prevent surface water run-off into excavation.
 - 3.7.9. Keep excavated and stockpiled materials safe distance away from edge of excavation.
 - 3.7.10. Restrict vehicle operations directly adjacent to open excavations.
 - 3.7.11. Remove Oversize Debris.
 - 3.7.11.1. Piles encountered during excavation must be cut off at base of excavation. Piles are not to be extracted beyond the base of the excavation unless otherwise directed by Departmental Representative.
 - 3.7.11.2. Debris that impinges on infrastructure or neighbouring properties is not to be removed unless directed by Departmental Representative. Contractor's Qualified Professional to confirm debris can be removed without impacting infrastructure or neighbouring properties.
 - 3.7.11.3. Reduce size of Oversize Debris to allow to be Transported, Treated, and Disposed, as required, as Non-Contaminated Quality Soil or Contaminated Soil, as appropriate.
 - 3.7.12. Remove Non-Contaminated Quality Soil to Landfill Facility or re-use as Backfill - Owner Supplied according to Contract and as directed by Departmental Representative.
 - 3.7.13. Earth bottoms of excavations to be undisturbed soil or sediment, level, free from loose, soft or organic material.
 - 3.7.14. Notify Departmental Representative when bottom of excavation is reached based on Contaminated Soil Extents.
 - 3.7.15. Provide assistance for collection of Confirmation Samples as directed to the Departmental Representative.
 - 3.7.16. Obtain acceptance by Departmental Representative of completed excavation.
- 3.8. Soil Stockpiling**
- 3.8.1. Stockpile material within work area in locations identified by Departmental Representative.
 - 3.8.2. Provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout.

CONTAMINATED SITES EXCAVATION

- 3.8.3. Segregate Contaminated Soil from Non-Contaminated Quality Soil into separate stockpiles to prevent cross-contamination.
- 3.8.4. Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable cover during periods of Work stoppage including at end of each Working Day and as directed by the Departmental Representative.
- 3.8.5. Securely fasten covers over stockpiled material until material is loaded for offsite transport.
- 3.8.6. Store excavated Non-Contaminated Quality Soil only on non-contaminated surface areas. Ensure no contact between excavated Non-Contaminated Quality Soil and drainage of Contaminated Water or Contaminated Soil.
- 3.8.7. Store excavated Contaminated Soil in temporary stockpiles.
 - 3.8.7.1. Install impermeable liner (eg asphalt or minimum 20 mil (0.5mm) polyethylene) below proposed stockpile locations to prevent contact between stockpile material and ground.
 - 3.8.7.2. Install appropriate containment measures (eg berms or containment cell perimeters) with impermeable liner to collect Contaminated Water generated from stockpiled material.
 - 3.8.7.3. Cover stockpiled material when not being worked or sampled to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material. Cover to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off.
 - 3.8.7.4. Prevent Non-Contaminated Quality Water, including surface runoff water, from coming into contact with Contaminated Soil stockpiles.
 - 3.8.7.5. Separate Contaminated Water from Non-Contaminated Quality Water within stockpile area and collect and divert to Contaminated Water Treatment Plant as required by Contract.
- 3.8.8. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization for Classification as directed by the Departmental Representative.
- 3.8.9. Assist Departmental Representative in collection of stockpile samples for exsitu characterization. Ex-situ characterization may take up to 5 Working Days, not counting the day the sample is collected. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Samples results provided within 5 Working Days, not counting the day the sample is collected.
- 3.8.10. Do not remove Contaminated Soil from stockpiles until exsitu characterization completed and as directed by Departmental Representative.

3.9. Backfill Types and Compaction

- 3.9.1. Use only Imported Backfilled, Overburden Backfill, or Owner Supplied Backfill in accordance with the Contract and which has been recommended by Contractor's Qualified Professional, and previously accepted as a Submittal.

CONTAMINATED SITES EXCAVATION

- 3.9.2. Compact material in accordance with the more stringent of Excavation Plan or Contract to ensure no long term settlement and is suitable for planned post-remediation use. Machine compact all fill materials unless otherwise according to Contract.

3.10. Backfilling

- 3.10.1. Backfill immediately only if required for stability purposes as determined by the Contractor's Qualified Professional.
- 3.10.2. Unless required to backfill immediately, do not proceed with backfilling operations until completion of following:
- 3.10.2.1. Confirmation Samples collection, analysis, and assessment has been completed by the Departmental Representative. Confirmation Samples analysis and assessment may take up to 5 Working Days, not counting the day the sample is collected. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Samples results provided within 5 Working Days, not including day of sample collection.
- 3.10.2.2. Surveying has been completed by the Contractor's Qualified Professional for Final Excavation Limits and As-Built documents, including utilities locations.
- 3.10.2.3. Departmental Representative has inspected and accepted Contaminated Material Extents based on survey data and Confirmation Samples results.
- 3.10.2.4. Departmental Representative has inspected and accepted backfill material.
- 3.10.2.5. Imported fill material brought onsite can be sampled and tested for geotechnical and environmental quality by Departmental Representative. Backfill material testing may take up to 5 Working Days not including day of sample collection.
- 3.10.2.6. Departmental Representative has inspected and accepted compaction results for previous lift.
- 3.10.2.7. Removal of shoring and bracing; backfilling of voids with satisfactory backfill material.
- 3.10.3. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground to greatest extent practicable.
- 3.10.4. Do not use backfill material which is frozen or contains ice, snow or debris to greatest extent practicable.
- 3.10.5. Place backfill material in uniform layers not exceeding 300 mm compacted thickness, or in accordance with the Contract. Compact each layer to the satisfaction of the Contractor's Qualified Professional and in accordance with the Contract before placing succeeding layer. If backfilling is allowed by the Departmental Representative to proceed in the wet (ie underwater), use self-compacting backfill as required by Contractor's Qualified Professional in accordance with Excavation Plan.
- 3.10.6. Backfill compaction to be tested by Contractor's Qualified Professional in accordance with Excavation Plan or as directed by Departmental Representative.

3.10.7. Notify Departmental Representative when final backfill grade is reached.

3.11. Overburden and Owner Supplied Material Backfilling

3.11.1. Place in locations in excavation as directed by Departmental Representative.

3.11.2. Be responsible for compacting to the satisfaction of Contractor's Qualified Professional and in accordance with the Contract.

3.11.2.1. Collect and test samples as required by Contractor's Qualified Professional prior to placement.

3.11.2.2. Identify any geotechnical concerns prior, and obtain Departmental Representative approval to proceed, prior to placement.

END OF SECTION

CONTAMINATED SITES SOIL TRANSPORTATION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Contaminated Material Transport: will be paid in accordance with unit rate price established for weight of material transported. Includes all handling, stabilization/amending, loading, hauling, unloading, transfer, interim storage, and transport to and from intermediate locations and final placement location. Stabilization/amending includes all measures required to prepare material for Transport, Treatment, and Disposal; includes provision and application of stabilizers or other amendments. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Contaminated Sites Transportation Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Transportation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include for each Transfer/Interim Storage Facility:

- 1.3.1.1. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Transfer/Interim Storage of relevant Contaminated Material.
- 1.3.1.2. Letter from Contractor's Qualified Professional that the Transfer/Interim Storage Facility is appropriate for the nature, type, concentration, and quantity of Contaminated Material to be Transferred/Interim Stored in accordance with any authorization and complies with appropriate government requirements of a general nature (eg BC Landfill Criteria).
- 1.3.1.3. Letter from Transfer/Interim Storage Facility that they can accept within the schedule in Contract Documents the nature, type, concentration, and quantity of Contaminated Material to be Transferred/Interim Stored at the Facility, signed by an authorized representative of the Facility.
- 1.3.2. Certificate of Seaworthiness: Prior to barge shipments, Submit a Certificate of Seaworthiness by an independent licensed Marine Surveyor for all marine vessels transporting Contaminated Soil.
- 1.3.3. Transport Manifests: within 5 Working Days of offsite transport, Submit documentation verifying that material has been transported appropriately. Include:
 - 1.3.3.1. Method of transport.

CONTAMINATED SITES SOIL TRANSPORTATION

- 1.3.3.2. Name of transport company.
- 1.3.3.3. Weigh scale receipt including location, date, and weight of loading, as appropriate.
- 1.3.3.4. Weigh scale receipt including location, date, and weight of unloading.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Soil Transport

- 3.1.1. Assume ownership of, and be responsible for, Contaminated Material once it is loaded on a vehicle, barge, or other vessel for transport.
- 3.1.2. Transport material as soon as practical; do not unreasonably stockpile onsite.
- 3.1.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leaching from material.
- 3.1.4. All vehicles must be watertight. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.
- 3.1.5. Stabilize material for transport as necessary.
- 3.1.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Material.
- 3.1.7. Barges must be certified by an independent Marine Surveyor for stability.
- 3.1.8. Manifest and correlate quantities of all Contaminated Material transported from Site documenting nature, type, concentration, and quantity removed from Site. Include all Transfer/Interim Storage, Treatment, and Disposal Facilities. Discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
 - 3.1.8.1. No manifest or an incomplete manifest.
 - 3.1.8.2. Material transported does not match the description in the manifest.
 - 3.1.8.3. Amount transported differs by more than 5% in the manifest.
 - 3.1.8.4. Material transported is in a hazardous condition.
- 3.1.9. Transfer/Interim Storage Facility must:
 - 3.1.9.1. Be an existing offsite facility located in Canada or the United States.
 - 3.1.9.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.
 - 3.1.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the transfer or interim storage of relevant Contaminated Material.

CONTAMINATED SITES SOIL TRANSPORTATION

- 3.1.9.4. Comply with requirements of acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.

END OF SECTION

CONTAMINATED SITES SOIL DISPOSAL

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Contaminated Soil Disposal will be paid in accordance with unit rate price established for weight of material disposed. Includes Treatment or any other processing of material not required by the Contract but required by Regulations, Disposal Facility, or for other reasons. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Contaminated Sites Disposal Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Disposal for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include for each Disposal Facility:
- 1.3.1.1. Letter from Contractor's Qualified Professional that the Disposal Facility is: appropriate for the nature, type, concentration, and quantity of Contaminated Material to be Disposed in accordance with any authorization; complies with appropriate government requirements of a general nature (eg BC Landfill Criteria); and meets the Disposal Facility Minimum Criteria.
- 1.3.1.2. Letter from Disposal Facility that they can accept within the schedule in Contract Documents the nature, type, concentration, and quantity of Contaminated Material to be Disposed at the Facility, signed by an authorized representative of the Facility.
- 1.3.1.3. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Material.
- 1.3.2. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, Submit documentation verifying that materials have been disposed by Contractor. Include:
- 1.3.2.1. Issued by the Disposal Facility.
- 1.3.2.2. On company letterhead.
- 1.3.2.3. Name and location of facility where the material is being disposed.
- 1.3.2.4. Date and weight for each shipment received and total weight received at the Disposal Facility.
- 1.3.2.5. Identification of acceptance of final ownership of material.
- 1.3.2.6. Signed by identified authorized disposal company representative.

CONTAMINATED SITES SOIL DISPOSAL

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Material Disposal

- 3.1.1. Assume ownership of, and be responsible for, Contaminated Material disposed.
- 3.1.2. Contaminated Material Disposal: dispose all Contaminated Soil, including onsite or offsite treated Contaminated Material that may no longer be contaminated, at Disposal Facility provided by Contractor and accepted by the Departmental Representative.
- 3.1.3. Disposal Facility must:
 - 3.1.3.1. Be an existing offsite facility located in Canada or the United States.
 - 3.1.3.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.
 - 3.1.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Material.
 - 3.1.3.4. Comply with requirements of acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.
- 3.1.4. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 3.1.5. Material sent to a Disposal Facility must be permanently stored at that facility.
- 3.1.6. If proposed Disposal Facility is not acceptable to Departmental Representative, provide an alternate Disposal Facility that is acceptable.

3.2. Disposal Facility Minimum Criteria

- 3.2.1. Designed, inspected, and monitored by a Qualified Professional.
- 3.2.2. Closure Plan prepared by a Qualified Professional.

END OF SECTION

ANNEX A
Water Management Information

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007

ANNEX A
WATER MANAGEMENT INFORMATION
R.087575.005 KÉL,SET (Reay) Creek Pond Remediation Project

Introduction

This document provides information relevant for development of the water management plan for the KÉL,SET (Reay) Creek Pond Remediation Project. This information can be used to direct development of a Water Management Plan to be prepared by the Contractor's Qualified Professional for approval by the Departmental Representative. KÉL,SET (Reay) Creek provides important habitat for coho salmon and resident cutthroat trout and flows through a public park. The top priority within the water management plan will be to isolate the work areas within the KÉL,SET (Reay) Creek Pond and maintain the rate and quality of creek flows downstream of the worksite to protect the environment and public health. Construction Drawings provide an overview of the KÉL,SET (Reay) Creek Pond and the surrounding areas and includes information on drainage pipes and structures around the pond and location and size of sewers in the area. All infrastructure components to be confirmed by the Contractor.

KÉL,SET (Reay) Creek flows upstream of the pond will need to be diverted around the site during construction to maintain a dewatered site and to maintain clean baseflows downstream to protect habitat. Several storm drain outlets that enter the pond may also need to be diverted or controlled. Seepage water within the pond during excavation of sediments may need to be treated prior to discharging to a local sewer line or downstream if approved.

Prior to removing contaminated sediments, the pond will need to be drained and dewatered in order to ensure that contaminated sediments are not transported downstream of the KÉL,SET (Reay) Creek Dam. The quality and volume of discharge while dewatering the pond may be restricted by the Capital Regional District (CRD) Bylaw 2922 - Consolidated Capital Regional District Sewer Use Bylaw No. 5, 2001 and the Town of Sidney. The maximum rate of waste discharged to sewer is controlled by the Town of Sidney. The successful contractor will be required to obtain the appropriate permits/approvals from both the CRD and Town of Sidney and pay all associated fees.

The Victoria Airport Authority (VAA), who manage the majority of the watershed upstream of the KÉL,SET (Reay) Creek Pond, will provide access to their stormwater detention pond (located on KÉL,SET (Reay) Creek upstream of the KÉL,SET (Reay) Creek Pond site) for the purpose of water management.

The Contractor may use existing water control facilities (sluice gates) and Reay Creek Detention Pond located on Victoria Airport Land for purposes of controlling high flow events to assist in water diversion activities around the work site. Sluice gates to be operated by Victoria Airport Authority personnel only. Contractor to coordinate with Departmental Representative and provide 24 hours notice of the need to operate water control facilities. Should the Contractor choose, existing Reay Creek Detention Pond may be used by Contractor to temporarily store retained runoff water during high flow events to help reduce peak flow. Downstream weir of Reay Creek Detention Pond adjacent to Norseman Road may be used to assist in controlling discharge rate during high flows for temporary retention in the detention pond.

Water Management Plan Requirements

The Contractor will be required to prepare a Water Management Plan which will describe the measures that will be taken to control the rate and quality of water both around and on site. The Contractor shall retain a qualified professional(s) with a background in hydrology, hydraulics and water treatment to assist in preparation of the plan. The plan shall include the following:

a) Water Management Drawing

A drawing showing diversion points and the methods to be used including flowrates, pipe/hose locations and sizes, pump locations and sizes and water quality treatment facilities locations and capacities.

b) Stormwater Management Plan

The Water Management Plan shall outline how creek, pond and stormwater discharges will be managed during construction including:

- A written diversion scheme for water to be bypassed around the site including storm flows. Maintain 100% of downstream flows and prevent dewatering of downstream habitat. Include details of downstream discharge areas, erosion and sedimentation controls including dissipation devices at the discharge point and in downstream creek areas, control of warm water surge associated with water diversion, and measures to avoid fish stranding and displacement. Cofferdams (if applicable) shall be lined to prevent erosion and leaking. Use only materials free of silt or other fine sediment. Unlined or uncontained earthen berms should not be used for cofferdams.
- A written dewatering plan outlining the method and rate of flow for dewatering of the pond prior to excavation of sediments which identifies discharge locations, time of day and flowrates.
- A written seepage water treatment plan outlining the flow rate, method and discharge rates and timing during the day of discharge. Seepage water collection, treatment and discharge at the stockpile management area shall also be included.
- A written water sampling and testing program prepared by the Contractor's qualified professional including frequency, laboratory turn-around-times, and analytical parameters.
- Any additional permits or permissions required from different agencies to be obtained by the Contractor.

c) Monitoring

The Contractor will be fully responsible for monitoring weather forecasts and preparing for storms if they occur. Contractor should be in regular contact with the project Environmental Monitor and Departmental Representative to verify that measures to be taken are appropriate.

Water diversion measures shall be monitored continuously, including during overnight and weekends, to ensure downstream flows are not interrupted and that water diversion infrastructure is working as intended. Describe procedures for immediately correcting any deficiencies or malfunctions observed.

Quality of water diversion and discharges, including but not limited to contaminants of concern, turbidity, temperature, and erosion and sedimentation considerations, is to be monitored by the contractor's qualified professional for the duration of the project.

d) Emergency/Contingency Plan

An emergency/contingency plan for high rainfall/flow events that identifies how weather will be monitored, measures to be taken, and how communications will take place during summer storm events. Transport of contaminated sediments downstream of the pond during construction as a result of storm events is not acceptable and in contravention of project permits and provincial and federal legislation and regulations. Therefore, robust contingency plans must be established, documented and implemented.

Additional materials and supplies shall be maintained at the site in the event that mitigation measures implemented for the project are not successful or in the event of equipment malfunction. Additional stand-by pumps, pipes, hoses, flow isolation materials, sedimentation and erosion control materials and fish salvage equipment shall be maintained at the site.

e) Waste Discharge

Discharge downstream to the creek is regulated under the Water Sustainability Act and BC Ambient Water Quality Guidelines issued by the BC Ministry of Environment and Climate Change Strategy (ENV). Discharge to sewer is regulated by the CRD Sewer Use Bylaw for quality and volume and permitted by the Town of Sidney for discharge rate and location. The sanitary sewer to the north of the pond along Westbrook Drive is available for discharge at a maximum rate of 8 l/s during dry weather. Waste discharge will not be permitted during wet weather as determined by the Departmental Representative.

Dewatering water will need to be tested by an accredited analytical laboratory and suitability for discharge is to be assessed by the Contractor's qualified professional to ensure it meets discharge regulations, whether being discharged to a natural water body, a storm drain or the sanitary sewer. Treatment of the dewatering water may be needed prior to discharge in order to meet the requirements of the discharge regulations, applicable permits, and approval from the Departmental Representative.

Following dewatering activities, seepage flows of contaminated sediments during excavation will also need to be tested, possibly treated and then discharged. The Contractor will be responsible to obtain and pay fees for the necessary discharge permits from the CRD and will also need to confirm approval from the Town of Sidney regarding the location(s), timing during the day and rate of discharge to the local sewers. Details of CRD sewer discharge permit application requirements are outlined within applicable sections of CRD Bylaw No. 2922. Schedule "C" of the bylaw is appended for guidance on waste discharge permit application requirements. Contractor is responsible for providing all necessary information to CRD as required by Bylaw No. 2922 to expedite the permitting process.

f) Water Treatment

The location of the seepage water treatment equipment will be identified by the Contractor with approval of the Departmental Representative. The Water Management Plan will identify the capacity and design and operating criteria of the facility.

g) Re-Flooding of Pond

Describe methods for reintroducing creek flows to the pond following remedial and restoration activities. Creek flows are to be gradually reintroduced to pond areas while maintaining water diversion infrastructure. Describe sedimentation and erosion control measures to be implemented and monitoring procedures to be followed. Downstream flows are to be maintained during pond re-filling to avoid dewatering of downstream habitat.

Available Data

The following hydrology data are available for the Contractor to develop a water management scheme:

Upstream end of existing 1200 x 2000 box culvert crossing of Canora Road

- 10-year return period, 6-hour duration summer peak instantaneous flow is approximately 1.19 m³/s
- The estimated storm volume is 15,000 m³ to the inlet of the pond.

Downstream End of Pond at Dam Spillway

- 10-year return period, 6-hour duration summer peak instantaneous flow is approximately 1.25 m³/s
- The estimated storm volume is 16,400 m³ to the outlet of the pond.
- The approximate Victoria Airport Detention Pond Volume is 5,000 m³.
- The baseflow rate to the inlet of the pond is estimated to be about 5 l/s.

Hydrometric Data

Continuous flow record collected from upstream of the site on KÉL,SET (Reay) Creek (Figure 1) is available for portion of 2019 (Figure 2) 2017 and 2018 (Figure 3) are appended.

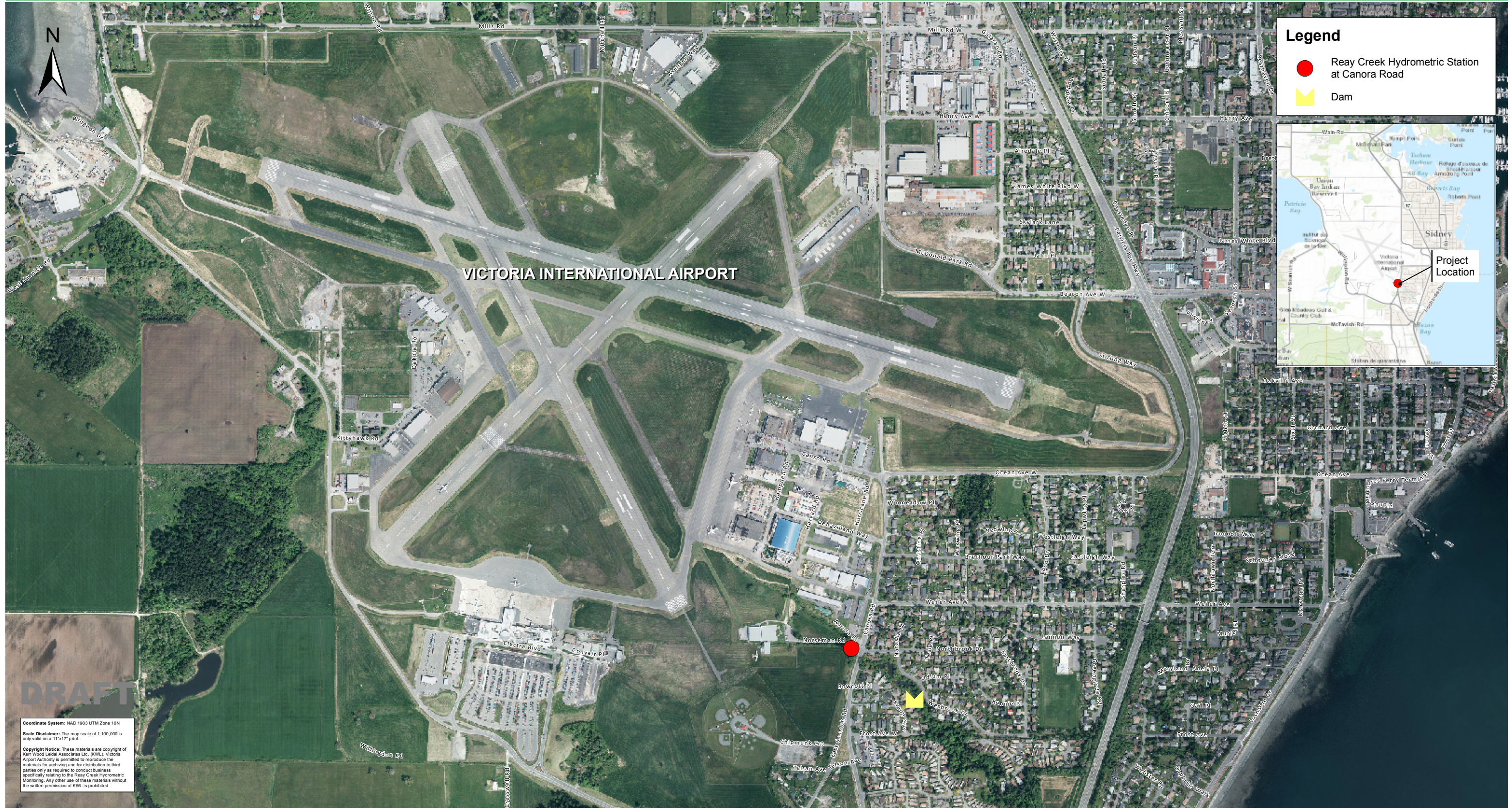
Enclosures:

Figure 1: Reay Creek Hydrometric Station – Site Map

Figure 2: SDR for Reay Creek Hydrometric Station (2019-02-20 to 2019-07-01)

Figure 3: SDR for Reay Creek Hydrometric Station (2017-11-15 to 2018-11-30)

CRD Bylaw No. 2922 Schedule “C” – Waste Discharge Permit Application Information Sheet



Project No. 2083.024
Date January 2018
Scale 1:10,000

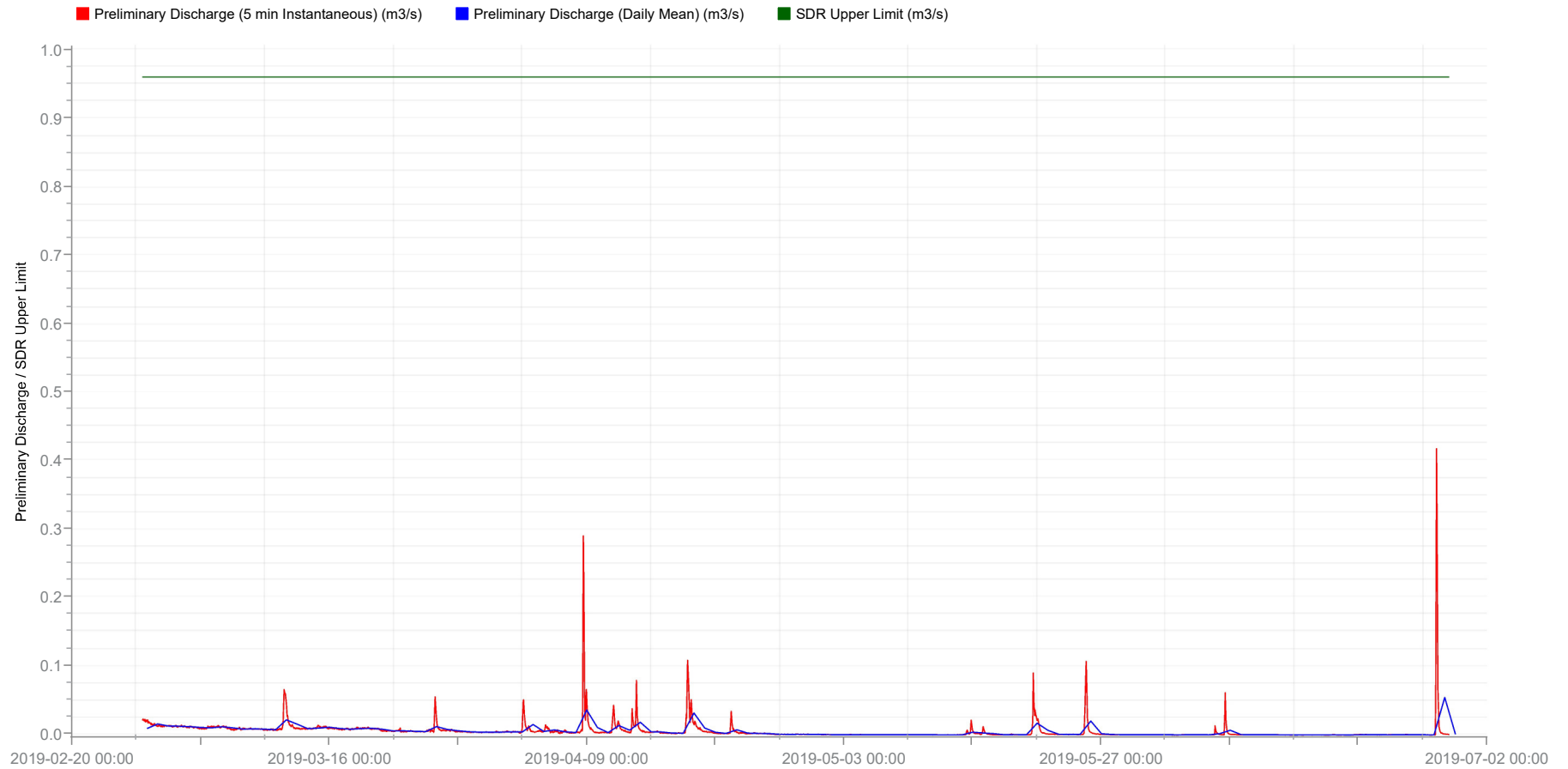
Reay Creek Hydrometric Station - Site Map

Figure 1

Reay Creek at Canora Road

Start Date: 2019-02-20 00:00

End Date: 2019-07-01 23:59

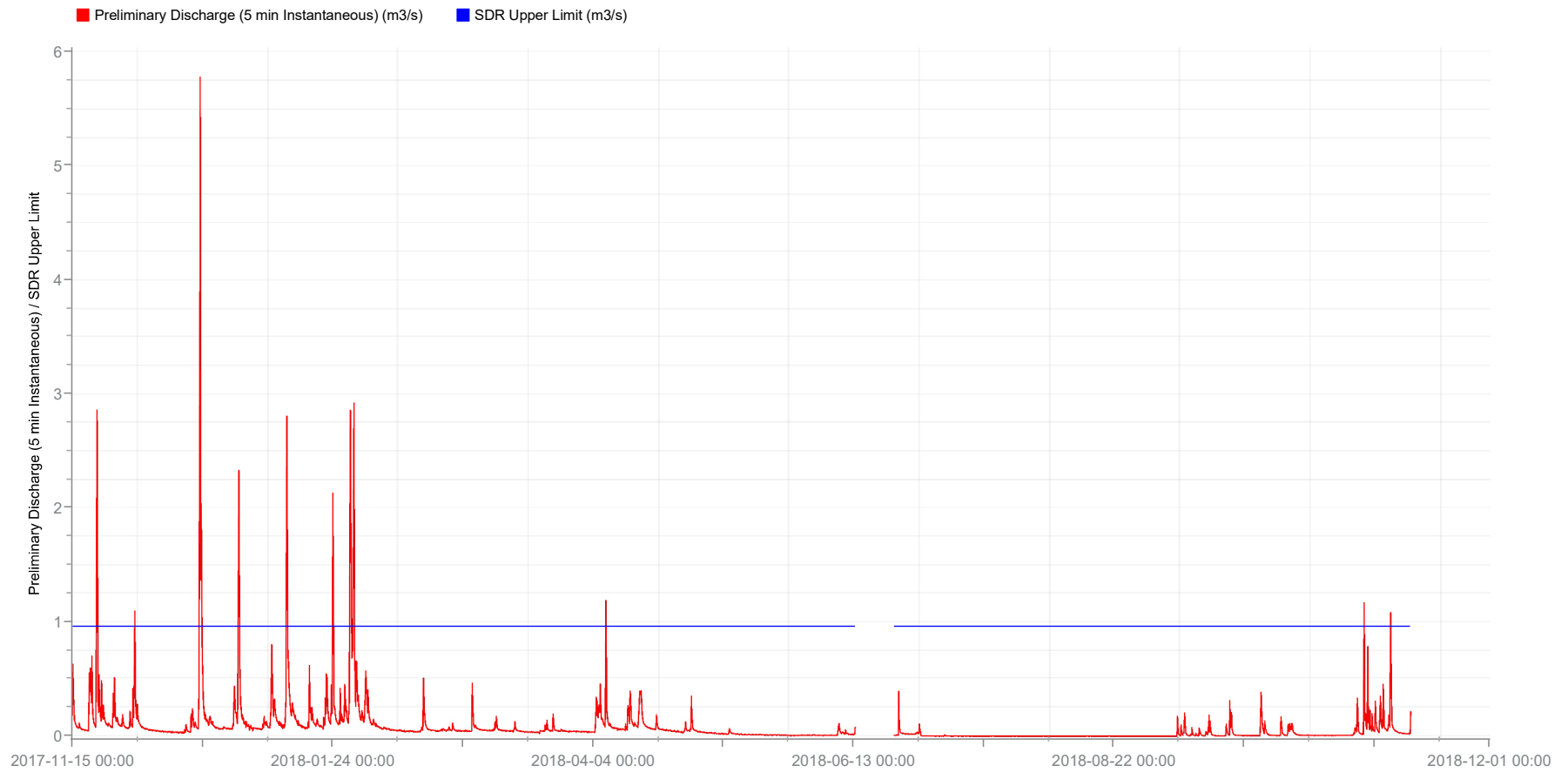


SDR for Reay Creek Hydrometric Station

Figure 2

Reay Creek at Canora Road

Start Date: 2017-11-15 00:00
End Date: 2018-11-30 23:59



Reay Creek Hydrograph - 5 Min Instantaneous

Figure 3

SCHEDULE "C"
INFORMATION SHEET
WASTE DISCHARGE PERMIT APPLICATION
BYLAW NO. 2922

This information sheet is provided to assist you in the preparation and submission of an application for a waste discharge permit under the Capital Regional District's (CRD) Sewer Use Bylaw No. 2922. Once the form has been completed, **initial each page and sign the declaration on page 10**. To assist CRD Environmental Services with the processing of the application, please make an accurate, readable and complete submission to the address provided below.

A. APPLICATION FORMS

1. COMPANY INFORMATION

Indicate the company name, incorporation number, type of business and location of the business. If your business or organization has more than one site address, please copy this form and complete a separate application for each site.

2. SUMMARY OF EFFLUENT DISCHARGE CHARACTERISTICS

Complete this section to indicate discharge duration, volume and quality.

3. NUMBER OF CONNECTIONS

List the number and type of connections to sewer.

4. SOURCES OF WASTEWATER

Where non-domestic waste is being discharged to sanitary sewer or storm sewer, list any pre-treatment works and the actual source of the wastewater.

5. SITE PLAN

A site plan must be submitted. Clearly mark the plant boundary, buildings and approximate locations of new and existing works, monitoring points and sewer connections.

6. DECLARATION FORM

The application form must be signed. Please ensure that the first box in the Declaration Section is complete. An application may be filed by an agent of the applicant and, unless the sewage control manager deems otherwise, an obligation imposed by this bylaw on an applicant may be carried out by his agent. If you wish to appoint an agent, please complete the appropriate box in the Declaration Section.

Initials _____

B. ADDITIONAL INFORMATION

1. Specifications and drawings of process equipment and control works associated with the discharge should be submitted to assist the CRD Environmental Services department with the evaluation of the application. The sewage control manager may request submission of additional details relevant to the application. Should additional application forms be required, they may be obtained from:

Sewage Control Manager
Environmental Services Department
Capital Regional District
P.O. Box 1000, 625 Fisgard Street
Victoria, BC V8W 2S6

(Bylaw 3350)

2. In the event of accidental discharge of a prohibited or restricted waste to a sewer (as required under Sections 2.8(b) and 7.1(a) of this bylaw), please call:

Regional Source Control Program
24 Hour Telephone Number
(250) 360-3248

Initials _____

Scientific Programs, CRD Environmental Services Department, Telephone (250) 360-3256, Facsimile (250) 360-3254 (Bylaw 3350)

APPLICATION FOR A WASTE DISCHARGE PERMIT

Application for New Permit Application to Amend Permit No. _____

Application for a WASTE DISCHARGE PERMIT under the Capital Regional District (CRD) Sewer Use Bylaw No. 2922. This application is to be filed with the sewage control manager, at the address on page 2, not less than 90 days prior to the date for which a permit is required.

1. I, _____
(Full name-if a company, British Columbia Registered Name)

Registered Address: _____

Incorporation Number: _____

hereby apply for a WASTE DISCHARGE PERMIT to discharge non-domestic waste into sanitary sewer from a:

_____ (Type of Business)

Located at: _____

2. Summary of Wastewater Discharge Characteristics

Maximum Duration of Operation: (hours/day) _____
(days/week) _____
(weeks/year) _____

Flow

Is the Discharge greater than 300 m³ in a 30-day period?: () yes () no

Is the Discharge greater than 10 m³ in a 24-hour period?: () yes () no

Frequency

Maximum discharge flow rate: _____ (m³/day)

Average daily discharge flow rate: _____ (m³/day)

Method of flow rate determination: _____

() measured () estimated

(Note: 1m³ = 220 Imperial gallons, or 264 U.S. gallons)

Initials _____

Type of Discharge

continuous batch both

Quality

Use the check boxes to indicate whether any of the following types of wastes are discharged:

Flammable or explosive waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Obstructive waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Air contaminant waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
High temperature waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Corrosive waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Biomedical waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Food waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Radioactive waste	<input type="checkbox"/> yes	<input type="checkbox"/> no
Seawater	<input type="checkbox"/> yes	<input type="checkbox"/> no

Hazardous Waste

Does any process within the plant produce special waste as defined under the Hazardous Waste Regulation of the Environmental Management Act. *(Bylaw 3350)*

yes no don't know

Wastewater Characteristics

In the space provided below, check the appropriate box for each wastewater contaminant to dictate whether the contaminant listed is "known to be present", "suspected to be present", "suspected to be absent", or "known to be absent" in the wastewater discharge.

If a contaminant is "known to be present" or "suspected to be present", estimate the expected average and maximum daily contaminant concentrations in the spaces provided.

If wastewater discharges have been sampled and analyzed in the past, please attach examples of sampling data.

Initials _____

Wastewater Contaminants	Known to be present	Suspected to be present	Suspected to be absent	Known to be absent	Expected Concentration mg/L (ppm)	
					Average	Maximum
<u>Conventional Contaminants</u>						
Ammonia	()	()	()	()	_____	_____
Biochemical Oxygen Demand (BOD)	()	()	()	()	_____	_____
Chemical Oxygen Demand (COD)	()	()	()	()	_____	_____
Suspended Solids	()	()	()	()	_____	_____
Oil and Grease (total)	()	()	()	()	_____	_____
pH max___ min ___	()	()	()	()	_____	_____
<u>Organic Contaminants</u>						
Oil and Grease (hydrocarbons)	()	()	()	()	_____	_____
Phenols (total)	()	()	()	()	_____	_____
Phenols (chlorinated)	()	()	()	()	_____	_____
Polynuclear Aromatic Hydrocarbons (PAH)	()	()	()	()	_____	_____
PCBs	()	()	()	()	_____	_____
Pesticides	()	()	()	()	_____	_____
Tetrachloroethylene	()	()	()	()	_____	_____
Organo-tin compounds	()	()	()	()	_____	_____
Benzene	()	()	()	()	_____	_____
Ethylbenzene	()	()	()	()	_____	_____
Toluene	()	()	()	()	_____	_____
Xylenes	()	()	()	()	_____	_____
Solvents (specify)	()	()	()	()	_____	_____

Initials _____
(Bylaw 3350)

Wastewater Contaminants	Known to be present	Suspected to be present	Suspected to be absent	Known to be absent	Expected Concentration mg/L (ppm)	
					Average	Maximum
<u>Inorganic Contaminants</u>						
Arsenic	()	()	()	()	_____	_____
Cadmium	()	()	()	()	_____	_____
Chloride	()	()	()	()	_____	_____
Chromium	()	()	()	()	_____	_____
Cobalt	()	()	()	()	_____	_____
Copper	()	()	()	()	_____	_____
Cyanide	()	()	()	()	_____	_____
Iron	()	()	()	()	_____	_____
Lead	()	()	()	()	_____	_____
Manganese	()	()	()	()	_____	_____
Mercury	()	()	()	()	_____	_____
Molybdenum	()	()	()	()	_____	_____
Nickel	()	()	()	()	_____	_____
Selenium	()	()	()	()	_____	_____
Silver	()	()	()	()	_____	_____
Sulphate	()	()	()	()	_____	_____
Sulphide	()	()	()	()	_____	_____
Zinc	()	()	()	()	_____	_____
Other	()	()	()	()	_____	_____

Initials _____

3. Number of Connections to Sewer

(a) Sanitary Sewer

Domestic waste only _____

Non-domestic waste only _____

Combined domestic and non-domestic waste _____

(Note connection locations on attached site plan.)

Is stormwater discharged to sanitary sewer? yes () volume _____ m³/day
no ()

Is uncontaminated water discharged to sanitary sewer? yes () volume _____ m³/day
no ()

(Note connection locations on attached site plan.)

(b) Storm Sewer

Stormwater only _____

Uncontaminated water only _____

Combined stormwater and uncontaminated water _____

(Note connection locations on attached site plan.)

Is domestic waste discharged to storm sewer? yes () volume _____ m³/day
no ()

(Note connection location on attached site plan.)

Is non-domestic waste discharged to storm sewer? yes () volume _____ m³/day
no ()

Initials _____

4. Sources of Wastewater Discharge to Sewer

(Note location of sources and control works on attached site plan.)

SOURCE OF WASTEWATER (e.g., galvanizing line rinse tank)	CONTROL WORKS TREATING EACH SOURCE PRIOR TO DISCHARGE TO SEWER* (e.g., Trade Waste Interceptor)
---	---

(a) **Sanitary Sewer**

(b) **Storm Sewer**

*Control Works include: small drainage, oil/water separators, grease traps, filters, reverse osmosis units, ion exchange units, neutralization facilities and other wastewater pre-treatment works.

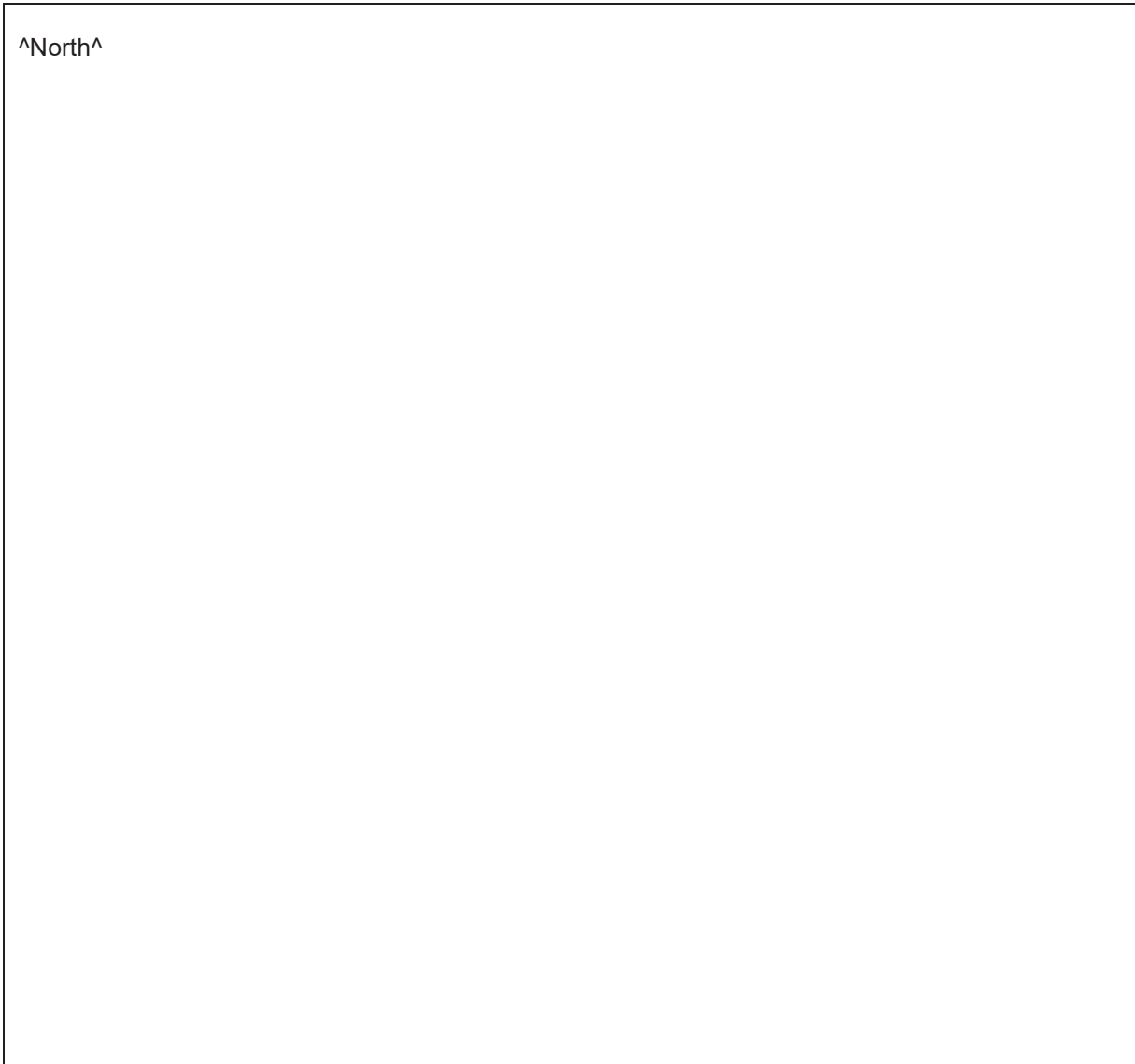
Initials _____

5. Site Plan

Sketch a site plan in the area provided below or attach a site plan to this application form. The plan shall include property lines, buildings, pre-treatment works, effluent lines, sanitary and storm sewer connections, flow measuring devices and monitoring points (or available sampling locations).

(Include approximate scale on site plan.)

^North^



Initials _____

6. Declaration

I, _____, declare that the information given on this application form is correct to the best of my knowledge.

_____ (Date) _____ (Signature of Applicant or Agent)

_____ (Title) _____ (Phone Number)

If you elect to appoint an Agent, please complete the following:

I, _____ (Print Name) _____ (Title)

_____ (Signature)

hereby authorize _____ (Print Name) _____ (Affiliation)

to deal with you directly on all aspects of the subject application.

The collection of this information is authorized under the Capital Regional District Sewer Use Bylaw and Sections 29 and 30 of the Environmental Management Act and will be used for the purpose of administration, including enforcement, of the Sewer Use Bylaw and orders made pursuant to the Environmental Management Act. *(Bylaw 3350)*

Enquiries about the collection or use of information in this form can be directed to the Freedom of Information and Protection of Privacy Contact: (250) 360-3089. *(Bylaw 3016)*

Initials _____

ANNEX B
Tree Removal and Retention Information

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007

ANNEX B

TREE REMOVAL AND RETENTION INFORMATION

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation Project

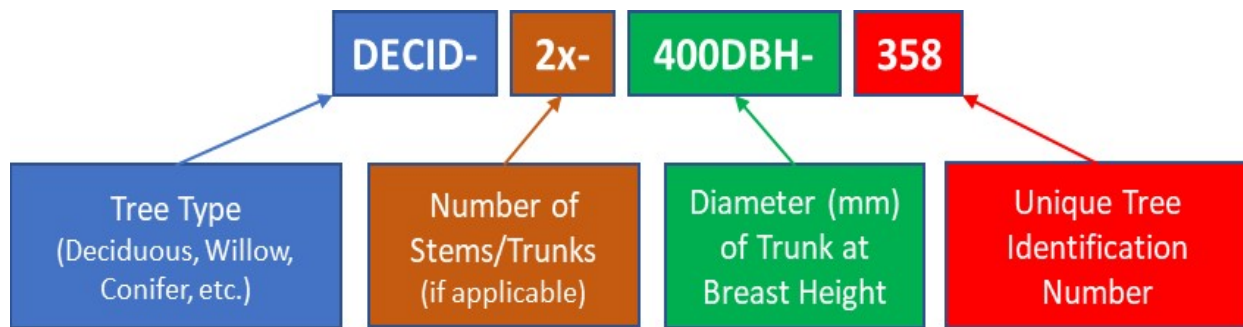
Designated Trees include the following whether or not they are identified on Drawings and/or tagged or flagged at the Site:

All trees that have a diameter at breast height of 30 cm or more; and

Arbutus (*Arbutus menziesii*), Dogwood (*Cornus Nuttallii*) and Garry Oak (*Quercus garryana*) trees that have a diameter at breast height of 15 cm or more.

Prior to any tree removal, cutting or pruning; the Contractor will retain a Certified Arborist to conduct a Hazard Tree Assessment and to review trees and other vegetation at the Site that may require removal, cutting or pruning to complete the Work.

Tree Identification Codes



Tree Retention, Removal, Cutting and Pruning Requirements:

1. *East side of Canora Road:*

Remove trees adjacent to west extent of Pond. Cut at stump to maximum height of 50 cm above ground surface. Retain root systems for bank stabilization. Coordinate tree removal with BC Hydro and other utility authorities as applicable for potential interaction with overhead lines and utilities. Tree removal to include the following:

#354	Remove. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.
#251	Remove. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.
#358	Remove. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.
#408	Remove. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.
#070	Remove. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.

2. *Trees at Pond margin adjacent to 2011 Northbrook Drive:*

Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary. Retain conifer trees unless removal is absolutely necessary as determined by Contractor's certified arborist and geotechnical engineer. Tree assessment to include the following:

#301	Remove or prune as per Contractor's certified arborist recommendation. Grub stump and roots up to property line if removed.
#302	Remove or prune as per Contractor's certified arborist recommendation. Grub stump and roots up to property line if removed.
#394	Remove or prune as per Contractor's certified arborist recommendation. Grub stump and roots up to property line if removed.
#375	Retain.
#269	Remove as necessary to complete work. Grub stump and roots up to property line.
#400	Retain.
#303	Retain if possible.

3. *Trees within Town of Sidney Park space along North bank of Pond:*

Designated trees to be retained where possible unless indicated on Drawings or below. Remove, cut or prune trees as recommended by Contractor's certified arborist and geotechnical engineer to complete remedial works. Where required, remove contaminated sediment by hand or alternate non-destructive method to protect roots of retained trees. Designated trees along Contractor selected access routes may require removal. Access routes to be selected to limit tree clearing requirements to extent practicable. Preference should be to prune trees for access to remedial areas over removal. Individual tree requirements include the following:

#207	Remove rotting willow tree. Cut at stump to maximum height of 50 cm above ground surface. Retain root system.
#382	Remove rotting tree and grub stump and roots.
#276	Contractor's certified arborist to determine removal, cutting or pruning requirements.
#423	Prune as necessary for access to remedial areas.
#310	Prune or remove tree as necessary for access to remedial areas. Cut stump to maximum height of 50 cm above ground surface. Retain root system where possible. Hand dig sediments from around root system.
#318	Remove tree as necessary for access to remedial areas. Grub stump and roots.
#304	Contractor's certified arborist to determine removal, cutting or pruning requirements.
#385	Retain.
#243	Remove as necessary for access to remedial areas. Grub stump and roots.
#360	Retain. Hand dig sediments from around root system.
#386	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#076	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#284	Contractor's certified arborist to determine removal, cutting or pruning requirements.

#232	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches) or for site access if required.
#377	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches) or for site access if required.
#404	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches) or for site access if required.
#250	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches) or for site access if required.
#440	Retain.
#441	Retain.
#442	Retain.
#444	Retain.
#445	Retain.
#446	Retain.
#454	Retain.
#455	Retain.
#456	Retain.

4. *Trees at Pond margin adjacent to 9487 Canora Road:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#421	Retain. Remove ivy from tree.
#405	Retain. Remove sediments from around roots by hand or alternate non-destructive method.
#406	Remove tree. Grub stump and roots up to property line.
#369	Retain.

5. *Trees at Pond margin adjacent to 2018 Bowcott Place:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#305	Remove or prune as per Contractor's certified arborist recommendation. Grub stump and roots up to property line if removed.
#390	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#391	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.

6. *Trees at Pond margin adjacent to 2022 Bowcott Place:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#392	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches).
#417	Retain. Prune as necessary as per Contractor's certified arborist recommendation for access to remedial extent (overhanging branches).
#381	Retain.
#306	Remove or prune as per Contractor's certified arborist recommendation for access to remedial extents. Cut at stump to maximum height of 50 cm above ground surface. Retain root system if removed.
#307	Remove or prune as per Contractor's certified arborist recommendation for access to remedial extents. Cut at stump to maximum height of 50 cm above ground surface. Retain root system if removed.
#308	Remove or prune as per Contractor's certified arborist recommendation for access to remedial extents. Cut at stump to maximum height of 50 cm above ground surface. Retain root system if removed.

7. *Trees at Pond margin adjacent to 2026 Bowcott Place:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#309	Remove or prune as per Contractor's certified arborist recommendation for access to remedial extents. Cut at stump to maximum height of 50 cm above ground surface. Retain root system if removed.
------	--

8. *Trees at Pond margin adjacent to 9462 Braun Crescent:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#288	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#275	Remove or prune as per Contractor's certified arborist recommendation. Grub stump and roots up to property line if removed.

9. *Trees at Pond margin adjacent to 9461 Braun Crescent:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#389	Remove or prune as per Contractor's certified arborist recommendation for access to remedial extents. If retained, hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#393	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#401	Retain. Hand dig sediments from around root system. Limit pruning of lower limbs for access to remedial extents as required as per Contractor's certified arborist recommendation.
#399	Remove tree. Grub stump and roots up to property line.
#353	Remove tree. Grub stump and roots up to property line.
#338	Remove tree. Grub stump and roots up to property line.

10. *Trees at Pond margin adjacent to 9459 Braun Crescent:*

Retain trees unless specified below or on Drawings. Remove trees only as required to complete remedial work. Contractor's certified arborist and geotechnical engineer to determine removal and pruning requirements. Where possible, limit to cutting and pruning rather than removal. Stumps and roots to be grubbed up to property line where tree removal is necessary unless specified below or on Drawings. Tree removal and retention requirements include the following:

#451	Retain.
#452	Retain.
#453	Retain.

ANNEX C
Site Photographs

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007



Photo 1: KÉL,SET (Reay) Creek Pond Dam, looking southwest.



Photo 2: KÉL,SET (Reay) Creek Pond Dam and the spillway, looking southwest.



KÉL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 3: KÉL,SET (Reay) Creek Pond Dam, looking northeast from a residential property.



Photo 4: View of potential water diversion discharge area within KÉL,SET (Reay) Creek downstream of dam, looking south.



KÉL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 5: View of lower KEL,SET (Reay) Creek Pond and typical overhanging riparian vegetation, looking northwest from the dam.



Photo 6: Overhanging willow trees along south portion of lower KEL,SET (Reay) Creek Pond adjacent to private property, looking east.



KEL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 7: Concrete retaining wall at property line along south boundary of lower KEL,SET (Reay) Creek Pond, looking east.



Photo 8: View of residential properties along the western perimeter of lower section of KEL,SET (Reay) Creek Pond, looking southwest.



KEL,SET (Reay) Creek Pond Remediation Project
 Transport Canada
 Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 9: Typical view of lower mid-section of KÉL,SET (Reay) Creek Pond in Fall 2019, looking west.

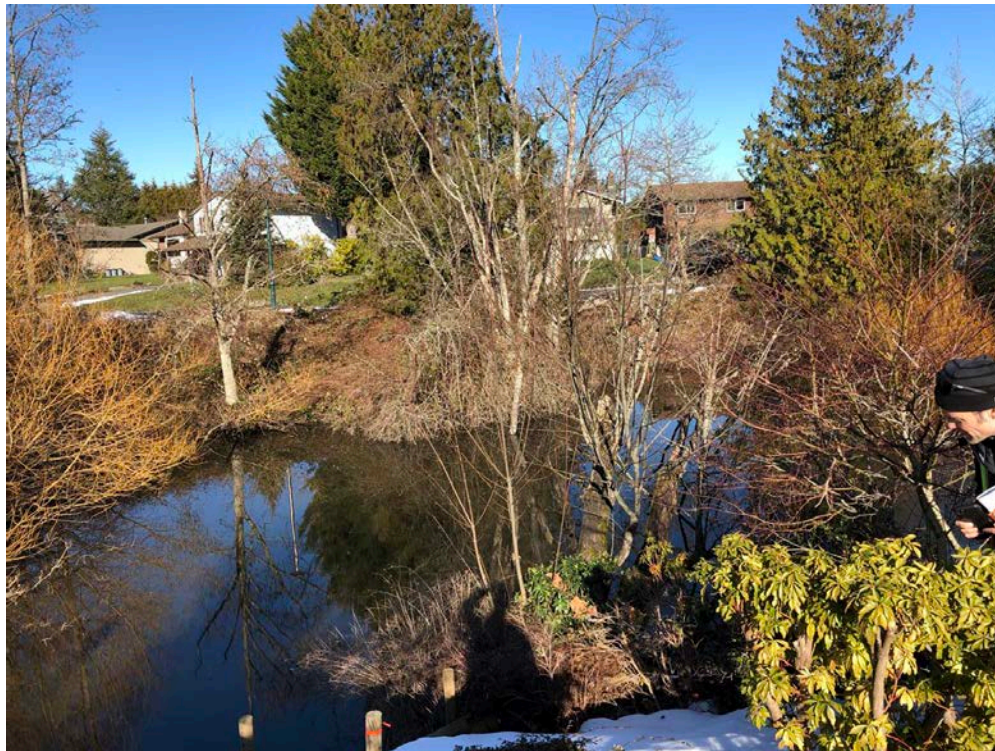


Photo 10: View of the lower mid-section of KÉL,SET (Reay) Creek Pond, looking towards the northeastern bank below Westbrook Dr.



KÉL,SET (Reay) Creek Pond Remediation Project
 Transport Canada
 Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 11: View of willow trees rooted in mid-section of KEL,SET (Reay) Creek Pond to be removed, looking north.



Photo 12: View of residential properties along the southern bank of the mid-section of KEL,SET (Reay) Creek Pond



KEL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 13: View of deck structure on private property at edge of KÉL,SET (Reay) Creek Pond, looking northwest.



Photo 14: View of wooden retaining walls and deck structure on private property overhanging pond boundary along the southern bank of KÉL,SET (Reay) Creek Pond, looking northwest.



KÉL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 15: View of riparian vegetation along the western bank of the upper mid-section of KEL,SET (Reay) Creek Pond bordering residential properties, looking south.



Photo 16: Typical view of upper mid-section of KEL,SET (Reay) Creek Pond, looking north.



KEL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 17: Wooden retaining wall and trees along south side of KÉL,SET (Reay) Creek Pond at the edge of residential properties, looking southeast.



Photo 18: Wooden retaining wall along south side of KÉL,SET (Reay) Creek Pond at the edge of residential properties, looking southeast.



KÉL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 19: Local property storm drainage outlet along south side of KÉL,SET (Reay) Creek Pond at the edge of residential properties.



Photo 20: Rock wall along the southwest perimeter of KÉL,SET (Reay) Creek Pond at the edge of residential properties, looking southeast. Structures extend beyond property line in select areas.


	KÉL,SET (Reay) Creek Pond Remediation Project Transport Canada Sidney, BC
SITE PHOTOGRAPHS	SLR Project No: 205.03892.00007



Photo 21: Rock wall along the southwest perimeter of KÉL,SET (Reay) Creek Pond at the edge of residential properties, looking northwest. Structures extend beyond property line in select areas.



Photo 22: Fence and rock-filled slope along the southwest perimeter of KÉL,SET (Reay) Creek Pond at the edge of residential property, looking southeast. Structures extend beyond property line in select areas.



KÉL,SET (Reay) Creek Pond Remediation Project
 Transport Canada
 Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 23: KÉL,SET (Reay) Creek Pond. View of residential properties along southwest pond perimeter. Shallow water depths and accumulated sediments can be seen.



Photo 24: Rock wall at property line along pond edge in upper section of KÉL,SET (Reay) Creek Pond, looking south.



KÉL,SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 25: Wooden retaining wall on private property adjacent to upper section of pond along south bank, looking west.



Photo 26: Concrete retaining structure on private property near upstream end of pond along south bank, looking northwest.



KEL, SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007



Photo 27: Shallow water depths and accumulated sediment near upstream end of pond along south bank, looking northwest.



Photo 28: Upstream end of KÉL,SET (Reay) Creek Pond below Canora Road (shown in background). Several large trees occur along the pond banks, looking west.



KÉL,SET (Reay) Creek Pond Remediation Project
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Photo 29: Large trees and powerlines along the upstream bank of KEL, SET (Reay) Creek Pond. View from Canora Road looking northeast.



Photo 30: Typical riparian vegetation present along upstream end of KEL, SET (Reay) Creek Pond, looking east.



KEL, SET (Reay) Creek Pond Remediation Project
Transport Canada
Sidney, BC

SITE PHOTOGRAPHS

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Photo 31: Patches of invasive species (Himalayan blackberry, English ivy) present along north banks of KEL,SET (Reay) Creek Pond adjacent to Northbrook Drive, looking south.



Photo 32: Large trees and vegetation along the northeastern banks of KEL,SET (Reay) Creek Pond adjacent to Westbrook Drive, looking southeast.



KEL,SET (Reay) Creek Pond Remediation Project
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Photo 33: One of several storm outlets along north side of KÉL,SET (Reay) Creek Pond on Town of Sidney property, looking east.



Photo 34: KÉL,SET (Reay) Creek Park lined with ornamental trees and grassed areas adjacent to Westbrook Drive, looking north.



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Photo 35: Town of Sidney park space along KEL,SET (Reay) Creek Pond at the corner of Northbrook and Westbrook Drive, looking south.



Photo 36: KEL,SET (Reay) Creek and culvert entrance upstream of Canora Road, looking south.



KEL,SET (Reay) Creek Pond Remediation Project
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Photo 37: Culvert entrance of KEL,SET (Reay) Creek upstream of Canora Road, looking south.



Photo 38: Proposed stockpile management area on airport lands north of Canora Road, looking northwest.



KEL,SET (Reay) Creek Pond Remediation Project
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Photo 39: Access area to proposed stockpile management area on airport lands north of Canora Road, looking southwest. Pedestrian and cycling path in foreground.



Photo 40: One of two existing access areas to proposed stockpile management area on airport land north of Canora Road, looking southwest.



KEL, SET (Reay) Creek Pond Remediation Project
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Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00007

ANNEX D
Existing Conditions and Environmental Quality Information

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007

**Summary of Historical KÉL,SET (Reay) Creek Pond
Sediment Sampling Analytical Data**

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation

**TABLE 1: SEDIMENT ANALYTICAL RESULTS-
POLYCYCLIC AROMATIC HYDROCARBONS**

	PAHs																						
	acenaphthylene	acenaphthene	anthracene	benz(a)anthracene	benzo(b)fluoranthene	benzo(b+j)fluoranthenes	benzo(g,h,i)perylene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	light molecular weight PAHs	heavy molecular weight PAHs	PAHs (sum of total)	IACR (CCME Lab)	
Reported Detection Limit	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	N/A

Location	Field ID	Sample Depth Range (m)	Sampled Date	Easting	Northing	acenaphthylene	acenaphthene	anthracene	benz(a)anthracene	benzo(b)fluoranthene	benzo(b+j)fluoranthenes	benzo(g,h,i)perylene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	light molecular weight PAHs	heavy molecular weight PAHs	PAHs (sum of total)	IACR (CCME Lab)
4C	4C-A	0.3-0.4	2015-Jan-15	469330.15	5387464.96	<0.05	<0.05	<0.05	0.051	0.117	-	0.051	<0.05	0.064	0.087	<0.05	0.106	<0.05	0.053	<0.05	<0.05	0.067	0.101	-	-	-	-
	4C-C	0.1-0.2				<0.05	<0.05	<0.05	<0.05	0.106	-	<0.05	<0.05	0.051	0.075	<0.05	0.133	<0.05	0.052	<0.05	<0.05	0.099	0.116	-	-	-	-
6C	6C-B	0.1-0.2	2015-Jan-15	469361.14	5387447.82	<0.05	<0.05	<0.05	0.252	0.832	-	0.355	0.264	0.44	0.507	0.056	0.806	<0.05	0.398	<0.05	<0.05	0.352	0.728	-	-	-	-
RCPR-Sed19-01	RCPR-SED19-01_0-0.1	0-0.1	2019-Nov-22	469283.93	5387491.407	0.036	0.087	0.19	1.3	2.2	3.1	1.7	1	1.9	2.2	0.39	3.7	0.12	1.7	0.013	0.0081	1.3	2.9	1.7	12	14	38
RCPR-Sed19-02	RCPR-SED19-02_0-0.1	0-0.1	2019-Nov-22	469303.493	5387495.362	0.041	0.07	0.15	1.3	2.7	3.8	2.2	1.3	2.1	2.5	0.46	3.9	0.1	2.1	0.019	0.0075	1.1	3.1	1.5	13	15	46
	RCPR-SED19-DUPA					0.035	0.071	0.14	1.3	2.7	3.8	2	1.2	2.1	2.5	0.39	4	0.097	1.9	0.012	0.006	1.1	3.2	1.5	13	15	45
RCPR-Sed19-03	RCPR-SED19-03_0-0.1	0-0.1	2019-Nov-22	469327.218	5387491.092	0.029	0.051	0.12	1	1.8	2.6	1.4	0.82	1.5	1.9	0.31	3.2	0.07	1.4	0.018	0.0062	0.92	2.5	1.2	10	12	32
RCPR-Sed19-04	RCPR-SED19-04_0-0.1	0-0.1	2019-Nov-22	469324.257	5387471.919	0.031	0.057	0.13	1.1	2.2	3.2	1.7	1.1	1.8	2.1	0.35	3.5	0.083	1.7	0.013	0.0058	0.88	2.7	1.2	12	13	38
RCPR-Sed19-05	RCPR-SED19-05_0-0.1	0-0.1	2019-Nov-22	469344.956	5387450.78	0.032	0.042	0.1	0.84	1.9	2.7	1.5	0.84	1.4	1.8	0.29	2.7	0.065	1.5	0.029	0.0096	0.73	2.1	1	9.1	10	31
RCPR-Sed19-06	RCPR-SED19-06_0-0.1	0-0.1	2019-Nov-22	469362.661	5387444.051	0.033	0.047	0.11	0.9	2	2.9	1.6	0.89	1.6	1.9	0.31	2.9	0.071	1.6	0.035	0.0094	0.81	2.2	1.1	9.8	11	34
RCPR-Sed19-07	RCPR-SED19-07_0-0.1	0-0.1	2019-Nov-22	469377.801	5387439.452	0.035	0.038	0.11	0.84	2	2.8	1.7	0.92	1.5	1.8	0.32	2.7	0.061	1.6	0.035	0.0097	0.68	2.1	0.97	9.3	10	33
RCPR-Sed19-08	RCPR-SED19-08_0-0.1	0-0.1	2019-Nov-22	469387.043	5387411.557	0.036	0.05	0.12	0.84	2.1	3	1.7	0.89	1.6	1.9	0.3	2.8	0.077	1.6	0.034	0.0074	0.77	2.3	1.1	9.7	11	34

Notes:
m - metres
µg/g - micrograms per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
• formatting of cells indicates exceedances of like-formatted standards
• where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded
PAH - polycyclic aromatic hydrocarbons
• Total PAHs include acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene

TABLE 3: SEDIMENT ANALYTICAL RESULTS - LEACHABLE PAHS AND LEACHABLE METALS

		Leachable PAHs																				Leachable Metals																									
		acenaphthylene	acenaphthene	acridine	anthracene	benz(a)anthracene	benzo(b+j)fluoranthene	benzo(g,h,i)perylene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	quinoline	light molecular weight PAHs	heavy molecular weight PAHs	PAHs (sum of total)	antimony	arsenic	barium	beryllium	boron	cadmium	chromium (III+VI)	cobalt	copper	iron	lead	mercury	molybdenum	nickel	selenium	silver	thallium	uranium	vanadium	zinc	zirconium			
Reported Detection Limit		0.1	0.1	0.5	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.5	0.5	0.2	0.5	100	100	100	100	100	100	100	100	100	500	100	2	100	100	10	100	100	100	100	100	100	100		
Location	Field ID	Sample Depth Range (m)	Sampled Date	Eastings	Northing	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.5	<0.5	<0.2	<0.5	<100	<100	240	<100	100	<100	<100	<100	<100	<100	<100	<100	<2	<100	<100	<100	<10	<100	<100	<100	<100	1680	<100	
RCPR-Sed19-01	RCPR-SED19-01_0-0.1	0-0.1	2019-Nov-22	469283.93	5387491.407	<0.1	<0.1	<0.5	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.2	<0.5	<100	<100	290	<100	<100	<100	<100	<100	<100	<100	<100	<100	<2	<100	<100	<100	<100	<10	<100	<100	<100	<100	2500	<100
RCPR-Sed19-02	RCPR-SED19-02_0-0.1	0-0.1	2019-Nov-22	469303.493	5387495.362	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	240	<100	<100	<100	<100	<100	<100	<100	<100	13,000	<100	<2	<100	<100	<100	<100	<10	<100	<100	<100	2200	<100
RCPR-Sed19-07	RCPR-SED19-07_0-0.1	0-0.1	2019-Nov-22	469377.801	5387439.452	<0.1	<0.1	<0.5	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.2	<0.5	<100	<100	240	<100	<100	<100	<100	<100	<100	3050	960	<100	<2	<100	<100	<100	<100	<10	<100	<100	<100	2420	<100	
RCPR-Sed19-08	RCPR-SED19-08_0-0.1	0-0.1	2019-Nov-22	469387.043	5387411.557	<0.1	<0.1	<0.5	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.2	<0.5	<100	<100	240	<100	<100	<100	<100	<100	<100	3050	960	<100	<2	<100	<100	<100	<100	<10	<100	<100	<100	2420	<100	

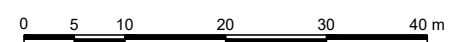
Notes:
 m - metres
 µg/g - micrograms per gram
 < - less than reported detection limit
 '-' - sample not analyzed for parameter indicated
 • formatting of cells indicates exceedances of like-formatted standards
 • where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded
 PAH - polycyclic aromatic hydrocarbons
 B(a)P TPE (BC CSR)- benzo(a)pyrene toxicity potency equivalence; calculated by adding the concentrations of the following parameters multiplied by their TEF:
 benzo(a)anthracene[0.1], benzo(b+j)fluoranthene[0.1], benzo(k)fluoranthene[0.1], dibenzo(a,h)anthracene[1], indeno(1,2,3-cd)pyrene[0.1]
 TEF - toxicity equivalent factor
 • Total PAHs include acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene
 µg/L - micrograms per litre
 mg/L - milligrams per litre



NOTES:
 Referenced from Kerr Wood Leidal Consulting Engineers drawing *EXISTING CONDITIONS & CONSTRUCTION SITE BOUNDARY* (Dec 20, 2019).
 Imagery © 2019 Capital Regional District. Image date: 2017.

LEGEND:

- ◆ SEDIMENT SAMPLE (SLR, 2015)
- ◼ SEDIMENT SAMPLE (SLR, 2019)



SCALE 1:750
 WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
 NAD 1983 UTM Zone 10 U
 THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

TRANSPORT CANADA
 KEL, SET (REAY) CREEK
 SIDNEY, BC

KEL, SET (REAY) CREEK POND
 REMEDIATION PROJECT

**SITE PLAN AND SEDIMENT SAMPLE
 LOCATIONS**

Date: February 7, 2020	Drawing No. D-1
Project No. 205.03892.00007	



Cadfile name: S_205-03892-00007-A1.dwg

Geotechnical Assessment of Potential Impacts to Dam

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation



THURBER ENGINEERING LTD.

MEMORANDUM

To: Town of Sidney
c/o Kerr Wood Leidal Associates
Attention: Craig Sutherland, P.Eng.

Date: February 13, 2020

From: Jay McIntyre, P.Eng.
Senior Geotechnical Engineer



File: 27437

Review: Steven Coulter, P.Eng.
Review Engineer

Cc: Jenn Clary, P.Eng., Town of Sidney

**REAY CREEK POND REMEDIATION
GEOTECHNICAL ASSESSMENT OF POTENTIAL IMPACTS TO DAM**

Introduction

As requested, this memo provides preliminary commentary and recommendations related to the planned removal of pond sediments in the vicinity of the Reay Creek Dam.

It is a condition of this memorandum that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

Background Information

Reay Creek is located on the east side of the Saanich Peninsula and traverses the Victoria International Airport before entering Reay Creek Park within the Town of Sidney. Reay Creek Pond is located on the east side of Canora Road and is impounded by a small earthfill dam located approximately 210 m downstream of the Canora Road crossing. The width of Reay Creek varies from a minimum of approximately 12 m immediately downstream from Canora Road to a maximum of roughly 23 m located about 60 m upstream from the dam.

Based on information provided in a contamination investigation report by Macdonald and Bruce (2015), a wood stave and rubble dam was originally constructed on Reay Creek in 1935 for the commercial rearing of ducks. The original dam was reportedly replaced by the current dam in 1950, which was constructed approximately 40 m downstream of the original dam. The current dam was partially breached in early 1997 during a significant rainfall event following a record snowfall. Repairs were subsequently carried out and included widening the dam on the upstream portion of the embankment as well as outlet control improvements and the placement of rip rap protection on the dam crest.

Environmental studies completed in 2010 and 2015 indicate that sediments in the pond have elevated concentrations of both metals (e.g., cadmium, chromium, lead and zinc) and polycyclic aromatic hydrocarbons (PAHs). Environmental remediation of the pond is proposed and would



include excavation and removal of the contaminated sediments. This will result in modifications of the existing pond banks, including along the upstream slope of Reay Creek Dam.

Geotechnical Field Work:

Thurber completed a field reconnaissance visit to Reay Creek Pond on February 26, 2019 to visually review the existing conditions at accessible locations around the perimeter of the pond. A second inspection was carried out on November 20, 2019 that focussed entirely on the south bank of the pond. Observations from the February 2019 site visit were summarized in a memorandum to KWL dated March 13, 2019. Additional observations and commentary regarding the lots along the south side of the pond were provided to KWL by email on December 9, 2019.

Additionally, Thurber has completed two field investigation programs at the Reay Creek Dam site in 2019 to characterize the embankment fill and underlying foundation materials. The first investigation was carried out for the Town of Sidney and was completed on July 31, 2019. A supplemental geotechnical investigation was completed on December 16, 2019 for KWL as part of the planned dam rehabilitation project.

Review of 1997 Dam Upgrades:

As noted previously, Reay Creek Dam was last upgraded in 1997 following a partial dam breach. C.N. Ryzuk & Associates Ltd. was retained to assess the dam and prepare a repair design. A review of the resulting assessment letter and construction photos suggests the following approach was employed:

- The breach resulted in a lowering of the pond level, which was then further lowered by pumping over the spillway. The low water level was maintained during construction by continued pumping around the work site.
- The pond sediment (described as muck) was allowed to dry out and consolidate prior to construction to permit steeper temporary excavation slopes.
- The dam was widened on the upstream side by approximately 2 m to 3 m using local clay. Prior to placing the new clay fill, the consolidated muck was to be stripped down to native clay.
- It was anticipated the excavated muck would be disposed of in the pond upstream of the dam.
- Construction photos suggest the work proceeded in sections along the face of dam.

Geotechnical Assessment of Potential Impacts of Sediment Removal:

Thurber has carried out an assessment of the potential impacts of sediment removal on the existing dam based on the data collected during the 2019 geotechnical investigations and reconnaissance visits, as well as available information from the 1997 dam rehabilitation work.



A stability analysis has been carried out to evaluate slope stability of the existing embankment during both rapid drawdown and following removal of any sediment presently against the dam's upstream slope. This analysis assumes the existing upstream slope of the dam is graded between 2H to 1V and 1.5H to 1V and that the existing embankment slope is partly buttressed by pond sediments. Some of these sediments likely have been consolidated as a result of the previous rehabilitation work and have a firmer consistency than sediments elsewhere in the pond.

The assessment results indicate the following:

- It is not necessary to specify a maximum pond drawdown rate during construction. It is anticipated the pond will take at least several days to be lowered.
- Pond sediment may be removed from the existing upstream slope of the dam provided a maximum temporary excavation slope of 1.5H to 1V is maintained.
- Localized steeper temporary excavations to remove sediments along the dam face may be permissible but must be carried out in short sections under the direction of a geotechnical engineer. These excavations should be backfilled promptly using approved backfill, which is anticipated to consist of free draining granular soil.
- Following sediment removal, approved backfill should be placed along the toe of the dam to provide a maximum slope angle of 2H to 1V. This is intended to provide an overall factor of safety that is at least equivalent to the current value.

It is noted that further modifications to the upstream slope of the dam are anticipated during the planned upgrade of Reay Creek Dam. This is expected to involve further flattening of the upstream slope, to approximately 3H to 1V, and placement of armouring on the slope face.

Thurber should be notified when sediment is excavated along the upstream face of the dam so that a geotechnical inspection can be carried out. Depending on the observations, updated recommendations may be provided.

Attachment:

Statement of Limitations and Conditions



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

ANNEX E
Environmental Mitigation Strategy

R.087575.005 KEL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007



global environmental solutions

**Public Services and Procurement Canada
Reay Creek Remediation Project
Sidney, BC**

Environmental Mitigation Strategy – Reay Creek Remediation

**March 2019
SLR Project No.: 205.03892.00003**



ENVIRONMENTAL MITIGATION STRATEGY – REAY CREEK

REAY CREEK REMEDIATION PROJECT

SIDNEY, BC

SLR Project No.: 205.03892.00003

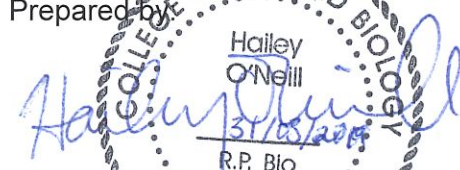

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC), on behalf of Transport Canada, to conduct an Environmental Mitigation Strategy (EMS) for the Reay Creek Remediation Project (the Project).

The Reay Creek Remediation Project involves the removal of contaminated sediment in the upper portions of Reay Creek that is located on Airport Lands (Reaches 1 to 4) as well as the Reay Creek Pond (Reach 5). Remediation would consist of removal of all soft sediments from Reaches 1 to 5 to native clay layers.

Historical activities at the Victoria Airport have contributed to the contamination of Reay Creek and Reay Creek Pond sediments. The remediation plan for Reaches 1 to 4 will include full removal of creek sediments to depths ranging from 0.15 to 1.0 m within all areas of the creek upstream of Canora Road with the exception of Reach 3, where only partial removal along the eastern extent is planned, and Reach 2, where creek sediments have already been removed as part of the Victoria Airport Authority (VAA) Detention Pond Project. Excavation of sediments from Reach 5 will range from 0.5 to 2.0 m deep.

The Project involves five stages: (1) Planning and Design Activities, (2) Site Preparation, (3) Site Remediation, (4) Site Restoration, and (5) Long-Term Monitoring. Stages 2 through 4 have the potential to interact with the surrounding environment and have effects on Valued Ecosystem Components (VECs).

Potential environmental effects of the Project were assessed and mitigation measures have been identified to minimize or eliminate impacts on physical, biological and social VECs. Physical components included atmosphere, ambient noise, surface water, sediment, and soils. Biological components included terrestrial habitat, vegetation, terrestrial animals, aquatic habitat and aquatic animals (including fish, reptiles, amphibians and benthic communities). Cultural components included heritage and historical resources, recreation, services and aesthetics, and people and public health.

Mitigation measures were identified and will be incorporated into Project design and implementation. Potential environmental effects associated with the Project are expected to be minimal and short-term in duration. With appropriate mitigation, adequate project planning, and compliance with applicable legislative and regulatory requirements, there is little likelihood that significant adverse environmental impacts will result from remedial activities within Reay Creek. Furthermore, several VECs are anticipated to benefit from removal of contaminated sediment from the upper reaches of Reay Creek creating a net positive environmental effect from the Project.

Potential cumulative effects associated with this Project in conjunction with past and potential future projects were assessed. The cumulative effects of past sediment and surface water enhancement programs, future potential habitat enhancement programs and the current sediment remediation and habitat enhancement program will provide a net benefit to the surrounding environment and VECs.

Based on the information presented in this EMS report, the proposed Reay Creek Remediation Project is not expected to cause significant residual adverse environmental effects. This expectation is based on the implementation of mitigation measures developed for this Project, and application and approval of associated permits and approvals. Long-term benefits to aquatic habitat, fish and wildlife resources, and public enjoyment of Reay Creek Pond are anticipated to result from the Project.

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APPENDICES

- Appendix A:** 90% Construction Design Drawings
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ACRONYMS

AFW	Freshwater Aquatic Life
AOA	Archaeological Overview Assessment
BC CDC	BC Conservation Data Centre
bgs	Below Ground Surface
BMP	Best Management Practices
CDF	Coastal Douglas fir
CEPA	Canadian Environmental Protection Act
CEQGS	Canadian Environmental Quality Guidelines
CCME	Canadian Council of Ministers of the Environment
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Contaminated Sites Regulation
CRD	Capital Regional District
DBH	Diameter at Breast Height
DFO	Fisheries and Oceans Canada
DO	Dissolved Oxygen
DR	Departmental Representative
EA	Environmental Assessment
ENV	BC Ministry of the Environment and Climate Change Strategy
EMA	Environmental Management Act
EMS	Environmental Mitigation Strategy
EPP	Environmental Protection Plan
ESA	Environmental Site Assessment
FCSAP	Federal Contaminated Sites Action Plan
FISS	Fisheries Information Summary System
FN	First Nations
HWR	Hazardous Waste Regulation
ISQG	Interim Sediment Quality Guidelines
LWD	Large Woody Debris
MBCA	Migratory Birds Convention Act
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
PSPC	Public Services and Procurement Canada
PEL	Probable Effect Level
PEP	Provincial Emergency Program

QEP	Qualified Environmental Professional
QP	Qualified Professional
RAP	Remedial Action Plan
RAR	Riparian Areas Regulation
SAR	Species at Risk
SARA	Species at Risk Act
SedFS	Sediment Quality Standards for Freshwater Sensitive Sites
SLR	SLR Consulting (Canada) Ltd.
TSS	Total Suspended Solids
VAA	Victoria Airport Authority
VEC	Valued Ecosystem Components
VIA	Victoria International Airport
WSA	Water Sustainability Act

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC), on behalf of Transport Canada, to complete an Environmental Mitigation Strategy (EMS) for the upstream reaches of Reay Creek located within the boundaries of the Victoria International Airport (VIA) in North Saanich, BC (Reaches 1 to 4) and for Reay Creek Pond (Reach 5) located in Sidney, BC (collectively known as the “Site”). The EMS was created to support applicable environmental permit applications, be used as part of the tendering package, and identify mitigation measures for the implementation of the Remedial Action Plan (RAP; SLR, 2019).

The EMS was completed under PSPC Contract No. EZ897-161534/001/VAN (Task Authorization Order No. 700429175).

1.1 Location of Proposed Project

Reay Creek originates at the VIA in North Saanich BC. It runs through the Town of Sidney and terminates in Bazan Bay in North Saanich BC. The upper portion of Reay Creek is located on VIA property and extends from the headwaters located south of the East Camp area and flows in a southeast direction for approximately 450 m to 500 m to a culvert under Canora Road. Downstream of the culvert, Reay Creek has been historically modified by a dam structure to create Reay Creek Pond within the Town of Sidney. The Pond extends for approximately 210 m through a park in a residential area. Reay Creek continues downstream beyond the dam in a southeast direction through Town of Sidney lands and eventually empties into Bazan Bay within the District of North Saanich.

The property is generally located at:

Easting: 469196.22 m E
Northing: 5387548.92 m N
Zone 10 U

1.2 Project Summary

This EMS focuses on the portion of Reay Creek that is located on Airport Lands (Reaches 1 to 4) as well as the Reay Creek Pond (Reach 5). Construction design drawings showing the designated reaches of Reay Creek can be found within Appendix A.

Historical activities at the Victoria Airport have contributed to the contamination of Reay Creek and Reay Creek Pond sediments. Historically, sediment contamination in the upper section of Reay Creek (i.e., on Airport Lands) contained various contaminants of concern, including and predominantly metals. The contamination of the creek sediment and water are presumed to be the result of past industrial activities and inputs to the creek via storm water outfalls.

The remediation plan for Reaches 1 to 4 will include removal of creek sediments to depths ranging from 0.15 to 1.0 m within all areas of the creek upstream of Canora Road with the exception of Reach 3, where only partial removal along the eastern extent is planned, and Reach 2, where creek sediments have already been removed as part of the Victoria Airport Authority (VAA) Detention Pond Project. The remediation of Reaches 1 to 4 is planned to occur in the summer of 2019.

In subsequent years beyond 2019, excavation of sediments from Reach 5 will range from 0.5 to 2.0 m deep. It is SLRs understanding that the Pond dam will be retained by the Town of Sidney and upgraded in the future if/as necessary. Future dam upgrades are not included in the current scope of work.

The objectives of the planned remedial activities are to reduce potential environmental effects associated with historic contamination resulting from past practices at the Victoria Airport and to reduce liabilities associated with this historic contamination.

This EMS contains information pertaining to remediation of Reaches 1 to 4 (2019) as well as remediation of Reach 5 (subsequent years). Reaches 1 to 4 occur on Airport Lands, while Reach 5 occurs on Town of Sidney lands.

2.0 REGULATORY FRAMEWORK

The following sections outline key environmental legislation and applicability to the Project. The Airport Lands are federally owned, and therefore fall under federal regulatory jurisdiction.

Generally, provincial and territorial laws and municipal by-laws do not apply on federal lands and to federal undertakings. Environmental standards, guidelines and objectives established by provincial, territorial or municipal departments, ministries, and agencies will be considered for the purposes of establishing investigation and remediation/risk management environmental quality criteria. Also, material removed from federal jurisdiction may become subject to provincial and territorial laws and municipal by-laws.

Accordingly, the BC Contaminated Sites Regulation (CSR) are used for remedial targets. The applicable standards for contaminated sediments within the Project area will be screened against the BC CSR Freshwater Sediment Standards for Sensitive Use (SedFS). More information on applicable standards can be referenced below in Section 2.2.3.2.

2.1 Key Federal Legislation

2.1.1 Fisheries Act (R.S.C., 1985, c. F-14)

In Canada, the legislation for the conservation and management of fisheries and fish habitat is the Fisheries Act. Section 35 (1) of the Federal Fisheries Act states that:

- ‘...No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery’.
- Serious harm is defined as the death of fish or permanent alteration to or destruction of fish habitat.

Subsection 35(2) of the Fisheries Act, outlines conditions under which proponents may carry on any work, undertaking or activity without contravening subsection (1). Current amendments are proposed to restore lost protections and incorporate modern safeguards into the Fisheries Act. Moving forward, the bill will be subject to the parliamentary process; however, a timeline for passing the bill into a law is currently unknown.

2.1.2 Migratory Birds Convention Act, 1994 (MBCA) (S.C. 1994, c. 22)

This Act protects all migratory birds and their nests regardless of where they are located. According to Section 6 of the Migratory Birds Regulations, no person shall 'disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird'. In practice, adherence to this section of the Regulations involves avoiding activities that disturb migratory birds during sensitive breeding and nesting periods through a combination of temporal and spatial avoidance of nesting areas for these species.

2.1.3 Species at Risk Act (SARA) (S.C. 2002, c. 29)

The Species at Risk Act (SARA) was proclaimed in June 2003 and is one part of a three part Government of Canada strategy for the protection of wildlife species at risk (SAR). The Act recognizes that the protection of wildlife species is a joint responsibility among federal and provincial jurisdictions and that all Canadians play a role in the protection of wildlife. It applies to all federal lands in Canada; all wildlife species listed as being at risk; and their critical habitat.

Species designated extirpated, endangered, threatened and of special concern are listed in Schedule 1 of the SARA. General prohibitions for species in this schedule, with the exception of special concern, specify that: "No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada." Species listed in Schedules 2 and 3 of the SARA are designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are reassessed before addition to Schedule 1.

2.1.4 Canadian Environmental Protection Act (CEPA), 1999 (S.C. 1999, c. 33)

The Canadian Environmental Protection Act (CEPA) 1999 aims to contribute to sustainable development through pollution prevention and to protect the environment, human life and health from the risks associated with toxic substances. It covers a diversity of activities that can affect human health and the environment and acts to address any pollution issues not covered by other federal laws. As such, CEPA 1999 is a "catch all" piece of legislation that ensures potentially toxic substances are not inadvertently exempt from federal oversight as a result of unforeseen legislative loopholes.

2.1.5 Canadian Council of Ministers for the Environment (CCME), 1999

As identified above, the Airport Lands fall under federal regulatory jurisdiction. Federal contaminated sites are generally evaluated using the Canadian Environmental Quality Guidelines (CEQGs) developed by the Canadian Council of Ministers for the Environment (CCME; 1999), including subsequent updates for individual substances (up to and including 2018). The CEQGs are primarily risk-based numerical guidelines set at levels for which it is believed that unacceptable adverse effects on environmental or human health are unlikely to occur. These were developed for various media including water, soil, and sediments.

The CCME Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life are applicable to be used as the federal guidelines for sediment. Both the PEL (Probable Effect Level) and the ISQG (Interim Sediment Quality Guidelines) apply on Airport Lands. The PELs are concentrations above which adverse effects to organisms are believed to occur frequently. The ISQGs are considered to be analogous to Threshold Effect Levels, contaminant

concentrations, below which adverse effects to organisms are believed to rarely occur. Remedial targets have been set which are based on provincial standards (see Section 2.2.3.2, below).

2.2 Key Provincial Legislation

2.2.1 Water Sustainability Act [RSBC 2014] c. 15

At the provincial level, the Water Sustainability Act (WSA) and the Water Sustainability Regulation (2016) provide important and powerful rules and guidance for issuing water licenses and approvals and directing the allocation of surface water and groundwater within the province (Ministry of Forests, Lands and Natural Resources, 2016). Under Section 11 of the WSA, Notifications or Approvals are required to make “changes in and about a stream”.

Notifications are typically used for project works that do not involve any diversion of water, may be completed within a short period of time and will have minimal impact on the environment or third parties. The information specified in the Notification Form must be submitted to the Habitat Officer at least 45 days prior to commencing the work.

A Change Approval (*Section 11, WSA*) is a written authorization for changes in and about a stream that are of a complex nature. For example, work requiring an approval include, but are not limited to:

- Watercourse or channel realignment;
- Retaining wall or bank protection installation;
- Dredging;
- Construction of a sediment sump; and
- Other significant works.

A Water Use Approval (*Section 10, WSA*) allows the diversion and use of water from a stream or an aquifer, and the temporary construction of works on the stream or aquifer, for a period of up to 24 months. Section 10 Use Approvals are related to dewatering operations, when water infiltrates excavation limits and requires active pumping to divert water from the area.

To receive an Approval, an application including all information on habitat assessment (fish and wildlife values), project designs and plan, channel stability and flood levels and application fee must be submitted. A Change Approval and Water Use Approval will be required for the proposed Project.

2.2.2 Riparian Areas Protection Act [RSBC 1997] c. 21

The Riparian Areas Regulation (RAR) was enacted in 2004 under Section 12 of the Fish Protection Act – re-titled the Riparian Areas Protection Act in February 2016. The RAR require those local governments that adopt the regulations to protect riparian areas during residential, commercial, and industrial development projects through the application of a science-based assessment of proposed activities as completed by a Qualified Environmental Professional (QEP). The primary purpose of the RAR is to protect the varied features, functions and conditions that are vital for maintaining stream health and productivity (Province of British Columbia 2018b).

2.2.3 Environment Management Act [RSBC 2003] c. 53

The Environmental Management Act (EMA) regulates industrial and municipal waste discharge, pollution, hazardous waste and contaminated site remediation. EMA provides the authority for introducing wastes into the environment, while protecting public health and the environment. The Act enables the use of permits, regulations and codes of practice to authorize discharges to the environment and enforcement options, such as administrative penalties, orders and fines to encourage compliance. Guidelines and objectives for water quality are developed under the EMA.

2.2.3.1 Hazardous Waste Regulation

Hazardous wastes are wastes that could harm human health or the environment if not properly handled and disposed. The Hazardous Waste Regulation (HWR) addresses the proper handling and disposal of hazardous wastes, under the EMA.

2.2.3.2 Contaminated Sites Regulation

The CSR under the EMA is the principal regulatory document defining requirements for contaminated sites management in British Columbia. The regulation outlines the procedures for site assessment, remediation and application for environmental closure for a property. The CSR is relevant to the characterization, transportation and disposal of contaminated materials.

The CSR was updated by the BC Ministry of Environment and Climate Change Strategy (ENV). The Stage 10 amendments to the CSR were enacted October 27, 2016 and came into effect November 1, 2017. Analytical data have been compared Stage 10 amended standards as reference.

CSR Schedule 3.4 Generic Numerical Sediment Standards for aquatic life use are intended to protect sediment-dwelling species from unacceptable effects that may be associated with exposure to contaminated sediments at typical and sensitive sites. Concentration standards for substances of potential concern are provided for freshwater sediments. In this report, these standards are abbreviated as SedFS for sensitive freshwater sediments. “Sensitive sediment use” is defined in ENV Procedure 8.

It should be noted that once contaminated sediments are removed from the creek, they will be considered “soil” under the CSR. If the soil meets industrial land use standards, deposition on industrial lands would not require a soil relocation agreement or BC ENV notification under the current procedures. However, if industrial land-use soil standards cannot be met, or the receiving site would have a more stringent land use standard than the soils to be deposited on can meet, additional requirements may be posed by BC ENV.

For the purposes of this report, SLR will continue to refer to contaminated sediments once they have been removed from Reay Creek and Reay Creek Pond.

2.2.3.3 Spill Reporting Regulation

The regulation defines a “spill” as an unauthorized release or discharge of a listed substance into the environment in an amount exceeding the listed quantity and specifies requirements for reporting to the Provincial Emergency Program (PEP). The requirements of the Spill Reporting

Regulation are to be considered in the development of a Spill Response Plan (see Section 3.2.1).

2.2.4 *Transportation of Dangerous Goods Act [RSBC 1996] c. 458*

Transportation of dangerous goods in vehicles is regulated under both the federal and provincial jurisdiction. The framework harmonizes both federal and provincial requirements under the British Columbia Act.

2.2.5 *Wildlife Act [RSBC 1996] c. 488*

The BC Wildlife Act regulates the management of wildlife in the province. It restricts the harvest of individuals and prohibits the killing, capture, and harassment of wildlife, except by permit or regulation. The BC Wildlife Act also provides protection for active bird nests, including specific measures for raptors and their habitats. Section 34 of the Wildlife Act specifically prohibits the disturbance or destruction of any bird, its active nest, or its eggs. It also protects the nest of any eagle, peregrine falcon, gyrfalcon, osprey, heron, or burrowing owl, regardless of whether it is actively used.

Should Project activities have the potential to interact with species identified under the BC Wildlife Act, a permit application will need to be submitted to FrontCounter BC for each activity type. These permit applications should be prepared and submitted well in advance of Project activities, as they can take up to 90-days for approval. A Scientific Fish Collection Permit will be required to complete fish salvage work within Reay Creek and Reay Creek Pond prior to in-water works. A General Wildlife Permit (including animal care form) will be required for the collection and relocation of amphibians, reptiles and other wildlife that may be incidentally encountered.

2.2.6 *Endangered Species Legislation*

Legislation for two Acts aimed at identifying and protecting SAR in BC were tabled in 2017: Endangered Species Act and the Species at Risk Protection Act. While these Bills are not currently enacted it is important to understand there may be potential implications to project proponents to consider once this legislation is put in force (Norton Rose Fulbright, 2018).

2.3 *Municipal Bylaws, Policies and Requirements*

2.3.1 *District of North Saanich Noise Bylaw No. 1383 (2015)*

The Noise Bylaw states that no person shall carry out "...excavating or other operation, or operate any kind of machine or engine...except between the following hours: Monday to Friday between 7:00 am and 7:00pm and Saturdays between 8:00 am to 4:00 pm." However, exemptions may be issued by the district under extenuating circumstances.

2.3.2 *Town of Sidney Noise Bylaw No. 1689 (2001)*

The noise bylaw states that "No person in the municipality shall on any day from Monday to Friday before 7:00 a.m. or after 8:00 p.m., nor on Saturday before 8:00 a.m. or after 8:00 p.m., construct, erect, reconstruct, alter, repair or demolish any building, structure or thing or excavate or fill in land in any manner which disturbs the quiet, peace, rest, enjoyment, comfort or convenience of the neighbourhood or of persons in the vicinity."

Exemptions may be approved by the Town of Sidney if deemed necessary.

2.3.3 Town of Sidney Tree Preservation Bylaw No. 2138 (2017)

Prior to cutting down or removing a tree, applications must be made to the Town of Sidney. Every person who cuts, removes, or damages a Protected Tree shall at that person's expense plant two (2) replacement trees of a type and in a location specified by the Director.

2.3.4 Capital Regional District (CRD) Sewer Use Bylaw No. 2922 (2016)

If discharging water into the sanitary sewer lines, a Waste Discharge Permit shall be obtained. This permit is required if discharging greater than 10 cubic meters per day of non-domestic wastewater, or wastewater containing high loads of specified chemical contaminants into the sanitary sewer. Permittees are required to sample and test their wastes, record flows and report to the program on a regular basis. Suspected or known contaminants must be indicated on the permit application.

2.3.5 Capital Regional District (CRD) Saanich Peninsula Stormwater Source Control Bylaw No. 4168 (2018)

This bylaw applies to the District of Central Saanich, the District of North Saanich and the Town of Sidney. The bylaws set out the requirements for discharges to the municipal drainage system with the goal to prevent the release of contamination through education, maintenance of catch basins, appropriate business practices, and the proper disposal of waste. The bylaw was finalized in December 2018 and CRD staff are currently working with municipalities, stakeholders and dischargers to implement the bylaw.

3.0 DESCRIPTION OF PROPOSED PROJECT AND SCOPE

3.1 Project Objectives

The objectives of the planned remedial activities are to reduce potential environmental effects associated with historic contamination resulting from past practices at the Victoria Airport and to reduce liabilities associated with this historic contamination.

The objective of the EMS is to provide information on historic and existing environmental site conditions immediately adjacent to Reay Creek and identify physical, biological, and social components that may be affected by Project activities. Mitigation measures and strategies are provided to reduce disturbance or negative impacts to those physical, biological, or social components.

The EMS was created to support applicable environmental permit applications, be used as part of the tendering package, and identify mitigation measures for the implementation of the RAP.

3.2 General Description of Proposed Project

Reaches 1 to 4 are planned for remediation during 2019. Reach 5 will be remediated in a subsequent year. All information regarding details of the remediation project in its entirety (i.e., Reaches 1 to 5) has been provided below.

Excavation is the preferred method to permanently remove impacted soil or sediments from a property to a secured disposal facility. Areas of anticipated sediment removal are provided in the attached 70% Construction Design Drawings and currently include all of Reaches 1A, 1B, 1C, 4 and 5 as well as the eastern-most portion of Reach 3 (Appendix A). The excavation shall begin at the high water mark and extend to the creek bottom until a stable surface (i.e., native clays) is encountered. Excavation depths will vary depending on depth of accumulated sediments and typically range from 0.15 to 1.0 m within all remedial areas of the creek upstream of Canora Road, and between 0.5 to 2.0 m for Reach 5 (Appendix A).

The remediation plan involves excavation, removal and off-site disposal of approximately 3,975 m³ of contaminated sediment from the site that exceed the CSR sediment quality standards for freshwater sensitive sites (SedFS). Table 1 following provides details of the sediment removal activities anticipated within each of the identified reaches. It should be noted that no changes to existing area (m²) of aquatic habitat are anticipated to result from the project.

**Table 1:
 Sediment Remediation Areas and Estimated Volumes per Reach**

Reach	Estimated Remedial Area (m ²)	Estimated Excavation Depth (m)	Estimated Volume (m ³)
Reach 1A	377	0.60	226
Reach 1B	338	0.25	85
Reach 1C	216	1.0	102
Reach 3	178	0.15	27
Reach 4	184	0.50	37
Reach 5	3,621	1.0	3,498

Following removal of contaminated sediments, remediation will be verified by collecting confirmatory samples at the base of excavations at predetermined frequencies. Samples will be sent for laboratory analytical testing to confirm removal of contaminated material and will be a condition of completing the sediment removal program.

3.3 Project Components, Scope and Timeframe

The remediation is anticipated to be split over multiple years, with the remediation of the Airport Lands occurring in 2019, followed by the remediation of Reay Creek Pond occurring in a subsequent year. The remediation of each yearly component consists of five general stages:

- **Stage 1 – Planning and Design Activities:** refinement of remedial areas, detailed design, and logistical support for the remediation Project must be considered prior to the development of a remediation specification. Stage 1 is anticipated to be completed by early spring 2019.
- **Stage 2 – Site Preparation:** preparing the site for the remediation including channel isolation, fish salvage, site clearing and grubbing, installation of sediment and erosion control measures, and Contractor set up of laydown areas and utility clearance. Select Stage 2 activities such as mobilization, clearing and grubbing may be completed prior to in-water works but could continue as the Project progresses, depending on overall Project sequencing. Other activities such as channel isolation and fish salvage will be

conducted within the reduced risk window (June 15th to September 15th). Stage 2 is anticipated to begin following contract award in late spring 2019 and will be completed prior to Stage 3.

- **Stage 3 – Site Remediation:** removal of contaminated material and transportation to a permitted facility for disposal. Stage 3 must be completed within the general reduced risk timing windows for instream works on Vancouver Island (June 15th to September 15th).
- **Stage 4 – Site Restoration:** includes backfilling and grading of the site and re-planting of disturbed areas to support fish and wildlife habitat. Stage 4 will be split into two restoration activities: instream restoration and upland restoration. Instream restoration will commence immediately following completion of in-water works (i.e., within the reduced risk timing window for instream works). Upland restoration and vegetation planting will be completed following remedial activities and in periods of favourable environmental conditions from increased precipitation events (i.e., fall 2019).
- **Stage 5 – Long-Term Monitoring:** includes assessment of riparian plantings and restoration areas in accordance with warranty periods (typically for a period of one year). Long-term monitoring may also include qualitative monitoring of riparian area establishment, fish habitat enhancement features, water flow and water quality monitoring. Additional monitoring based on conditions set out by approval and permitting agencies may also be included. Stage 5 is anticipated to be conducted for up to two years post-construction but may depend on specific conditions set out in approvals stipulated by the relevant permitting agencies.

These five stages are described in detail in the following sections.

3.3.1 Planning and Design Activities

The following additional work will need to be completed in tandem with the finalization of the detailed design and prior to the development of tender specifications:

- Completion of detailed remedial design by the design engineer;
- Once the detailed design has been sufficiently advanced, submissions to permitting agencies will need to be completed. The following permit submissions are anticipated to be required:
 - DFO online submission of a Request for Project Review form;
 - Application for BC WSA Water Use Approval and Change Approval (*Section 10 and Section 11, WSA*) (i.e., dewatering construction works and approval for changes in and about a stream); and
 - Application for BC Wildlife Act Permit for fish salvage work (Scientific Fish Collection Permit) and General Wildlife Permit (including animal care form) for the collection and relocation of amphibians, reptiles, and other wildlife that may be incidentally encountered (managed through FrontCounter BC).

Once the above investigations and permitting submissions have been completed, contract specifications can be completed. Completed design drawings and specifications will then be tendered in order to select and engage the remediation Contractor.

Once the remediation Contractor has been selected through the tendering process, the Contractor will be required to complete the following prior to remedial works:

- Health and safety program;
- Environmental Protection Plan (EPP) including:

- environmental protection measures and methods;
- Sediment and Erosion Control Plan; and
- Spill Response Plan.
- Soil and Contaminated Materials Management Plan;
- Construction Work Plan;
- Water Management Plan;
- Transportation Management Plan;
- Disposal facility details;
- Backfill source and quality information;
- Site Restoration Plan; and
- Applicable security clearances and documents if/as appropriate for the site (i.e., working within airside portions of the Airport).

3.3.2 Site Preparation

The site preparation stage is anticipated to include the following:

- Nesting bird surveys within and adjacent to areas identified for vegetation removal will be required prior to any vegetation removal activities;
- Site clearing and grubbing in all Reaches. In many areas, access to the creek can be limited to a number of locations in order to reduce disturbance and retain vegetation, where possible. The Contractor shall attempt to limit the amount of disturbance along each Reach by accessing the remedial areas from only one bank slope and moving up the main channel of the Reach as needed:
 - There will be shrub and small tree clearing required within Reach 1A. Some invasive species (i.e., reed canarygrass (*Phalaris arundinacea*)) removal may be required from the main channel as well as Himalayan blackberry (*Rubus armeniacus*) removal from the creek banks in order to gain access in some areas;
 - Reach 1B will require small tree and shrub clearing in select areas. There is a large Garry oak tree (*Quercus garryana*) adjacent to Reach 1B that will need to be protected from remedial activities. Larger planted trees may be able to be retained where possible along this reach.
 - Reach 1C will involve clearing of some trees and shrubs. Remedial extents have been set to protect larger red alders (*Alnus rubra*) that are growing downstream of the culvert that runs below the gravel access road.
 - Reaches 3 and 4 will involve clearing of some trees and shrubs. Native tree and shrub species that currently exist in these reaches are red alder, black cottonwood (*Populus trichocarpa*), willows (*salix spp.*), Indian plum (*Oemleria cerasiformis*), salmonberry (*Rubus spectabilis*), red osier dogwood (*Cornus stolonifera*) and oceanspray (*Holodiscus discolor*). A number of larger red alder and Douglas fir (*Pseudotsuga menziesii*) trees exist in Reach 4 and the downstream end of Reach 3. To the extent possible, these trees shall be retained.
 - Reach 5 will involve clearing shrubs, small trees, some invasive species, and large trees that may be deemed as a danger or hazard during remediation. To the extent possible, large trees should be limbed in order to gain access, with the majority of the tree being retained. Where root stability following remediation may become compromised, tree removal may be required. A danger tree assessment shall be completed by the Contractor prior to clearing activities. Within Reach 5, decisions on whether to retain or remove a tree may need to be completed on an individual basis and should be completed during the danger tree assessment. Site

- access shall be limited to the northern and eastern sides of the Pond, through Town of Sidney lands.
- Significant trees have been identified within the Project area (see Appendix A). To the extent possible, the significant trees shall be protected during the remediation Project. Significant trees have been defined as trees > 10 cm diameter at breast height (DBH) in Reach 1A and 1B, trees > 30 cm DBH in Reaches 1C, 3, 4 and 5, and select species > 15 cm DBH adjacent in Reach 5 (Garry oak, *Arbutus menziesii*), or Western flowering dogwood (*Cornus nuttallii*);
 - A Certified Arborist will be retained by the Contractor to determine extents of tree clearing in order to keep disturbance to a minimum; and
 - In select areas where there is potential risk to roots of significant trees, hand tools shall be used by the Contractor to obtain remedial extents.
- Installation of sediment and erosion control measures;
 - Contractor site set-up which may include Contractor facilities water management and treatment equipment as required, etc.;
 - Mobilization of equipment and materials to site;
 - Set up of laydown areas and temporary sediment stockpile locations (ground liners, sump pumps, etc.);
 - Identification and protection of underground and overhead utilities prior to initiating work (Contractor);
 - Fish and aquatic species salvage (including amphibians and reptiles); and
 - Channel isolation, dewatering and diversion equipment and supplies to allow work in the dry.

3.3.3 Site Remediation

Preliminary remedial excavation limits will include all areas below the high water mark within Reaches 1A, 1B, 1C, 4 and 5 as well as the eastern-most portion of Reach 3. Table 1 outlines the estimated excavation depths and anticipated excavation volumes.

Site clearing and grubbing within remedial access locations will be done in the Site Preparation phase. A number of remedial access locations may be required for remediation within Reach 5. The location of the remedial access locations will be determined by the Contractor; however, these locations must be approved by the PSPC Departmental Representative (DR) prior to initiation of clearing and grubbing.

Prior to excavation, channel isolation and dewatering will occur. In the upstream Reaches of Reay Creek that are on Airport Lands, it is anticipated that a standard channel isolation and passive flow diversion around the remedial areas will be completed by the Contractor.

Within Reach 5, dewatering is anticipated to be comprised of three phases following channel isolation: (1) passive dewatering of surface water to the lowest elevation of the Pond dam spillway; (2) active pumping of water below the spillway and above the sediment layer; and (3) active dewatering of sediments during remediation. For phases 2 and 3, the Contractor may be required to pump the water into holding tanks, allow the water to decant, conduct treatment (if necessary), complete testing and finally release the water either into downstream creek areas or into sanitary sewer lines. If water is to be released back into the downstream creek areas, water must meet BC water quality guidelines for the protection of freshwater aquatic life (BC ENV, 2018). If discharging water into the sanitary sewer lines, the Contractor shall obtain a waste discharge permit (see Section 2.3.4). The Contractor shall be required to sample the water for analytical testing, record flows and report to the Capital Regional District (CRD) on a regular basis when discharging occurs.

Excavation activities are anticipated to involve smaller equipment in select areas in order to minimize disturbance as much as possible. Equipment to be used may include small track excavators, spider hoe excavators, small tracked dump trucks (e.g., marookas) and standard dump trucks for material transport.

Within Reach 5, it is likely that multiple excavators will be working in the isolated channel. Swamp pads, temporary access routes, or similar devices may be used in the Pond areas to reduce movement of contaminated sediments and to provide a stable base for the equipment. A temporary access road may also be created to allow access to interior sections of the Pond. It is anticipated that one or more excavators may work in tandem to move material within the Pond area and maximize dewatering operations prior to movement of the sediments into dump trucks or other material transport vehicles (e.g., marookas). The Contractor will not be permitted to excavate onto private property.

The Contractor may also temporarily stockpile the removed sediment material prior to transport off-site to the disposal location. Sealed dump trucks will move the contaminated sediments from the remedial areas and truck it to a dedicated stockpile area. The sediments will be windrowed in the stockpile area which will allow for further dewatering and drying of sediments prior to transportation off-site. All dewatering operations and facilities, whether within the Pond area or in the temporary stockpile area, will allow for the collection, treatment, testing and appropriate discharge or disposal of generated water.

The Contractor will be responsible for identifying and protecting all utilities within and immediately adjacent to the excavation areas. The Contractor will be responsible for surveying excavation limits and adhering to finalized detailed design drawings. Confirmatory sediment samples will be collected during remedial works to verify remedial objectives are met (see Section 3.2.3.2 for more detail).

A commissioner escort for all work within air-side areas of Airport Lands will be required. It will be the responsibility of the Contractor to coordinate with VAA for the provision of appropriate commissioner supervision of the works.

The specific remediation methods, means, and sequencing is up to the Contractor performing the work. It is the responsibility of the Contractor's Qualified Professional (QP) that the work is performed in general conformance with this EMS and associated permits or approvals. If not, it is the responsibility of the Contractor to obtain regulatory approvals based on modified methods.

3.3.3.1 *Environmental Monitoring*

Environmental monitoring will be conducted during the remediation program to verify compliance with the terms of the remedial program, the Contractor's EPP, this EMS, and any permitting obligations and requirements.

The Contractor will be responsible for implementation of all necessary environmental controls prior to, and during, the remedial activities for the protection of environmental features and resources at, and immediately adjacent to, the site.

Details of environmental protection measures including sediment and erosion control measures, spill contingency and response planning and equipment, dewatering and water bypass activities and other mitigation measures will be inspected and documented as required. If any corrections, modifications or additional measures are required, the environmental monitor will provide recommendations to the PSPC DR for their implementation by the Contractor.

The environmental monitor will have the authority to halt construction activities in the event of imminent risk to the environment or significant non-compliance issues. PSPC will be notified immediately of any such actions by the environmental monitor. Corrective actions will be the responsibility of the Contractor in order to regain compliance with Project requirements and permit conditions.

3.3.3.2 Excavation Monitoring

On-site excavation monitoring will also be conducted for the duration of the remediation program to monitor, observe and document the remedial excavation works. This includes the creation of a soil/sediment tracking manifest and the collection of the soil/sediment disposal certificates in accordance with standard practices for the off-site removal of contaminated materials. The excavation works for both years of the Project are expected to be undertaken during summer months within the reduced risk fisheries window between June 15 and September 15.

Following excavation works, and prior to backfilling activities, the excavation monitor will collect confirmatory samples to determine the residual sediment quality within the excavated channels. The confirmatory samples will be collected at a frequency consistent with the requirements outlined in BC ENV Technical Guidance Document 1: Site Characterization and Confirmation Testing (BC ENV, 2009).

When excavating the creek areas on Airport Lands, confirmatory samples will be collected from the floor and sidewalls of the excavation approximately 20 m apart. In Reach 5, confirmatory samples will be collected within a 10 m x 10 m grid. This will consist of collecting sidewall samples along each side of the Pond, and one floor sample, every 10 m. All confirmatory samples will be collected to a depth of approximately 5 to 10 cm.

The confirmatory samples will be discrete samples; no composite samples are to be collected in the field or to be composited in the laboratory. Table 2 below details the expected number of confirmatory samples to be collected during the remediation.

**Table 2:
 Expected Number of Confirmatory Samples**

Reach	Number of Confirmatory Floor Samples	Number of Confirmatory Sidewall Samples	Number of BFDs	Total Number of Confirmatory Samples
Reach 1A	6	12	2	20
Reach 1B	8	16	2	26
Reach 1C	4	8	1	13
Reach 3	2	4	1	7
Reach 4	2	4	1	7
Reach 5	21	42	6	69
Total Number of Samples			142	

Should any confirmatory sample exceed the CSR SedFS standards, additional excavation and subsequent confirmatory sampling may be required.

The analytical results will provide valuable information on the post-remediation site conditions prior to installation of backfill material and/or reinstatement of the Reay Creek channel and Pond areas. In some areas adjacent to private property lines adjacent to Reay Creek Pond, slot cuts

or other construction methods to maintain slope stability followed by immediate backfilling may be required for structural and slope stability purposes. In these instances, collection of confirmatory sediment samples may not be possible and it is understood that some residual contamination may remain in place in these areas.

Additional monitoring will be required by a qualified engineer to verify that the Contractor is adhering to the remedial design and that excavation limits are achieved in accordance with the contract. The qualified engineer will be on site periodically as necessary during the remediation.

3.3.4 Site Restoration

Select excavated areas within the creek and Pond will be backfilled using clean sub-rounded to rounded sands, gravels and small cobble. Side slopes along the creek segments will be graded to an approximate 2 Horizontal to 1 Vertical (2:1) slope using clean fill material. Clean sand and gravel material will be used in select locations along the channel bottoms to provide substrates suitable for fish and aquatic organisms. Material is to be clean, sub-rounded to rounded, well graded granular material from naturally formed deposits of sand, gravel and cobbles, free of any recycled material.

Short term sediment and erosion controls shall be implemented by the Contractor immediately following slope disturbance in order to access creek and Pond remedial areas. These measures may include placing topsoil along the bank, followed by covering with an erosion control blanket (e.g., coconut matting, straw matting etc.).

Following placement of backfill material and regrading, disturbed slopes of the creek are to be reseeded with native seed mix and plantings of native shrubs and live stakes of native shrubs or willows shall be installed to provide additional vegetative cover along the creek banks and in disturbed areas along the riparian zones.

The Contractor shall develop a Site Restoration Plan that follows BC Landscape Standards and prioritizes the restoration of native riparian vegetation. The Site Restoration Plan shall be submitted to, and approved by, the PSPC DR prior to conducting restoration activities.

Re-planted shrub species may include salmonberry, thimbleberry (*R. parviflorus*), hardhack (*Spiraea douglasii*), red osier dogwood, oceanspray, and Nootka rose (*Rosa nutkana*). Graminoids that could provide bank stability and enhance instream fish habitat may include slough sedge (*Carex Obnupta*), small-flowered bulrush (*Scirpus microcarpus*) and soft-stemmed bulrush (*S. lacustris*).

Tree planting with appropriate native species such as red alder and black cottonwood shall be installed within the disturbed riparian areas. Species selection should consider full mature height to ensure height restrictions in accordance with Airport operations are not exceeded. The frequency and number of tree plantings should be linked to removal activities such that no net loss of trees results from the Project. If trees are required to be removed in order to access remedial areas, they should be replaced with two species of the same tree (if native) or a suitable native tree species (if exotic).

Aquatic habitat enhancement features shall be maintained or installed, where appropriate. Existing riffles within the bypass channel (Reach 1B) shall be retained in order to provide flow diversity within the channel. Following remediation in the Pond (Reach 5), aquatic habitat enhancement features shall be installed at access locations to increase structural diversity and

habitat complexity. Root balls, anchored logs, and large woody debris (LWD) should be placed at these disturbed areas (see Appendix A). No instream aquatic vegetation will be planted as it is anticipated that species shall recolonize naturally from upstream sources.

The manicured areas adjacent to Northbrook and Westbrook Drive shall be restored to their original state. The Contractor shall demobilize from the site and restore any disturbed areas to pre-construction conditions including remedial access locations and laydown areas as required.

3.3.5 Long Term Monitoring

Periodic inspection of the constructed works is likely to be required as a condition of approval from regulatory agencies such as DFO and the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD; administers the BC Water Sustainability Act). Environmental monitoring will be completed during remedial activities (see Section 3.2.3.1).

A confirmatory sampling program will be implemented to confirm and verify results of the sediment remediation program prior to reinstating creek and Pond areas.

For up to two years following remediation, a QEP will conduct qualitative monitoring of the riparian plantings, fish habitat enhancement efforts and water flow rate and create a follow-up post-remediation report describing the findings and recommendations of the monitoring effort. It is anticipated that regular water quality and flow monitoring will continue to be conducted by VAA which will likely satisfy any water volume and quality monitoring requirements.

4.0 EXISTING ENVIRONMENTAL CONDITIONS

4.1 Previous Reports and Assessments

A review of available literature and web-based information was conducted to identify existing and potential terrestrial and aquatic resources at the Project site. Several reports, assessments and investigations have been undertaken throughout the Reay Creek system over the past several years. The following studies were reviewed to provide context and information regarding current conditions within Reay Creek:

- Victoria International Airport Environmental Baseline Study - M.M. Dillon Ltd., 1994.
- Subsurface Soils Investigation - Environmental Design Solutions Ltd. (EDSL), 2003.
- Reay Creek Watershed – Proper Functioning Condition Assessment - Aqua-Tex, 2004.
- Assessment of Metal Contamination and Fish Kills in Reay Creek at Victoria International Airport - Environmental Solutions Partnership, Royal Roads University (undated, approximately 2005).
- Investigation of Recent Fish Kills (March 2003 and November 2004) in Reay Creek - Global Environmental Management Systems Ltd, 2005.
- Reay Creek Assessment Study - MB Laboratories, September 2005.
- Site Inspection, Navair Lease Property, Victoria International Airport, BC - Franz Environmental Inc., 2006.
- Detailed Site Investigation (DSI), Hangar 17-39, Victoria Airport, Sydney, BC - Franz Environmental Inc., 2006.
- Airfield Tributary Storm Drain Remediation Program Summary - Bethell Associates Ltd., 2007.
- Lower Airfield Ditch Remediation - Bethell Associates Ltd., 2008.
- Upper Airfield Ditch Remediation - Bethell Associates Ltd., 2008.

- Reay Creek Pond Remediation Study - Justin Robinson and Rachelle Sarrazin, 2010.
- Reay Creek Channel Rehabilitation - SLR, 2012.
- Reay Creek Remediation Project Summary - SLR, 2012.
- Sediment and Water Sampling Results, Reay Creek Hydraulic Oil Spill - SLR, 2012.
- Reay Creek Dam, Sidney, BC Geotechnical Inspection and Assessment - Thurber Engineering Ltd., 2013.
- Underground Services Condition Survey at Victoria International Airport - Kerr Wood Leidal, 2014.
- Environmental Consulting Services - Viking Air Spill Support - SLR, 2015.
- Plating Shop Spill Response, Viking Air Facility, Victoria International Airport, Sidney, BC - Arcadis, 2015.
- Reay Creek Sediment Sampling Results - Viking Air Spill Support – SLR, 2015.
- Sampling and Analysis of Reay Creek Pond Sediments - SLR, 2015.
- Reay Creek Side Channel Sediment Removal – SLR, 2015.
- An Investigation of Reay Creek Pond - Macdonald and Bruce, 2015.
- Technical memorandum - Reay Creek Preliminary Stormwater Impact Assessment - Kerr Wood Leidal, 2015.
- Data Gap Analyses Reay Creek Pond – SLR, 2016.
- Reay Creek Sediment and Soil Investigation - 2016 Stormwater Management Plan Design – SLR, 2016.
- Phase II Environmental Site Assessment - Reay Creek (on Victoria Airport Lands) – SLR, 2019.
- Reay Creek Remediation – Preliminary Remedial Action Plan Reaches 1 to 4 (Draft) – SLR, 2018.
- Reay Creek Remediation – Archaeological Overview Assessment. Millennia Research Limited. 2018.
- Reay Creek Fish and Fish Habitat Assessment. LGL Limited Environmental Research Associates. 2018.
- Reay Creek Supplemental Sediment Sampling and Probing on Airport Lands (Final) – SLR, 2019.

Detailed summaries of each of the above reports are provided in the updated RAP (SLR, 2019).

4.2 Site Visits

SLR biologists have conducted numerous site visits of the remedial areas of Reay Creek in tandem with design engineers. During these visits, observations were made along Reaches 1 through 5 regarding the description of the riparian habitat and possible Contractor remedial access locations. The riparian habitat was observed to consist mainly of deciduous trees, shrubs and riparian forbs that provide shade to the creek and foraging and nesting habitat potential for birds. Preliminary observations were made to identify trees that could be retained during construction. These trees were identified as significant trees and are provided on construction design drawings (see Section 3.2.2). Additional assessments have been completed including supplemental sediment sampling programs, site visits to assess remedial strategies and options, sediment probing programs, and geotechnical assessments of the Project area.

A fish and fish habitat assessment was also completed by LGL Limited Environmental Research Associates (LGL, 2018). The results of the assessment have been described in Section 5.2.3.

4.3 External Resources

In addition to the site visits and site-specific reports, the following sources were examined as part of the EMS:

- BC Conservation Data Centre iMap: <http://www.env.gov.bc.ca/cdc/>
- BC Species and Ecosystems Explorer: <http://a100.gov.bc.ca/pub/eswp/>
- BC Water Resource Atlas: <http://maps.gov.bc.ca/ess/sv/wrbc/>
- Environment Canada – Climate: <http://climate.weather.gc.ca/>
- Fisheries and Oceans Canada - New Salmon Escapement Database System: <https://open.canada.ca/data/en/dataset/c48669a3-045b-400d-b730-48aafe8c5ee6>
- Environment Canada. *National Air Pollution Surveillance Program*: <https://www.canada.ca/en/environment-climate-change/services/air-pollution/>
- Environment Canada. General Nesting Periods of Migratory Birds: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harmmigratory-birds/general-nesting-periods/>

4.4 Project Boundaries

4.4.1 Spatial Boundaries

Reay Creek is a sinuous linear channel that originates at the VIA in North Saanich, BC. It runs through the Town of Sidney and terminates in Bazan Bay in North Saanich, BC. Reaches 1 to 4 are located within VIA property. Reay Creek flows in a southeast direction and below Canora Road through a culvert. Downstream of the culvert, Reay Creek turns into Reay Creek Pond (Reach 5) on the Town of Sidney lands. Reay Creek Pond is bounded by seven residential lots along its southwest bank edge. Along its northeast bank edge, the Pond is bounded by two residential lots (only the east-most lot has a dwelling) and Reay Creek Park. The park is comprised mainly of a grassed boulevard that is lined with trees and is further bound by Wesbrook Drive along its northeast edge. A dam, owned and maintained by the Town of Sidney, is located at the downstream end of Reay Creek Pond. Construction drawings in Appendix A show the spatial boundaries of the Project area.

4.4.2 Temporal Boundaries

For Reaches 1 to 4, site preparation works are anticipated to commence in the spring of 2019 following contract award. Instream Project works are anticipated to be completed in the summer of 2019, and upland site restoration work will extend into the fall of 2019.

Reach 5 will be remediated in a subsequent year. The anticipated preliminary schedule for various Project components can be referenced in Section 3.2.

The yearly Project components will take place within multiple timing windows (e.g., general nesting windows, reduced risk fisheries windows). Additional mitigation measures must be considered when Project activities occur outside these windows (see Section 6.0).

Site preparation works will be completed within the general nesting period for migratory birds (mid-March to mid-August; Environment Canada, 2019). Mitigation measures have been outlined for site clearing activities occurring within the general nesting period and can be referenced below in Section 6.2.2.

Instream work shall be conducted within the general reduced risk timing (instream work) windows for Vancouver Island (from June 15th to September 15th). Relevant data (DFO, 2018) indicate that cutthroat trout (*Oncorhynchus clarkia*) and coho salmon (*O. kisutch*) have been observed within Reach 5 and further downstream. Despite the presence of these salmonids within the Reay Creek system, average aquatic habitat for salmonids within Reaches 1A – 1C is considered poor. Reaches 2 – 4 have classified the average aquatic habitat for salmonids as fair, while Reach 5 has been considered to have good aquatic habitat for salmonids (LGL, 2018; see Section 5.2.3). Fish capture efforts have determined that the majority of fish species present within the Reay Creek system are threespine stickleback (*Gasterosteus aculeatus*) (LGL, 2018). Therefore, the likelihood of the presence of cutthroat trout and coho salmon occurring within the upper reaches of Reay Creek on VAA lands, particularly during summer months, is low. If mitigation measures are implemented (see Section 6.2.4.1), construction activities can proceed using the general reduced risk timing window for instream work.

4.5 General Description

Reay Creek is a permanent coolwater urban stream within the Reay Creek watershed. Reay Creek headwaters daylight at the upstream end of Reach 1B and originate from airside runway and other Airport Lands drainage routes. On Airport Lands, Reay Creek consists of narrow, linear channels that are lined with riparian vegetation (see Drawings in Appendix A). Further downstream of Canora Road, Reay Creek becomes a linear Pond due to a historic dam that is owned and maintained by the Town of Sidney. Further downstream of the dam and outside of the Project Area, Reay Creek again becomes a sinuous creek within a forested park area. For detailed information on specific environmental components, refer to Section 5.0, below.

5.0 VALUED ECOSYSTEM COMPONENTS

Valued Ecosystem Components (VECs) are described below. VECs have been broken down amongst physical, biological and social components consistent with established EMS practices.

5.1 Physical Components

5.1.1 Atmosphere

Atmosphere is selected as a VEC as it has been identified as an important aspect of the environment by provincial and federal regulators and because emissions from the Project activities have the potential to alter the existing air quality.

Environment Canada works with provincial and territorial governments to implement the National Air Pollution Surveillance program, which provides long-term air quality data from across Canada (Environment Canada, 2013). There are numerous data collection stations within Western Canada. Although not directly specific to the Project area, the station in Victoria (Victoria Topaz, station ID# 231886) has the most complete data for the region.

Based on the 2016 ambient air quality data from the Victoria monitoring station, the ambient air quality in the area is good most of the time, with no averages exceeding the applicable limits for the measured pollutants (Environment Canada, 2013).

5.1.2 Ambient Noise

Acoustic environment is selected as a VEC as it has been identified as an important aspect of the environment by public, provincial and federal regulators and because noise, defined as an unwanted sound, from the Project activities has the potential to alter the existing outdoor acoustic environment. Noise conditions in the Project area are dominated by flight traffic at the VAA as well as local traffic along Canora Road and various other urban noise sources.

5.1.3 Surface Water

Water Quality is a critical component in the maintenance of healthy aquatic ecosystems. It is a valued component in its own right, as well as being crucial to the functioning and maintenance of other biological VECs such as fish, amphibians and benthic communities and linkages with other biological, social and aboriginal VECs.

Reay Creek is a low-gradient stream with the upstream portion draining Airport Lands including runways, open fields and meadow. The downstream sections of Reay Creek meander through urban forested areas (AquaTex, 2004; LGL, 2018). Stormwater inputs and outfalls occur throughout the length of Reay Creek including from the East Industrial Area on Airport Lands and municipal outfalls adjacent to Reay Creek Pond and further downstream.

Relevant data indicate the presence of cutthroat trout and coho salmon within Reach 5 and further downstream (see Section 5.2.4.1). Robinson and Sarrazin (2010) noted that based on the optimum temperature ranges for specific life history stages of salmonids, the temperatures at several locations in Reay Creek Pond exceeded temperature requirements for many of the coho and cutthroat trout life stages (BC ENV, 2001). The temperature in the middle of Reay Creek Pond exceeded all optimum temperatures for incubation, rearing, migration and spawning life stages for coho and cutthroat trout.

In the same study by Robinson and Sarrazin (2010), dissolved oxygen (DO) levels were suitable to sustain aquatic wildlife but were too low to accommodate spawning activities and healthy populations of food sources for salmonids.

Large fluctuations in pH were identified throughout Reay Creek Pond (Robinson and Sarrazin, 2010), which is an important non-chemical parameter that can have adverse impacts on fish and fish habitat. Available data (Robertson & Bryan, 2004) suggest that Reay Creek Pond would not be suitable to support or sustain a population of coho salmon and cutthroat trout in its current state. Recent fish capture activities have been completed within the Pond and have determined that the majority of fish occurring within the pond are threespine stickleback (LGL, 2018).

In addition to these parameters, contamination has also been documented to affect the aquatic community in Reay Creek. In 2003 and 2004, approximately 600 coho fry and 80 cutthroat trout were found dead in Reay Creek. Fish tissue chemical analysis identified lethal doses of cadmium in these fish (Robinson and Sarrazin, 2010), which is suspected to be the result of an upstream release.

The VAA maintains two fixed water monitoring stations on Airport Lands, one at TenTen Creek and one at Reay Creek. Weekly water samples are taken to monitor water quality leaving Airport property. In addition to the fixed stations, the Airport uses portable testing stations when analyzing various inputs to the creeks (VAA, 2016).

Table 3 following, summarizes metals concentrations in surface water collected by VAA from the Reay Creek sampling station between 2012 and 2017. Results are compared against Canadian Council of Ministers of the Environment (CCME) water quality guidelines for protection of freshwater aquatic life (AFW). As Reay Creek Pond is located on Town of Sidney lands, BC Water Quality Guidelines for the protection of freshwater aquatic life have been presented in the following table. With the exception of past episodic and periodic spill events, trends in recent years have indicated water quality improvement due to upstream activities and controls such as stormwater pipe cleanouts, environmental procedural controls within the East Camp, and Glycol Recovery and Monitoring programs (VAA, 2016). Removal of sediment contamination in the upper Reaches of Reay Creek through the current remediation Project is anticipated to continue to improve water quality.

**Table 3:
Summary of Metals Concentrations in Surface Water Collected by VAA within the Upper Reaches of Reay Creek (on Airport Lands)**

Parameter	CCME AFW Guideline (µg/L)	BC AFW Standard (µg/L)	Concentration (µg/L)	
Total Hardness (CaCO ₃)	n/a ¹	n/a ¹	Minimum	33.1
			Maximum	374
			Average	171
Total Mercury (Hg)	0.026	0.00125 ³	Minimum	0.0051
			Maximum	0.022
			Average	0.01
Total Arsenic (As)	5.0	5.0 ⁴	Minimum	0.28
			Maximum	13.3
			Average	0.70
Total Boron (B)	1500	1200 ³	Minimum	51
			Maximum	318
			Average	84.2
Total Cadmium (Cd)	Hardness Dependent ²	Hardness Dependent ^{2*}	Minimum	0.01
			Maximum	0.46
			Average	0.12
Total Chromium (Cr)	1.0 ^{5,6}	1.0 ^{6,7}	Minimum	1.0
			Maximum	29.8
			Average	2.27
Total Copper (Cu)	Hardness Dependent ²	Hardness Dependent ²	Minimum	1.03
			Maximum	70.6
			Average	6.55
Total Iron (Fe)	300	1000 ⁴	Minimum	174
			Maximum	9560
			Average	792
Total Lead (Pb)	Hardness Dependent ²	Hardness Dependent ²	Minimum	0.2
			Maximum	6.05
			Average	0.81

Parameter	CCME AFW Guideline (µg/L)	BC AFW Standard (µg/L)	Concentration (µg/L)	
Total Molybdenum (Mo)	73	1000 ³	Minimum	1
			Maximum	12.8
			Average	2.40
Total Selenium (Se)	1.0	1.0 ³	Minimum	0.1
			Maximum	0.55
			Average	0.15
Total Silver (Ag)	0.25	Hardness Dependent ²	Minimum	0.02
			Maximum	0.42
			Average	0.05
Total Thallium (Tl)	0.8	0.8 ⁷	Minimum	0.282
			Maximum	0.282
			Average	0.282
Total Uranium (U)	15	8.5 ⁷	Minimum	0.1
			Maximum	1.49
			Average	0.52
Total Zinc (Zn)	30	Hardness Dependent ²	Minimum	5.9
			Maximum	240
			Average	27.4

Bold – Exceeds CCME AFW Guideline and/or BC WQG AFW

¹ No CCME AFW Guideline or BC AFW Guideline exists for parameter

² Guideline is dependent on waterbody hardness

² Standard is dependent on waterbody hardness. Standard is based on dissolved cadmium. No standards exist for total values.

³ BC WQG (Approved), AFW, Long-term (30 day)

⁴ BC WQG (Approved), AFW, Short-term

⁵ CCME WQG, AFW, Long-term guideline

⁶ Chromium VI guideline used for conservative purposes

⁷ BC WQG, AFW (Working), Long-term (30 day)

One water license exists within Reay Creek. Water licenses allow licensees to divert, store and use specific quantities of water for one or more water use purposes. A water license may also authorize works related to the diversion and use of the water (BC ENV, 2019b). The license is held by Town of Sidney for the purpose of construction works (License Number C064092). Under the license the Town of Sidney is permitted to use 3,700 m³ of water per year from Reay Creek, although it should be noted that the specific use and intention of this water use is unknown.

5.1.4 Sediment

Numerous environmental investigations of Reay Creek have been completed since 2003. During the Phase II Environmental Site Assessment (ESA; SLR, 2018), sediment stratigraphy in areas surrounding Reaches 1 to 4 consisted of silt and silty clay overlying clay. The sediments encountered from samples collected were composed of mainly gray clay and sand with organics with some brown/orange mottling. Sediments within Reach 5 have been investigated and have been deemed to be contaminated with metals throughout this Reach (SLR, 2015).

Historic sediment quality data were compiled from various sources including SLR, CRD, and VAA including investigations up to December 2018. The primary contaminants of concern at the site include select metals parameters in sediment including arsenic, cadmium, chromium (total), copper, lead, mercury and zinc. A summary of select metals results in sediment within each designated reach of Reay Creek are provided below in Table 4 with comparison to the remedial objective for the site (CSR SedFS standards). The following data was compiled from previous SLR sampling programs, CRD, and VAA.

**Table 4:
Summary of Metals Concentrations in Sediment within Reay Creek**

Parameter	CSR SedFS Standard (mg/kg)		Concentration (mg/kg)					
			Reach 1A	Reach 1B	Reach 1C	Reach 3	Reach 4	Reach 5
pH	n/a ¹	Minimum	7.10	6.38	7.35	6.72	6.67	6.17
		Maximum	7.75	7.94	7.77	7.93	6.67	7.21
		Average	7.46	7.16	7.58	7.14	6.67	6.7
Arsenic	11	Minimum	6.60	3.13	5.48	5.33	2.0	4.51
		Maximum	12.5	10.3	9.50	8.62	21.3	11.2
		Average	8.34	5.98	7.18	7.38	5.24	5.9
Cadmium	2.2	Minimum	0.266	0.276	1.01	0.326	0.40	0.448
		Maximum	18.9	3.94	4.72	0.397	12.6	42.1
		Average	6.59	0.87	2.97	0.357	4.29	22
Chromium (total)	56	Minimum	48.4	25.4	30.7	31.9	16.3	31.2
		Maximum	271	59.6	73.7	59.3	152	153
		Average	129	42.3	54.3	46.1	47.6	123
Copper	120	Minimum	53.1	22.1	26.2	41.6	18.0	22.5
		Maximum	192	168	137	67.5	132	99.8
		Average	124	62.0	73.2	58.8	43.4	59
Lead	57	Minimum	6.54	4.84	8.477	7.64	6.0	13.9
		Maximum	140	57.3	45.4	9.29	44.0	68.2
		Average	61.3	17.2	23.8	8.21	17.2	42
Mercury	0.3	Minimum	0.058	<0.05	<0.05	<0.05	<0.05	<0.05
		Maximum	0.216	0.16	0.141	0.065	4.80	0.129
		Average	0.123	0.067	0.080	0.059	0.261	0.087
Zinc	200	Minimum	77.0	62.9	115	102	77.7	90.7
		Maximum	1390	1300	1710	320	614	700
		Average	576	247	680	175	295	366

Bold – Exceeds BC CSR Sed FS standard.

¹ No CSR SedFS Standard exists for parameter

Note: Reach 2 has recently been remediated as part of the VAA Detention Pond Project. Confirmatory sediment sampling results have confirmed successful removal of contaminated sediment in this area. Reach 2 has not been included in the above table or remedial areas.

5.1.5 Soils and Groundwater

The geology of the Reay Creek area is dominated by deposits of Victoria clay overlying bedrock (Blyth & Rutter, 1993). In an aquifer located approximately 0.5 km south of Reay Creek, and falling partially within the Reay Creek watershed, the clay layer was found to be between 0.91 and 12 m thick (AquaTex, 2004).

During the Phase II ESA conducted by SLR (SLR, 2018), while installing groundwater monitoring wells adjacent to Reaches 1 A-C, depth to groundwater ranged from 1.91 m below ground surface (bgs) to 3.65 m bgs. Groundwater concentrations exceeded federal interim groundwater guidelines for cadmium, iron and selenium at select monitoring well locations. Provincial groundwater standards for drinking water check values were also exceeded for iron, lithium and manganese. However, since groundwater is not used as a supply of drinking water at or immediately near the site, these standards are unlikely to apply. All other parameters tested in groundwater were below federal and provincial guidelines and standards.

Existing water well infrastructure was determined using an electronic search of the on-line BC Water Resource Atlas. The search indicated 40 water wells occurring within a 1,000 m buffer of the proposed Project area (BC ENV, 2019b). Of these, 6 were designated as other use, 4 were designated as private domestic use, and 30 were designated as unknown use (Appendix B). The nearest water well is located 415 m southwest of the Project area and is designated as unknown use.

5.2 Biological Components

5.2.1 Terrestrial Habitat

Terrestrial habitat has been selected as a VEC because of the intrinsic value of wildlife and wildlife habitat, specifically within riparian areas.

Riparian areas are unique ecosystems that surround the banks of waterways. The individuals in a riparian community have specific adaptations for living in repeatedly flooded environments. Riparian forests provide critical wildlife habitat for migratory songbirds, waterfowl, fish and a host of other species. The vegetation within riparian areas provides predator protection, shade that cools water temperatures, breeding and nesting areas, and food sources.

5.2.1.1 Vegetation

The riparian vegetation on Airport Lands has height restrictions due to the proximity of Reay Creek to Airport runways. From Reach 1A to 1C, the riparian habitat consists mainly of woody shrub species and some shorter trees such as willows and red alder. Adjacent to Reaches 3 and 4, the riparian habitat is comprised of mainly taller alders, black cottonwoods and Douglas fir trees. Beyond the riparian vegetation, the surrounding area has been cleared of natural vegetation in order to maintain sight lines for the Airport. Large areas of land consist of parking lots, runways and fields that are maintained by Airport staff. Invasive species such as Himalayan blackberry occur throughout many areas surrounding the upstream creek sections.

Surrounding Reach 5, the riparian habitat is made up of a number of woody shrub species lining the steep banks as well as large deciduous trees such as big leaf maple (*Acer macrophyllum*), red alder, black cottonwood, western redcedar and ornamental weeping willow (*S. babylonica*). A large proportion of invasive species including Himalayan blackberry and English ivy as well as

other native woody shrub species and herbs are present along the banks of Reach 5. Manicured lawns associated with adjacent private properties also occur along much of the southwestern pond perimeter.

5.2.1.2 *Plant Species at Risk*

The BC Species and Ecosystem Explorer online database was reviewed for potential occurrences of plant SAR that may be found within the Project area. The search was refined by filtering through spatial categories. SLR narrowed results to Vancouver Island, CRD, Coastal Douglas Fir (CDF) biogeoclimatic zone, and riparian habitat. The results of the advanced search indicated that three plant SAR potentially occur within the Project area (Appendix B). Following a literature review of each species record, SLR concluded that one plant SAR (Columbian water-meal) has the potential to occur within or near the Project area; this species is shown in Table 5 and discussed below.

The BC Conservation Data Centre (CDC) database was reviewed for records of plant and ecosystem SAR. This search revealed one plant or fungi SAR occurrence and five ecosystem occurrences that have been mapped on site or within 1.5 km from the center of the site (Table 5). One masked occurrence was found to potentially occur within 1.5 km the site; however, further discussions with the BC CDC indicated that the details of this occurrence are not required for the planning of site activities (i.e., Project activities are unlikely to impact this masked species occurrence).

The ecological community, *Populus trichocarpa* - *Alnus rubra* / *Rubus spectabilis* (black cottonwood - red alder / salmonberry) exists within the floodplain of Reay Creek, along Reach 5 as well as areas further downstream. This ecological community is designated as Blue Listed under Provincial status but is not designated under the SARA. Based on previous site visit observations, this ecological community primarily occurs further downstream of the dam within Reay Creek Park and is unlikely to be affected by Project activities.

Downstream of the dam within Reay Creek Park, three additional provincially red-listed terrestrial communities were observed by Sherwood, Franke, and Fitzpatrick (2018). These included (1) the ecological community (red alder and skunk cabbage (*Lysichiton americanus*)), (2) the ecological community of Western redcedar, Douglas fir, and Oregon beaked-moss (*Eurhynchium oregonum*), and (3) the ecological community (Douglas fir and/or grandifir (*Abies grandis*) with an understory cover of dull Oregon-grape (*Mahonia nervosa*). None of these communities are protected under SARA and all were observed downstream of the dam. Therefore, these ecological communities are not anticipated to be affected by Project activities.

Columbian water-meal, an aquatic plant species was identified using the BC Species and Ecosystem Explorer as having the potential to occur within the Project area. Known mapped occurrences indicate that the nearest population of this plant is found in Beaver Lake, approximately 15 km south of the site. Therefore, it is unlikely that this plant will occur, or be affected by, Project activities. The remainder of the potentially occurring ecological communities and plant SAR have been mapped by the CDC and are unlikely to occur or be affected by Project activities.

More detailed descriptions of terrestrial habitat community and SAR records are provided in Table 5 below.

**Table 5:
Terrestrial Plant and Ecological Community SAR Potentially Occurring within the Project Area**

Scientific Name	English Name	Classification	BC List	SARA Schedule	Location
Within Reay Creek Project Area					
<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i> ¹	black cottonwood - red alder / salmonberry	Ecological Community	Blue	---	On the floodplain of Reay Creek between Victoria Airport and the highway
Within 1.5 km of Reay Creek Project Area					
<i>Thuja plicata</i> / <i>Achlys triphylla</i> ¹	western redcedar / vanilla leaf	Ecological Community	Red	---	Near small stream east of present Dunsmuir Lodge
<i>Thuja plicata</i> / <i>Oemleria cerasiformis</i> ¹	western redcedar / Indian-plum	Ecological Community	Red	---	Near small stream east of present Dunsmuir Lodge
<i>Abies grandis</i> / <i>Mahonia nervosa</i> ¹	grand fir / dull Oregon-grape	Ecological Community	Red	---	Northeast side of Mt. Newton, northeast of present Dunsmuir Lodge
<i>Pseudotsuga menziesii</i> / <i>Berberis nervosa</i> ¹	Douglas-fir / dull Oregon-grape	Ecological Community	Red	---	Mount Newton, Saanich Peninsula
<i>Abies grandis</i> / <i>Tiarella trifoliata</i> ¹	grand fir / three-leaved foamflower	Ecological Community	Red	---	Piece of Airport south of Airport access road
<i>Epilobium torreyi</i> ¹	Brook spike-primrose	Vascular Plant	Blue	1, Endangered	West of Bazan Bay, near McTavish Road
<i>Wolffia columbiana</i> ²	Columbian water-meal	Vascular Plant (aquatic)	Blue	---	---

¹ CDC generated results

² BC Species and Ecosystem Explorer generated result

5.2.2 Terrestrial Animals

Terrestrial animals, including migratory and nesting birds, are selected as a VEC as they have been identified as an important aspect of the environment and have intrinsic value within the greater terrestrial ecosystem.

The areas surrounding Reay Creek on Airport Lands are surrounded by grass fields that are maintained by the VAA for aircraft approach. Residential urban properties surround Reay Creek Pond, while further downstream of the Pond, an urban park trail which is maintained by the Town of Sidney, follows the creek for approximately 650 m before terminating adjacent to the Patricia Bay Highway.

Terrestrial species occurring within the general area of the Project are those typical of an urban environment and likely include urban deer, squirrels, bats, raccoons, mice, voles, passerine birds, and some larger birds of prey.

Airport Lands are actively managed to discourage or prevent specific wildlife from potentially coming into contact with aircraft. Although this is primarily focused on birds, all mammals that could pose a risk to aviation safety are encompassed in the program.

The Airport works to discourage birds from feeding in high-risk zones using a variety of non-lethal techniques in habitat management and deterrents. A continued focus on drainage helps to reduce the potential for flooding in airside fields, which can attract waterfowl and gulls.

There is a potential for nesting birds to occur within the Project area during remedial works. Mitigation measures detailing methods to avoid adverse impacts to nesting birds can be found below in Section 6.2.2.

5.2.2.1 *Terrestrial Species at Risk*

The BC Species and Ecosystem Explorer online database was reviewed for potential occurrences of animal SAR that may be found within the Project area. The search was refined by filtering through spatial categories as indicated above in Section 5.2.1.2. The results of the advanced search indicated that 32 animal species potentially occur within the Project area (Appendix B). SLR conducted a literature review of each potential occurrence and refined the potential to 8 terrestrial animal SAR that could occur in the Project area. These species can be found in Table 6 below.

One Provincially red-listed species (warty jumping slug) was among one of the potential occurrences within the Project area. Following a literature review, it was determined that this species is unlikely to occur within the Project area, as the habitat and biological needs associated with the warty jumping slug do not occur within the Project boundary. The warty jumping slug is associated with rich mesic mature and old growth coniferous temperate forests dominated by western hemlock (*Tsuga heterophylla*) and western redcedar (BC Invertebrate Recovery Team, 2008), none of which occur within, or adjacent to, the Project area.

The BC CDC database was reviewed for records of terrestrial SAR. This search revealed one animal SAR species occurrence (Brant) has been mapped on the site or within 1.5 km from the center of the site. Additionally, one masked occurrence was found to potentially occur within the Project area; however, further discussions with the BC CDC indicated that the details of this occurrence are not needed to plan activities at the site and therefore Project activities are unlikely to impact this masked species occurrence. More detailed descriptions of animal SAR records are provided in Table 6 below.

**Table 6:
Terrestrial Animal SAR Potentially Occurring within the Project Area**

Scientific Name	English Name	Classification	BC List	SARA Schedule
Bats				
<i>Corynorhinus townsendii</i> ²	Townsend's Big-Eared Bat	Vertebrate Animal (Bat)	Blue	---
<i>Myotis lucifugus</i> ²	Little Brown Myotis	Vertebrate Animal (Bat)	Yellow	1, Endangered
Birds				
<i>Ardea Herodias fannini</i> ²	Great Blue Heron, <i>fannini</i> subspecies	Vertebrate Animal (Bird)	Blue	1, Special Concern
<i>Butorides virescens</i> ²	Green Heron	Vertebrate Animal (Bird)	Blue	---
<i>Megascops kennicottii kennicottii</i> ²	Western Screech-Owl, <i>kennicottii</i> subspecies	Vertebrate Animal (Bird)	Blue	1, Threatened
<i>Branta bernicla</i> ¹	Brant	Vertebrate Animal (bird)	Red	---
Invertebrates				
<i>Sympetrum vicinum</i> ²	Autumn Meadowhawk	Invertebrate Animal (Dragonfly)	Blue	---
<i>Tamea lacerata</i> ²	Black Saddlebags	Invertebrate Animal (Dragonfly)	Red	---
<i>Hemphillia glandulosa</i> ²	Warty Jumping-slug	Invertebrate Animal (Slug)	Red	1, Special Concern

¹ CDC generated results

² BC Species and Ecosystem Explorer generated result

Many of the SAR listed above are transient in nature and are not likely to occur within the land or waters in and around Reay Creek. The CDC occurrence of the Brant is unlikely to occur within the Project area due to its affinity for coastal habitats. Furthermore, the last date that this species was observed in the CDC database was in 1993.

5.2.3 Aquatic Habitat

Aquatic habitat is selected as a VEC because of Reay Creek's potential for fish spawning, rearing and feeding. The aquatic habitat can be an indicator for the productive capacity of a waterbody and the associated riparian vegetation, which is important to both people and wildlife.

Aquatic habitat is often defined by numerous biophysical parameters including hydrology, channel and flow characteristics, substrate, cover, water and sediment quality, and benthic invertebrate communities. Furthermore, water quality parameters help to define aquatic habitat including temperature, DO, total suspended solids (TSS), turbidity and pH. Overhanging riparian vegetation is present in all reaches of the Project area, while emergent and submergent aquatic vegetation are present primarily in Reaches 1A, 1B and 5. This habitat feature provides structural complexity as well as potential spawning and rearing opportunities to the fish within the Reay Creek system.

The upper portion of Reay Creek is located on VIA property and extends from the headwaters located south of the East Camp area and flows in a southeast direction for approximately 450 m to 500 m to a culvert under Canora Road. In 2012, a new 190 m (approximate) channel was constructed to bypass a 130 m portion of the old channel that received potentially contaminated stormwater from the East Camp area. Upper Reay Creek, which includes a tributary channel, has been segregated into six sub-reaches to allow for proper assessment and determination of appropriate remedial actions (Appendix A). Lower Reay Creek consists of Reay Creek Pond, which flows over a constructed dam and becomes a sinuous channel further downstream. The Project area consists of Reaches 1 to 5 and the aquatic habitat within these Reaches is described in the following sections.

5.2.3.1 *Reach 1A*

Reach 1A is a segregated, 130 m section of the historic channel that is presently known as the “former channel”. Reach 1A is connected to the main channel via two gates / dam structures with flow-controllers and is currently used to receive stormwater through several outfalls that drain surface water from the nearby East Camp (Photo 1). Reach 1A also provides emergency control and storage capacity in the event of spill events as the channel can be isolated by closing the flow control gates at both the upstream and downstream ends of the reach. Currently, this channel is used as a water quality improvement linear wetland/retention Pond with instream vegetation consisting primarily of reed canarygrass (Photo 2). Fish habitat surveys completed by LGL (2018) indicate that Reach 1A is rated “good” for holding pools and percent overhead cover, and “poor” for percent of pools, pool frequency, percent of wood in pools, spawning gravel quantity, and gravel quality.

The riparian vegetation in Reach 1A consists of numerous groves of mature native shrubs and deciduous trees (Photo 3). A number of large patches of Himalayan blackberry exist along the north bank of Reach 1A (Photo 4), as well as on the vegetated berm that separates Reach 1A from Reach 1B.

5.2.3.2 *Reach 1B*

Reach 1B is a 190 m stretch known as the “bypass channel” and was constructed in 2012 to allow Reay Creek headwaters to bypass Reach 1A – former channel. Reay Creek headwaters daylight at the upstream end of Reach 1B and originate from airside runway and other Airport Lands drainage routes (Photo 5). Rip rap armouring was placed along the stream channel at the headwaters and along the outer edges of the creek meanders to limit erosion during higher flows anticipated in fall and spring seasons. Coconut and straw matting was placed, stapled and staked along the length of the new channel side-slopes to reduce erosion and sedimentation potential and to facilitate establishment of vegetative cover. Three riffle structures were installed within the new channel to diversify flow patterns and to reduce the potential for channel erosion while also providing habitat diversity and potential support for spawning areas in the future. Fish habitat surveys completed by LGL (2018) indicate that Reach 1B is rated “good” for holding pools and percent overhead cover, and “poor” for percent of pools, pool frequency, percent of wood in pools, spawning gravel quantity, and gravel quality.

Instream aquatic vegetation consisting mainly of duckweed (*Lemnaceae* sp.), sedges and rushes exists in areas of lower flow within Reach 1B (Photo 6). Riparian vegetation has matured since its installation in 2012 and consists mainly of red alders and willow shrubs that were planted along the south bank edge (Photo 7).

5.2.3.3 *Reach 1C*

Reach 1C, also known as the “connector channel” begins at the terminus of the bypass channel and flows approximately 95 m to the southeast towards a new detention pond. This portion of Reay Creek was previously described as a sinuous channel with a steeper gradient and is separated into two halves by a culvert underneath a gravel access road. Fish habitat surveys completed by LGL (2018) indicate that Reach 1C is rated “good” for holding pools and percent overhead cover, and “poor” for percent of pools, pool frequency, percent of wood in pools, spawning gravel quantity, and gravel quality.

To the east of the access road, a number of larger red alder and Western redcedar trees as well as native shrubs line the channel (Photo 8).

5.2.3.4 *Reach 2*

Reach 2 (also referred to as the “detention pond”) is situated along the north-eastern edge of a newly constructed detention pond located ground-side within Airport Lands. A 5,000 m³ detention pond was constructed in 2017/2018 along this Reach to help control stormwater flows within the Reay Creek drainage system. At the downstream end of the detention pond, an outlet structure has been constructed that provides a controlled rate of water discharge aimed at reducing peak flows in downstream areas in an effort to mitigate flooding and soil erosion and improve aquatic habitat. The previous channel along the detention pond was excavated of all potentially contaminated sediments and the new channel has been lined with rounded gravels and cobbles. During low flows, the creek channel maintains flow to downstream areas. Higher flow events back up at the outlet weir and inundate the pond area which slowly draws down and alleviate large pulses in flow during storm events. Fish habitat surveys completed by LGL (2018) indicate that Reach 2 is rated “good” for holding pools and spawning gravel quantity, “fair” for percent overhead cover and gravel quality, and “poor” for percent of pools, pool frequency, and percent of wood in pools.

Riparian vegetation was retained along the northern bank of the creek, while the southern bank is reserved for the detention pond, therefore limiting larger shrubs and trees that could provide shade to this Reach (Photo 9).

5.2.3.5 *Reach 3*

Reach 3 is described as the “tributary channel” that flows adjacent to the BC Aviation Museum and confluences with Reay Creek channel south of Norseman Road at the upstream portion of Reach 4. Aqua-Tex (2004) suggested that Reach 3 may be the original upper channel of Reay Creek.

Much of this section of creek is currently a channelized ditch and the upstream sections are devoid of riparian vegetation (likely due to its proximity to Airport runways and associated limitations to the acceptable height of vegetation) leading from the Airport terminal building toward the museum. Fish habitat surveys completed by LGL (2018) indicate that Reach 3 is rated “good” for holding pools and spawning gravel quantity, “fair” for percent overhead cover and gravel quality, and “poor” for percent of pools, pool frequency, and percent of wood in pools.

Some shrub and taller deciduous trees occur toward the eastern section of Reach 3 beyond the BC Aviation Museum and toward its confluence with Reach 4. These trees provide shade and leaf litter input into this Reach of Reay Creek (Photo 10).

5.2.3.6 *Reach 4*

Reach 4 is the “connector channel” that connects Reaches 2 and 3 and then flows toward the Canora Road culvert. Fish habitat surveys completed by LGL (2018) indicate that Reach 4 is rated “good” for holding pools and spawning gravel quantity, “fair” for percent overhead cover and gravel quality, and “poor” for percent of pools, pool frequency, and percent of wood in pools.

Tall riparian vegetation surrounds this section of the creek, including a number of red alder, black cottonwood, and Douglas fir trees (Photo 11).

5.2.3.7 *Reach 5 (Reay Creek Pond)*

Downstream of Canora Road, Reay Creek Pond (Reach 5) extends for approximately 210 m through a park in a residential area. The Pond is approximately 18 m wide (range = 10 to 22 m) with a water depth ranging from <0.5 to 2.25 m (Robinson and Sarrazin, 2010). Historically, agricultural land use surrounded Reay Creek. A property owner installed a mud dam in the 1950’s to raise the water level in Reay Creek and develop a pond to support a duck farm. In 1998, the municipality of Sidney reconstructed the dam with stronger materials (Photo 12). The dam was not constructed to permit fish passage (Robinson and Sarrazin, 2010); however, recent site visits conducted by SLR indicated that at higher flows fish may be able to pass up the spillway to the southwest of the dam (Photo 13).

Overtime, the Pond has acted as a reservoir for accumulation and settlement of sediments and associated contaminants. The sediment depth in Reay Creek Pond ranges from 0.5 m to 2.0 m with an average sediment depth of 1.0 m (KWL, 2019). The Pond has undergone periods of eutrophication, massive algal blooms, resulting in reduced DO levels (Robinson and Sarrazin, 2010). SLR completed a sediment investigation of Reay Creek Pond in January 2015 and a data gap analysis in May 2016 for the Town of Sidney. In the data gap analysis, the analytical results for metals were found to be relatively uniform throughout the sediments, and it was concluded that all samples were from one population and that the entire accumulated sediment mass is contaminated.

The aquatic environment within the Reay Creek Pond has been rated as overall “good” habitat for salmonids. However, the instream water quality is marginal due to high temperatures and low DO levels that occur in the summer months and is highly degraded. Instream aquatic vegetation has been observed in summer site visits and is mostly absent in the winter months (Photo 14). Fish habitat surveys completed by LGL (2018) indicate that Reach 5 is rated “good” for holding pools, percent of pools, pool frequency, and percent overhead cover, rated “fair” for percent of wood in pools, and “poor” for spawning gravel quantity, and gravel quality.

The riparian habitat is made up of a number of woody shrub species lining the steep banks as well as large deciduous trees such as big leaf maple, red alder, black cottonwood, western redcedar and ornamental weeping willow (Photo 15). A large proportion of invasive species including Himalayan blackberry and English ivy (Photo 16) as well as other native woody shrub species and herbs are present along the banks of Reach 5. Along the southwestern edge of the Pond, some private homeowners have manicured lawns and gardens that reach to the Pond

edge. Through conversations with landowners during site visits, many have noted erosion of the Pond banks over time. At the top of the Pond banks along the northeastern edge and adjacent to a grassed area within the residential area, larger ornamental and deciduous trees line the street (Photo 17).

5.2.4 Aquatic Animals

5.2.4.1 Fish

Fish are valued for their ecological services as a renewable resource base, and have economic, cultural, spiritual and ceremonial benefits.

Within the Fisheries Information Summary System (FISS) Database, fish observations were recorded in Reay Creek from 1977 to 1995. These data indicate the presence of cutthroat trout and coho salmon within Reach 5 and further downstream over the 28 years of record.

Recent fish collections in Reach 5 resulted in the capture of threespine stickleback, cutthroat trout, coho salmon, and prickly sculpin (*Cottus asper*) (LGL, 2018). The majority of fish caught were sticklebacks (102 observations). Threespine stickleback is highly tolerant of disturbance associated with urbanization and degraded conditions. Based on the information available at the time of this report, no aquatic federally listed SAR have been identified in Reay Creek. Provincially listed fish SAR are referenced below in Section 5.2.4.4.

Aqua-Tex (2004) reported that coho and cutthroat trout utilize Reay Creek for spawning and rearing functions. In addition, DFO regularly stocks Reay Creek. Records back to 2006 show that 500 to 900 coho and/or chum salmon fry have been released annually, although the exact location is unknown. Peninsula Stream Society (2016) set up smolt traps within Reay Creek and counted over 600 healthy coho salmon on their way to sea in 2014. Sampling from LGL (2018) indicated that cutthroat trout and coho salmon were caught in the upstream reaches of Reay Creek (Reaches 1 – 4) as well as Reach 5 and lower in the system.

Coho returns (3 year averages) have been reported to increase from 8 individuals during 1987-1989 to 35 individuals during 1999 – 2001 (Peninsula Streams Society, 2004). Further to this, government records indicate that the 10 year mean coho return was 18 individuals, with a maximum return of 41 individuals in 2001, where data was collected from 1953-2016 (DFO; NuSEDS, 2018).

The salmonid species observed in Reay Creek are not permanent resident species. Coho and cutthroat trout migrate from marine to freshwater environments for spawning. Eggs will incubate in Reay Creek for a few months and fry may spend up to a year in freshwater before migrating back to Bazan Bay (Table 7).

**Table 7:
Typical Habitat Preferences and Life History Strategies for Fish in Reay Creek**

Common Name	Scientific Name	Habitat Preferences and Life History Strategies*
Cutthroat Trout	<i>Oncorhynchus clarkia</i>	<ul style="list-style-type: none"> gravelly lowland coastal streams and lakes, inland alpine lakes and small rivers, and estuaries or the sea near shore <ul style="list-style-type: none"> spawn in gravel streams stay close to the shore and the estuaries they came from time spend in ocean is variable, couple weeks to half a year <ul style="list-style-type: none"> can live up to 10 years
Coho Salmon	<i>Oncorhynchus kisutch</i>	<ul style="list-style-type: none"> spawning occurs in swifter water of shallow, gravelly areas of river tributaries the emergent fry occupy shallow stream margins, and, as they grow, establish territories which they defend from other salmonids Coho fry live in ponds, lakes, and pools within streams and rivers, usually among submerged, woody debris- in quiet areas free of current most migrate to the open ocean after one year of growth in freshwater
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	<ul style="list-style-type: none"> usually inhabits coastal waters or freshwater bodies well connected (or once well connected) to the coasts <ul style="list-style-type: none"> prefers slow-flowing water with areas of emerging vegetation can be found in ditches, ponds, lakes, backwaters, quiet rivers, sheltered bays, marshes, and harbours

*Adapted from Scott and Crossman, 1973; Lamb and Edgell, 2010; Froese and Pauly, 2016.

Typically, adult coho migrate from the ocean to freshwater tributaries in the summer and spawn from August to November. In contrast, cutthroat trout spawn in the spring (February to May) and adults typically migrate from marine environments to freshwater tributaries in February (Table 8).

**Table 8:
Timing of Migratory Salmonid Species in Reay Creek**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Coho Salmon												
Adult Migration												
Spawning												
Egg Incubation												
Emergence												
Rearing												
Overwintering (Juvenile and Adult)												
Cutthroat												
Adult Migration												
Spawning												
Egg Incubation												
Emergence												
Rearing												
Overwintering (Juvenile and Adult)												

Table adapted from DFO, 2001

5.2.4.2 Reptiles and Amphibians

No reptile or amphibian surveys have been completed within Reay Creek. There are thirteen species of frogs and toads, nine species of salamanders and newts, and two species of turtles in British Columbia. The following table displays the reptiles and amphibians whose distributions overlap the Project area and could potentially be found on site.

**Table 9:
Potential Reptiles and Amphibians Occurring within the Project Area**

Common Name	Scientific Name	Status (BC)	Status (SARA)
AMPHIBIANS			
Frogs and Toads			
Bullfrog	<i>Lithobates catesbeiana</i>	Exotic	Exotic
Green Frog	<i>Lithobates clamitans</i>	Exotic	Exotic
Northern Red-Legged Frog	<i>Rana aurora</i>	Blue	Special Concern
Pacific Tree Frog	<i>Hyla regilla</i>	Yellow	---
Tailed Frog	<i>Ascaphus truei</i>	Blue	Special Concern
Western Toad	<i>Anaxyrus boreas</i>	Yellow	---
Salamanders and Newts			
Rough-skinned Newt	<i>Taricha granulosa</i>	Yellow	---
Northwestern Salamander	<i>Ambystoma gracile</i>	Yellow	---
Long-Toed Salamander	<i>Ambystoma macrodactylum</i>	Yellow	---
Rough-skinned newt	<i>Taricha granulosa</i>	Yellow	---
REPTILES			
Turtles			
Red-eared Slider	<i>Trachemys scripta</i>	Exotic	Exotic
Western Painted Turtle	<i>Chrysemys picta bellii</i>	Red	Endangered

From conversations with surrounding landowners, it is possible that turtles have been observed in Reay Creek Pond. If present, these turtles are most likely red-eared sliders (*Trachemys scripta*), an introduced species of turtle that are known to occur in Southern Vancouver Island (BC ENV, 2019a). Red-eared sliders are commonly confused with Western painted turtles (*Chrysemys picta bellii*) and are more widely distributed on Southern Vancouver Island.

The riparian and aquatic habitat of Reay Creek Pond does not meet the obligate requirement type of Western painted turtles for successful nesting or rearing. Females nest in loose, warm, well-drained soils devoid of riparian vegetation. The majority of populations in BC occur in the Okanagan Valley, with the closest known population of Western painted turtles occurring in Beaver Lake, approximately 15 km south of Reay Creek. Furthermore, threats to this species include water pollution, habitat fragmentation, drainage of wetlands, and increased predation of eggs and juveniles particularly by higher populations of raccoons (COSEWIC, 2006). For these reasons, it's unlikely that Western painted turtles will occur within Reay Creek Pond.

Rough-skinned newts (*Taricha granulosa*) were observed during fish surveys in 2018 within the Reay Creek system (LGL, 2018).

5.2.4.3 Benthic Communities

Benthic communities were selected as a VEC because of their functional importance to both terrestrial and aquatic ecosystems. Benthic macroinvertebrates burrow deeply into layered sediments and accelerate nutrient cycling. Burrowing benthic organisms and insect larvae mix the sediments, aerate deeper layers of sediments, and increase rates of recycling of macronutrients (nitrogen, phosphorus, and organic carbon) and micronutrients (trace elements) by bioturbation and fecal production. Epibenthic organisms enhance microbial growth and nutrient cycling through their mixing of surface sediments and breakdown of organic detritus.

No benthic invertebrate studies or community analyses have been completed within Reay Creek or Reay Creek Pond. Some studies have shown that contaminated sediments can lead to effects in the benthic community structure as well as changes to life history alterations including acute toxicity, morphological and genetic changes (Rawson *et al.*, 2010). LGL (2018) observed several signal crayfish (*Pacifastacus leniusculus*) when conducting fish and fish habitat surveys of Reay Creek.

5.2.4.4 Aquatic Species at Risk

The BC CDC database and BC Species and Ecosystem Explorer were reviewed for records of aquatic SAR (Table 10). This search revealed two fish species occurrence within Reay Creek that are provincially designated as yellow and blue (coho salmon and cutthroat trout, respectively). While both of these species are provincially designated, neither are considered at risk of imminent extinction or extirpation, nor are they federally listed under the SARA.

DFO's Distribution of Fish Species at Risk mapping (2013) shows approximately 37 SAR that occur within the Pacific Ocean, where Reay Creek eventually discharges. These records are marine species and do not occur within Reay Creek. More detailed descriptions of SAR records are provided in Appendix B.

**Table 10:
Provincially Listed Fish Species Occurring Within Reay Creek**

Scientific Name	English Name	Classification	BC List	SARA Schedule	Location	Description
<i>Oncorhynchus kisuth</i>	Coho Salmon	Vertebrate Animal – Fish	Yellow	---	This occurrence is located within the waters of Reay Creek	Species of anadromous fish that spawn in fall/winter months and spend between a few weeks and 2 years in freshwater streams before migrating to sea.
<i>Oncorhynchus clarkii clarkii</i>	Cutthroat Trout	Vertebrate Animal – Fish	Blue	---	This occurrence is located within the waters of Reay Creek	Species of semi-anadromous fish that spawns in late winter / early spring months and spend upwards of 2-3 years in freshwater streams before migrating to sea (time at sea depends on geographical area and population).

The BC Species and Ecosystem Explorer online database was reviewed for potential occurrences of aquatic animal SAR that may be found within the Project area. The results of the advanced search indicated 6 aquatic animal species that could potentially occur within the

Project area (Appendix A). SLR conducted a literature review of each potential occurrence and refined the potential to 3 aquatic animals SAR that could potentially occur in the Project area. These species can be found in Table 11 below.

**Table 11:
Aquatic Animal SAR Potentially Occurring within the Project Area**

Scientific Name	English Name	Classification	BC List	SARA Schedule
Reptiles and Amphibians				
<i>Chrysemys picta</i>	Western Painted Turtle	Vertebrate Animal (Reptile)	Red	1, Endangered/Special Concern
<i>Anaxyrus boreas</i> (previously <i>Bufo boreas</i>)	Western Toad	Vertebrate Animal (Amphibian)	Yellow	1, Special Concern
<i>Rana aurora</i>	Northern Red-Legged Frog	Vertebrate Animal (Amphibian)	Blue	1, Special Concern

Based on the life history and habitat preferences for the Western painted turtle, this species is unlikely to occur within the Project area (see Section 5.2.4.2). The two above amphibian species could potentially occur within the Project area.

5.3 Social Components

5.3.1 Heritage and Historical Resources

An Archaeological Overview Assessment (AOA) has been completed for the Project by Millennia Research Ltd. (Millennia; 2018). Known archaeological sites adjacent to the Project area include DdRu-4, an ethnographic village located at Bazan Bay. This site spans 1.2 km along the shoreline adjacent to Lochside Drive and is considered to have high archaeological significance.

Millennia found that the archaeological potential associated with the land immediately surrounding Reay Creek Pond is considered minimal.

Millennia concluded that upper Reay Creek areas (i.e., on Airport Lands) are deemed to have some archaeological potential as there is some possibility of old, habitable landforms to be present that are obscured by industrial developments and agricultural practices.

Several of the reaches of Reay Creek that exist on Airport Lands are located near the BC Aviation Museum. This museum preserves aircraft and aviation artifacts that relate to the history of aviation in Canada, and particularly in British Columbia. The museum is host to many tourists and visitors; it also serves as an educational resource for local schools and organizations.

5.3.2 Recreation, Services and Aesthetics

The Reay Creek area is used throughout the year for a wide range of recreational activities by tourists and local residents alike. The Reay Creek Park, located on Town of Sidney lands, features forested walking trails and park benches. Reay Creek provides ecosystem services to residents and other public users who enjoy being close to nature. The public area is commonly used by dog walkers and bird watchers. The public park and watershed contribute aesthetic value to the neighbourhood, which is highly valued by its residents.

5.3.3 People and Public Health

The Reay Creek area has been classified under Transport Canada's list of contaminated sites; the site is considered to be high priority for action under the Federal Contaminated Sites Action Plan (FCSAP). Signage has been erected within Reay Creek Park regarding the elevated levels of metals contamination within the Pond sediments of Reay Creek Pond. This signage advises park users to avoid contact with bottom sediments. There has been a consistent public demand for cleanup of the area to alleviate the public health advisory, which the Project intends to address.

Spawning of trout and salmon species are monitored by several organizations including Sidney Anglers Association and Saanich Peninsula Stream Society. These organizations have engaged in spawning habitat enhancement activities in downstream areas of Reay Creek in the past. There is potential for future fish habitat restoration in upstream reaches of Reay Creek (Reach 3); however, further communication with VAA is needed to confirm long term restoration and habitat enhancement plans.

5.4 Consultation

Throughout the planning phase of the Project, Transport Canada has engaged in a number of consultative activities which are summarized in the sections below.

5.4.1 Consultation with Federal Departments

Transport Canada has engaged Health Canada, DFO, and Environment and Climate Change Canada as expert support in obtaining funding for the Project through the FCSAP. The site has been classified as high priority for action through the FCSAP program.

5.4.2 Consultation with the Public

Throughout the planning stages of this Project, the Town of Sidney has consulted with the general public. The Town of Sidney attends the Reay Creek Neighbourhood Association meetings and provides updates on information generated from the Technical Working Group. Transport Canada is engaged with the Technical Working Group (see Section 5.4.4).

5.4.3 Consultation with First Nations

Transport Canada has completed an AOA and has distributed it to the following four surrounding First Nations (FN) groups in summer 2018:

- Pauquachin
- Tsartlip
- Tsawout
- Tseycum

In November 2018, Transport Canada requested/offered to meet the above FN to discuss and solicit any interest in the Project. In December 2018, Transport Canada met with both the Tsawout and the Tsartlip FN groups to discuss the Project. Transport Canada will continue to request/offer to meet FN groups as the Project progresses.

5.4.4 Consultation with Other Departments, Agencies or Jurisdictions

In 2015, the Town of Sidney created the Reay Creek Technical Working Group. Throughout the planning phase of the Project, Transport Canada has been engaged with the Reay Creek Technical Working Group, which includes representatives from the following agencies/departments:

- Transport Canada
- VAA
- DFO
- BC ENV
- CRD
- Town of Sidney
- District of North Saanich

The Reay Creek Technical Working Group meets approximately bi-annually to discuss details of the Reay Creek Remediation Project and associated business.

6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS, MITIGATION MEASURES, AND RESIDUAL EFFECTS

The effects assessment consisted of a qualitative analysis of potential changes induced by the proposed Project, and a rating of the effects of those changes.

Potential direct and indirect Project effects were identified by assessing the potential interactions between the Project activities associated with creek remediation and the environmental components described in Section 5.0. Potential effects are detailed in the Environmental Effects Matrix seen below in Table 12.

Once the potential effects were identified, specific response measures to address each identified effect were considered. These responses include physical measures, methods, or management strategies which are implemented to mitigate potential Project impacts. Potential effects which could not be eliminated through the implementation of mitigation measures were treated as residual effects.

**Table 12:
Environmental Effects Matrix**

PROJECT COMPONENT	VALUED ECOSYSTEM COMPONENTS												
	PHYSICAL						BIOLOGICAL				SOCIAL		
	Atmosphere	Ambient Noise	Surface Water	Sediment	Soils	Groundwater	Terrestrial Habitat	Terrestrial Animals	Aquatic Habitat	Aquatic Animals	Heritage and Historical Resources	Recreation, Services, and Aesthetics	People and Public Health
Site Preparation	X	X	X		X		X	X	X	X	X	X	X
Instream Remediation	X	X	X	X*	X			X	X	X	X	X	X
Site Restoration			X*	X*	X*		X*	X*	X*	X*		X*	X*

X – Potential Effect
X* - Potential Positive Effect

6.1 Effect on Physical Components

6.1.1 Atmosphere

Site Preparation, Instream Remediation

Potential Effects

The operation of heavy equipment such as the excavators, dump trucks and other small construction equipment may result in decreased ambient air quality during site preparations and remediation activities (i.e. from increased emissions and concentrations of chemical pollutants, dust and other particulate matter) in the immediate vicinity for the duration of remedial activities. Air emissions from vehicles and equipment, including sulphur oxides, nitrogen oxides, particulate matter, volatile organic compounds, and carbon monoxide, are expected to represent only a small change to ambient conditions. Dust may also be generated during site preparation and remediation components of the Project. Sources of dust may include exposure of loose soils during clearing and grubbing, operation of vehicles over dirt or gravel roadways or remedial access locations, and wind-blown dust from stockpiled or transported materials.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on the atmosphere:

- Vehicles and equipment will be kept in good working condition, use low sulphur fuels when possible, and limit idling to a minimum;

- Vehicles/machinery/equipment are to be in good repair, equipped with emission controls as applicable and operated within regulatory requirements;
- The Contractor will employ dust control measures such as water misting and covering of stockpiles and transported material as necessary; and
- Burning of waste material is not permitted.

Residual Effects

Potential effects during remediation are anticipated; however, residual effects are expected to be low after the above mitigation measures are implemented.

6.1.2 Ambient Noise

Site Preparation, Instream Remediation

Potential Effects

The operation of heavy equipment such as excavators, dump trucks, and hand machinery / equipment is likely to result in increased ambient noise levels in the immediate vicinity of remedial activities and for the duration of the Project. Noise generating activities will be temporary and have the potential to affect wildlife and adjacent residents near the Project site during approved work hours.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of noise and vibration generation of the Project:

- The operation of heavy equipment shall be limited to specified excavation locations;
- Vehicles/machinery/equipment are to be in good repair, equipped with noise emission controls as applicable and operated within regulatory requirements;
- Vehicles and machinery shall not be left idling while not in use;
- Activities that could create excessive noise will be restricted to daylight hours and adhere to both the District of North Saanich and Town of Sidney Noise Bylaws;
- Noise monitoring will be completed by the Contractor, and will be triggered on a complaint-driven basis; and
- The Contractor's foreman or designate shall be on site for the duration of the remedial activities and shall direct public complaints to the PSPC DR, as appropriate.

Residual Effects

Potential effects exist; however, the residual effects are expected to be low due to adherence to Noise Bylaws and the above mitigation measures.

6.1.3 Surface Water

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

During the site preparation phase, surface water quality could be affected as heavy equipment is mobilized to the site. Clearing and grubbing activities could negatively impact surface water if exposed soils on site following clearing activities encounter unseasonal precipitation events. Machinery and equipment used during construction may result in the introduction of contaminants to surface waters such as oil and grease, lubricants and fuel.

During in-water works, impacts to water quality may occur from the suspension of particles in local watercourses during Project activities. Stream diversion techniques may alter flow downstream for a short period of time.

Water from dewatering activities could be discharged into the sanitary sewer system. Dewatering of Pond sediments may generate contaminated water that could enter downstream environments if not properly collected and disposed.

Potential effects to surface water quality associated with construction activities include:

- Increase in TSS levels;
- Increase in contaminant concentrations due to dewatering of sediments; and
- Introduction of other contaminants (e.g. oil and grease).

The potential surface water quality effects outlined above could, in turn, affect fish and wildlife.

Mitigation Measures

Mitigation measures for protection of water quality during construction activities are well documented and include standard engineering and construction practices as well as best management practices (BMPs). These practices are to be outlined in the Contractor's EPP, specifically the Sediment Erosion and Control Plan as well as the Water Management Plan, which will provide details on the procedures that the Contractor will employ to dewater the work area and manage turbid water.

Dewatering of the Pond may require the Contractor to collect, treat, test and discharge/dispose of water. The Contractor shall identify the ultimate discharge location in the Water Management Plan. Water discharge to sanitary sewer during dewatering shall be in accordance with the CRD Sewer Use Bylaw and Saanich Peninsula Stormwater Source Control Bylaw (CRD Bylaws No. 2922 and 4168, respectively). The Contractor shall be responsible for obtaining and adhering to a Waste Discharge Permit prior to discharging any volume of water to the sanitary sewer. Water discharge into downstream reaches of Reay Creek must meet applicable provincial standards (i.e., BC Water Quality Guidelines for the protection of freshwater aquatic life).

Creek isolation and fish salvage activities (including minnow trapping, electrofishing, or other methods within appropriate areas of the creek and Pond) will be conducted under supervision of qualified fisheries biologists prior to sediment removal. See Section 6.2.4.1 for more details on fish salvage.

Water will be diverted around the temporary work sites during Project activities. A Change Approval (Section 11, WSA) and Water Use Approval (Section 10, WSA) for changes in and about a stream will be obtained prior to instream works.

In addition to the above, mitigation measures to minimize potential effects to surface water quality will include, but not necessarily be limited to:

- Full time environmental monitoring by a QEP will be implemented for instream works;
- Instream remedial works will be completed during the reduced risk timing window (June 15th – September 15th) to reduce potential impacts to fish;
- Sediment control measures, such as silt fences, must be placed in areas where there is potential for runoff to intercept downstream surface waters. The Contractor will be required to meet federal and provincial water quality guidelines for turbidity at locations downstream of Project activities;
- A Spill Response Plan will be developed as part of the Project specific EPP. The Spill Response Plan will outline procedures to prevent spills and procedures to be followed in the event of an accidental spill, including a list of all spill response equipment to be maintained on site;
- All equipment must be in proper working condition before arriving on site and must be maintained throughout the Project;
- Equipment and machinery left in the Project area during shut-down hours will have properly placed drip pans;
- The QEP shall provide environmental awareness training with the Contractor's staff and discuss environmental components of the Project with all new staff;
- Place fill/ stockpiles away from watercourses and ditches and minimize stockpiles by coordinating construction and disposal activities;
- Clean equipment in areas designated for vehicle maintenance and cleaning prior to leaving the construction site;
- Washing, refueling and servicing of land-based equipment will be conducted away from the water (i.e., no closer than 30 m from the Pond or creek edge or other surface water conveyance structures);
- Any hydraulic machinery used in isolated channels will use environmentally-friendly hydraulic fluids (i.e., nontoxic to aquatic life, and biodegradable);
- Ensure work proceeds rapidly to ensure that disruptions are minimized;
- Backfill materials will be free of potential contaminants; and
- The QEP must be present during all instream works and shall conduct periodic post-construction inspections of Reay Creek at remedial locations and locations downstream of remedial activities to ensure that the system is functioning as planned during both low precipitation and high precipitation periods during the first year following Project activities. All observations shall be promptly conveyed to the PSPC DR.

Residual Effects

Potential effects exist however the residual effects are expected to be low. Taking into account the implementation of the mitigation measures, the residual effects of the Project is:

- Temporary increase in turbidity and decreased water quality in the immediate Project site.

The permanent removal of contaminated sediment within Reay Creek and Reay Creek Pond is considered to be a beneficial effect of the Project on surface water quality. The remediation will also result in increased water depths within Reach 5. Increased depth will provide a net benefit to cutthroat trout and coho by lowering the average surface water temperature and result in improved salmon rearing and potential spawning conditions.

6.1.4 Sediment

Instream Remediation, Site Restoration

Potential Effects

Disturbed sediments from remedial activities have the potential to migrate and distribute contamination further downstream. Removal of sediment may result in the re-suspension of some contaminated sediments and local redistribution in the creek system if not properly contained.

Settlement of suspended sediments can disrupt benthic communities through siltation and smothering of aquatic vegetative communities and substrates, which are important for supporting fish and invertebrate food and habitat. Potential effects to the aquatic habitat include stress to fish due to abrasion and clogging of gills from increased TSS, as well as the smothering of sessile organisms. Temporary increased water turbidity can disrupt feeding behaviours in fish and reduce photosynthesis in algae and aquatic vegetation. More details on these effects can be found within Section 6.2.

The permanent removal of contaminated sediment within Reay Creek and Reay Creek Pond is considered to be a net positive effect to the entire Reay Creek system.

Mitigation Measures

The Project includes measures to reduce sedimentation and loading from the remediation where exposed sediments have the potential to become mobilized within the creek.

Mitigation measures for prevention of contaminated sediment migration during remedial activities are to be outlined in the Contractor's EPP, Sediment Erosion and Control Plan as well as the Soil and Contaminated Materials Management Plan. Within these Plans, the Contractor shall detail contaminated sediment material handling and segregation, stockpiling and transportation to disposal facilities.

The Project will take place during the reduced risk fisheries window from June 15 to September 15 and work areas will be hydraulically isolated to allow work in the dry. Summer months coincide with when flows within the creek are typically at their lowest, thus reducing sediment migration.

In addition to the above, mitigation measures to minimize the effects of sediment removal will include, but not necessarily be limited to:

- The Contractor shall prevent the release of silt, sediment, sediment-laden water into all downstream watercourses or storm sewer systems; The Contractor shall install effective erosion and sediment control measures, such as silt fences, sand bags, flow diversion measures, and other features, prior to site disturbance;

- Erosion and sediment control measures shall be inspected regularly and maintained as needed;
- Creek base flows will be diverted around the temporary work sites during Project activities to allow work in the dry;
- The Contractor shall segregate and track contaminated sediments removed during remedial works and dispose of contaminated material at an appropriate licensed facility; and
- All stockpiled materials will be underlined and covered with 6 mm polyethylene sheeting or plastic liner to prevent contamination of underlying soils and minimize interaction with wind and precipitation.

Removal of contaminated sediments conducted as part of this Project will provide a beneficial effect on the environment.

Residual Effects

The permanent removal of contaminated sediments within the remedial areas will provide considerable benefit to the local environment as a result of this Project.

6.1.5 Soils

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

Equipment storage or vehicle movement during remediation may result in surface soil compaction and rutting. Environmental effects of remedial activities on soils include erosion impacts, and potential for soil quality impacts via improper waste disposal and/or contamination from accidental release of contaminants such as fuels.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on soils:

- Excavation activities shall involve smaller equipment wherever possible in order to minimize disturbance in sensitive areas;
- Equipment to be used may include small track excavators, spider hoe excavators, small tracked dump trucks (e.g., marooka) and standard dump trucks for material transport;
- The Contractor shall restore areas of exposed soils where compaction or rutting from vehicle movement has occurred;
- The Contractor shall operate construction vehicles on existing and established routes to minimize disturbance and compaction;
- All imported materials will be stockpiled away from sensitive receptors such as drainages or surface water features and will be underlined and covered with 6 mm polyethylene sheeting or plastic liner to minimize interaction with wind and precipitation;
- Imported material for use as backfill shall be tested and verified to meet appropriate provincial and/or federal standards prior to being brought to site;
- No soils or fill brought to the property shall be stockpiled within 30 m of a waterbody;
- Fueling must be conducted in a designated area, at least 30 m away from drainage ditches, catch basins, or waterbodies and must have secondary containment in place;
- Equipment and machinery left in the Project area during shut-down hours will have properly placed drip pans;

- A Spill Response Plan will be developed as part of the Project specific EPP. The Spill Response Plan will outline procedures to prevent spills and procedures to be followed in the event of an accidental spill, including a list of all spill response equipment to be maintained on site; and
- Construction vehicles and equipment will be checked every morning for leaks and shall be maintained in good working order.

Residual Effects

Residual environmental effects to soil quality are not anticipated provided the mitigation measures are implemented during all Project phases.

6.2 Effect on Biological Components

6.2.1 Terrestrial Habitat

Site Preparation, Site Restoration

Potential Effects

Site preparation will require the removal of riparian vegetation including trees and shrubs to establish remedial access locations along Reay Creek and Reay Creek Pond. Riparian areas serve as important habitat for terrestrial species, and are used as travel corridors, feeding grounds and nesting areas for wildlife. The removal of shrubs and trees will reduce the available habitat for local bird species and will reduce a minor quantity of habitat present in the area.

Disturbed and exposed soils are susceptible to colonization by invasive plants, which - once established - are capable of out competing native plants in the area and reducing native habitat for local species.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on terrestrial habitat:

- Wherever possible, trees and vegetation shall be retained in order to minimize disturbance to the riparian area;
- Significant trees that are removed shall be replanted at a 2:1 ratio of the same tree species (or suitable native species as directed by the PSPC DR);
- Replacement of shrubs and other vegetation will also be completed with use of native species;
- Invasive plants and impacted soils are to be completely removed from soils within the bounds of the Project area, and disposed of off-site; and
- Disturbed soils must be promptly revegetated to prevent invasive plant colonization.

Residual Effects

Residual effects include the loss of trees and shrubs for nesting of local bird species and the loss of a small area of riparian habitat within the Project area. However, impacts to terrestrial habitat are not believed to be significant, as Site Restoration activities shall replace any removed terrestrial vegetation with native varieties of plants.

6.2.1.1 *Vegetation*

Potential Effects

Vegetation will be removed or impacted in the process of accessing the Project areas by heavy machinery and equipment. A number of large native trees may be removed within the Project area in order to gain access to the remedial areas or as deemed necessary by geotechnical and/or certified arborist review. Disturbed and exposed soils are susceptible to colonization by invasive plants which, once established, are capable of out competing native plants in the area.

Site access through private lands adjacent to the Pond is not anticipated; therefore, removal of lawns or other landscaped vegetation occurring on private lands is not anticipated.

Mitigation Measures

Removal of vegetation shall be limited to various remedial access locations and replanting will occur following remedial activities. The removal of invasive plant species will be completed in select areas which will be replanted with native plant species according to Contractor's Site Restoration Plan. This will result in a net benefit to the surrounding native plant community.

The Contractor shall employ a certified arborist to complete a danger tree assessment and remove any trees that have been identified to pose a safety hazard.

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on vegetation:

- Care will be taken to minimize trampling by using appropriate equipment (e.g., track-mounted excavators) and using protective matting if applicable;
- Remedial access shall be limited to a select number of locations and care shall be taken by the Contractor to limit vegetation removal at all times. Access areas will be subject to approval by the PSPC DR;
- Equipment movement shall follow existing and established routes when possible;
- The laydown area should be limited to existing gravel or paved areas wherever possible;
- Significant trees that are removed shall be replanted at a 2:1 ratio of the same tree species (or suitable native species);
- If a non-native tree is removed, two trees of appropriate native species shall be replanted in its place;
- Hand tools shall be used by the Contractor when working within the root zones of significant trees;
- Patches of invasive species shall be removed as indicated on Project drawings (Appendix A) and re-vegetated with native plant species;
- Removed invasive plants shall be placed directly into covered bins and immediately disposed of at an appropriate disposal facility;
- To reduce the movement and establishment of non-native species, equipment shall be cleaned when moving between areas;
- The Contractor's Site Restoration Plan will include a list of possible native plant species that can be installed during site restoration activities;
- Upon completion of construction activities, all areas must be restored to their pre-existing conditions, which will include planting native shrubs and hydro-seeding with a native seed-mix;

- If an incidental SAR plant observation occurs, work should stop and an appropriate QEP is to be consulted. During pre-work tailgate meetings, all Contractors on the site should be briefed on SAR plants potentially in the area, and encouraged to notify the PSPC DR regarding all suspected SAR observations; and
- If disturbance is made to the public park areas adjacent to the Pond, these areas shall be returned to their pre-construction state immediately following remedial activities.

The tree removal is anticipated to occur prior to Project works in early June, which is within the general nesting period for migratory birds for Vancouver Island (late March - mid August). Further discussion is presented in Section 6.2.2.

Residual Effects

Remediation activities will result in a temporary net loss in vegetation. Significant trees removed during the Project will be replaced at a 2:1 ratio; however, plantings will take several years to reach maturity.

Taking into account the implementation of the mitigation measures, the residual effects of the Project are:

- Temporary loss of large trees, native shrubs, herbs and graminoids.

As replacement trees will be planted and all areas will be restored to their pre-existing condition, the effect is considered reversible. The removal of invasive plant species followed by replanting of native plants will contribute to a gain in the native plant population, resulting in a net positive effect.

6.2.2 Terrestrial Animals

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

Site preparation, remediation and restoration activities, including the operation of equipment and machinery, and clearing and grubbing, may cause a disturbance to terrestrial animals. In addition to stress from noise, terrestrial wildlife could be impacted by the loss of habitat.

The presence of construction equipment and noise emissions may disrupt some migratory birds and resident species (i.e. waterfowl) utilizing the Pond and creek during the remediation timeframe. It is likely that these birds will seek other areas in the vicinity that are less disturbing to their activities.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on terrestrial animals:

- Wildlife handling procedures shall be clearly detailed in the EPP, and procedures shall adhere to the conditions outlined in the General Wildlife Permit and accompanying Animal Care Form;

- During the felling of all large trees, a QEP shall be on hand to ensure that wildlife is cleared from the area;
- Removal of riparian vegetation must be overseen by a QEP to ensure small mammals and amphibians have cleared the area. The QEP must be present for all vegetation removal operations;
- Vegetation removal will occur within the key breeding and nesting bird period identified by Environment Canada (mid-March to mid-August) (Environment Canada, 2019);
- A pre-construction breeding bird nest survey will be conducted by a QEP in the areas where tree and vegetation removal is necessary. The surveys will be completed by a qualified professional and will follow a scientifically sound approach as recommended by Environment and Climate Change Canada. Nest surveys are generally valid for a 7-day period. If tree removal occurs outside of the 7-days following nest surveys, additional surveys shall be conducted;
- If nests are present, the QEP will develop a nest management plan identifying protective measures specific to the species present. The nest management plan should be developed in accordance with Federal and Provincial guidelines;
- A QEP, who is provided with authority to modify or halt Project activities if it is deemed necessary to do so for the protection of bird species or habitat, will monitor the nest management plan through Project implementation;
- If an incidental observation of a migratory bird nest or terrestrial animal SAR occurs in the vicinity of the Project Area, project activities near the sighting must stop and an appropriate QEP must be consulted; and
- During pre-work tailgate meetings, all Contractors on the site shall be briefed on terrestrial animal SAR potentially in the area and directed to notify the PSPC DR for all wildlife sightings.

Residual Effects

Residual effects include the loss of mature trees for local nesting bird species. As replacement trees will be planted in the area at a 2:1 ratio, and no SAR are expected to be impacted, the effect is considered minimal and reversible.

6.2.3 Aquatic Habitat

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

The Project has the potential to interact with the aquatic environment by altering water depths, aquatic habitats and/or changing populations of wildlife that are important in an environmental context, including SAR.

Removing aquatic vegetation may lead to temporary changes in light penetration resulting in changes in water temperature, DO, primary productivity and food supply. This may also lead to changes in habitat structure and cover as well as lead to changes in resuspension and entrainment of sediments which may affect downstream watercourses. These short duration works may involve the introduction of sediment and other deleterious substances into the aquatic environment, and / or riparian vegetation disturbance. Instream works will result in the short-term disruption of instream habitat during remedial activities. Suspended sediments can smother and alter aquatic habitat substrate.

The clearing of vegetation along the banks at remedial access locations reduces riparian function, which affects instream habitat quality. Riparian areas contribute food to the aquatic system in the form of organic detritus and insects shed from vegetation, improve habitat quality by creating cover from predators and moderate temperatures along streambanks and within waterways.

Accidental fuel or chemical spills during refueling and operation of equipment have the potential to pollute aquatic habitat.

The long-term effects of the Project are anticipated to benefit the aquatic habitat following contaminated sediment removal. Increased water depths in the Pond area will benefit fish habitat, aquatic vegetative growth, and thermal properties of the watercourse. Post construction restoration presents opportunities to enhance riparian areas and instream fish habitat. Therefore, aquatic habitat will be improved as a result of remedial activities, thus enhancing the habitat complexity for fish and other aquatic animals.

Mitigation Measures

The risk to aquatic habitat from these and other potential impacts is often controlled or eliminated through the use of timing windows for in-water works, restricting remedial access locations, site controls and operational constraints, and construction monitoring and inspection.

The following mitigation measures will be followed to reduce effects of the Project on the surrounding aquatic habitat:

- The Contractor's Water Management Plan shall provide details on the procedures that the Contractor will employ to dewater the work area and manage turbid water;
- Existing vegetation will be preserved where possible. Removed vegetation will be compensated with new native plantings (see Section 3.2.4);
- Sediment and erosion controls shall be employed by the Contractor;
- Work will be completed in-the-dry during the reduced risk fisheries window for instream works on Vancouver Island (June 15th to September 15th);
- A fish salvage program will be completed prior to stream isolation works (see Section 6.2.4.1 for more details);
- During in-water works, flow will be isolated in remedial areas and diverted around the Project site to downstream areas, thus maintaining downstream flow;
- Instream aquatic vegetation shall be allowed to recolonize from upstream seed sources naturally;
- Instream habitat enhancement features shall be installed at remedial access locations along the Pond as per design drawings (Appendix A). These may include buried emergent logs, anchored root balls, and LWD;
- Aquatic habitat features in Reaches that exist within Airport Lands shall be retained. These include riffle structures in Reach 1B; and
- A DFO Request for Project Review will be submitted prior to remedial activities and recommendations will be incorporated into future planning of the Project.

Residual Effects

Taking into account the implementation of the mitigation measures, the residual effect of the Project on Aquatic Habitat is:

- Temporary loss in instream aquatic vegetation; and
- Temporary loss in riparian vegetation at remedial access locations.

A negative residual effect of short duration is associated with the loss of riparian area function where riparian vegetation will be removed. The residual effect will be maintained until planted riparian vegetation reaches the pre-construction age class. It is anticipated that a net positive effect will occur at remedial access locations, as riparian vegetation matures.

A loss in instream aquatic vegetation is not anticipated to be significant, as recolonization from upstream seed sources will naturally infill available spaces during the instream aquatic habitat growing season.

Long-term improvements to aquatic habitat will result through the removal of contaminated sediments, an increase in Pond water depths, in which is anticipated to lower Pond water temperatures.

6.2.4 Aquatic Animals

Site Preparation, Instream Remediation, Site Restoration

6.2.4.1 Fish

Potential Effects

During site preparation and instream remediation activities, the following potential effects on fish could occur:

- Potential to impact fish movements during remediation;
- Potential to obstruct flows during remediation;
- Removal of riparian and instream vegetation during remediation;
- Entrainment in pumps/machinery may lead to direct mortality of fish;
- Creek isolation may lead to impacts on downstream and upstream fish passage resulting in alterations of migration patterns, change in access to habitat, incidental entrainment, or mortality of resident species;
- Change in water chemistry and temperature may lead to alteration of migration patterns and access to habitats as well as changes in thermal cues or temperature barriers;
- Flow alterations may lead to changes in thermal cues and attraction;
- Increased water depths in the Pond area to allow for improved aquatic habitat benefitting aquatic vegetative growth as well as thermal properties of the watercourse; and
- Potential post construction restoration opportunities to enhance riparian areas and instream fish habitat.

These short duration works may involve the introduction of sediment and other deleterious substances into the aquatic environment, and / or riparian vegetation disturbance. However, the long-term effects of the Project are anticipated to benefit fish and fish habitat following contaminated sediment removal.

Mitigation Measures

A creek isolation and fish salvage will be conducted by qualified fisheries biologists prior to any waterway diversion. In the larger remedial areas (i.e., Reay Creek Pond), the fish salvage program may take upwards of 1 week to complete. A Scientific Fish Collection Permit will be obtained in order to complete fish salvage work within Reay Creek prior to in-water works.

The following mitigation measures will be followed to reduce potential effects of the Project on fish:

- Sediment and erosion controls shall be employed by the Contractor;
- Work will be completed in-the-dry during the reduced risk fisheries window for instream works on Vancouver Island (June 15th to September 15th);
- A fish salvage program will be completed prior to stream isolation works;
- In the Pond, the fish salvage program will be completed through the use of several techniques including isolation nets, minnow traps, fyke nets, and pole seines. The salvage program may take up to seven days to complete, or until no more fish are caught using the above techniques;
- For reaches that exist on Airport Lands, where the creek channel is more defined, and the substrate bottom is more consolidated, electrofishing may be utilized to capture and salvage fish;
- During in-water works, flow will be isolated in remedial areas and diverted around the Project site to downstream areas, thus maintaining downstream flow;
- All pumps will utilize appropriate fish screens and/or anti-entrainment measures to avoid physical impact to fish or other wildlife and measures will be taken to avoid siltation near pump intakes;
- Following remediation, instream aquatic vegetation shall be allowed to recolonize from upstream seed sources naturally;
- Instream habitat enhancement features shall be installed at remedial access locations along the Pond following instream remediation. These may include buried emergent logs, anchored root balls, and LWD;
- Aquatic habitat features in reaches that exist within Airport Lands shall be retained. These include riffle structures in Reach 1B;
- All remedial works will be monitored by a QEP, who will be equipped to rescue any stranded or isolated fish; and
- A DFO Request for Project Review will be submitted prior to remedial activities and recommendations will be incorporated into future planning of the Project.

Residual Effects

Taking into account the implementation of the mitigation measures, no residual effects are anticipated.

6.2.4.2 *Reptiles and Amphibians*

Potential Effects

Reptiles and amphibians may be present in the remedial areas of Reay Creek and could be directly affected by the remedial activities. The reduced risk timing windows for instream Project work (June 15 – September 15) may affect reptiles and amphibians, when they typically move from wetland breeding habitats to adjacent upland features off site.

Potential effects of remedial activities on reptiles and amphibians include alteration or removal of riparian vegetation and upland creek banks and disruption of aquatic habitat. Reptile or amphibian SAR have the potential to be affected by remedial activities.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on reptiles and amphibians:

- Full time environmental monitoring by a QEP will be implemented for removal of riparian vegetation and instream remedial works. The QEP will be equipped to rescue any stranded or isolated reptiles or amphibians;
- QEPs shall visually search for evidence of turtle nests on the side slopes of the Pond; however, due to the vegetated nature of the Pond slopes, turtle nests are not anticipated;
- Minimize removal of riparian vegetation where possible;
- Obtain a General Wildlife Permit (including preparation of the animal care form);
- If an incidental SAR reptile or amphibian occurs, work should stop and an appropriate QEP is to be consulted. During pre-work tailgate meetings, all Contractors on the site should be briefed on SAR reptile and amphibian species potentially in the area, and directed to notify the PSPC DR regarding all suspected SAR observations; and
- Install instream habitat enhancement features such as emergent buried logs, large root balls, and LWD in accordance with the Project design drawings (Appendix A); and
- Stabilize disturbed areas as soon as possible after remedial activities are complete.

Residual Effects

Removing impacted sediments will likely improve water quality and overall aquatic habitat value. Improved water quality is likely to contribute positively to amphibian and reptile health, as well as to other wildlife species which rely on this food source. Once mitigation measures are implemented, no residual effects are anticipated.

6.2.4.3 *Benthic Communities*

Potential Effects

The Project has the potential to interact with benthic communities through siltation and smothering of aquatic vegetative communities and substrates, which are important for supporting fish and invertebrate food and habitat. Smothering can cause direct mortality to benthic invertebrates and reduce the photosynthetic capacity of aquatic vegetation.

The benthic communities within the remedial areas will be directly affected by the Project, which will result in the temporary loss of benthic, epibenthic and infaunal organisms as a result of sediment removal activities within the Project area.

Accidental fuel or chemical spills during refueling and operation of equipment have the potential to pollute aquatic habitat and negatively impact downstream benthic communities.

The permanent removal of contaminated sediment within Reay Creek and Reay Creek Pond is considered to be a beneficial effect of the Project on benthic communities. The remediation will result in increased water depths within Reach 5 which will increase the wetted depth of the Pond and lower the average surface water temperature. Remedial work is also likely to create higher benthic community diversity by enhancing opportunities for less pollution-tolerant species to become established.

Mitigation Measures

Downstream benthic communities can be protected by the following mitigation measures:

- A Spill Response Plan will be developed as part of the Project specific EPP. The Spill Response Plan will outline procedures to prevent spills and procedures to be followed in the event of an accidental spill, including a list of all spill response equipment to be maintained on site;
- Imported fill material will provide more diverse substrate types for future colonization;
- During in-water works, flow will be isolated in remedial areas and will be maintained in downstream areas, thus maintaining downstream flow; and
- Sediment and erosion controls shall be employed by the Contractor.

Residual Effects

A negative residual effect of short duration is associated with the loss of benthic, epibenthic and infaunal organisms as a result of sediment removal activities. The residual effect will be maintained until benthic community recolonization occurs, which is likely to happen rapidly following contaminated sediment removal. It is anticipated that a net positive effect will occur following removal of contaminated sediments, which is considered to provide beneficial effects on benthic communities.

Furthermore, increases in wetted depths, lowering of water temperatures and improving water quality and diversity of substrate conditions will have a net benefit on benthic communities.

6.3 Effect on Social Components

6.3.1 Heritage and Historical Resources

Site Preparation, Instream Remediation

Potential Effects

Based on the aforementioned AOA (Millennia, 2018), the archaeological potential for select areas within Reay Creek is considered moderate to high. Therefore, archaeological sites and/or artifacts could potentially be uncovered during the Project works.

The BC Aviation Museum may be impacted by the Project area surrounding the museum on Airport Lands. The main access to the museum parking lot is on Norseman Road, which lies directly adjacent to the tributary channel (Reach 3) of Reay Creek. This narrow road may be subject to increased construction traffic.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on heritage and historical resources:

- Employ full time archaeological monitors during construction activities that involve ground disturbance;
- In the event that archaeological artifacts are uncovered, Project activities within the vicinity will be halted and the PSPC DR and archaeological monitor will be notified to determine appropriate actions prior to resuming work.

- Limit construction vehicles to established trucking routes;
- Establish a route and/or alternate parking area for museum visitors during Project work affecting Norseman Road (if applicable);
- Consult with BC Aviation Museum staff throughout the duration of the Project; and
- Reduce idling when vehicles and equipment are adjacent to the museum.

Residual Effects

Given the information provided and the mitigation measures listed above, no residual adverse effects of the Project are anticipated.

6.3.2 Recreation, Services and Aesthetics

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

The presence of remediation equipment and other associated Project vehicles may result in a temporary negative impact on the general aesthetics of the immediate Project area. The greatest potential for people to view Project activities is from publicly accessible locations along adjacent roadways such as Norseman Road, Canora Road and Westbrook Drive. Adjacent private properties will also have a high potential for observing Project activities.

Use of the park and the public area for recreation and other ecosystem services will be restricted during the Project period. However, the main portion of the park and trails, which are downstream from the dam, will not be affected by the Project. Downstream flows in the creek shall be maintained during stream isolation and remediation.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project:

- Minimize the duration of Project activities to the extent practical;
- All non-hazardous and hazardous construction wastes generated by the Project shall be collected, stored in secure / approved containers, and transported to a provincially-approved facility for disposal on a regular basis. Long-term storage of waste materials on site shall be avoided;
- Stockpiling of materials and staging equipment shall be undertaken in designated locations only and as far away from residences as possible;
- Site maintenance and housekeeping shall be completed on a regular basis; and
- Clean-up all sites and repair all damages to lands utilized for Project activities.

Residual Effects

Given the information provided and the mitigation measures listed above, no residual adverse effects of the Project are anticipated.

6.3.3 People and Public Health

Site Preparation, Instream Remediation, Site Restoration

Potential Effects

Disturbance to people's use and enjoyment of their properties (especially those directly adjacent to Reach 5) may be affected during the Project. However, due to consistent public demand for cleanup of the area, the temporary disturbance is considered acceptable.

Public safety may be affected from Project activities from the use of large machinery, trucking movement, and potential exposure to contaminated sediments. Private properties adjacent to Reach 5 may be affected by the remediation if remedial extents impede on private properties.

The previous habitat enhancement performed by fisheries-focused organizations downstream of the dam will not be impacted. The Project will be completed within the reduced risk timing (instream work) windows for Vancouver Island from June 15th to September 15th. In addition, fisheries resources will benefit from the reduction of contaminated sediments from the creek that have the potential to migrate further downstream. The removal of contaminated sediment will also have a net benefit on fisheries resources available upstream of the dam.

Mitigation Measures

The following mitigation measures are recommended to eliminate, reduce or otherwise control the adverse environmental effects of the Project on people and public health:

- The Contractor shall maintain communication with private land owners when working adjacent to private lands;
- The Contractor shall direct complaints made by adjacent private land owners to the PSPC DR;
- The Contractor shall maintain setbacks as described on Construction Drawings and not impede on private property;
- The Contractor shall secure the work areas to prevent public access;
- Site maintenance and housekeeping shall be completed on a regular basis; and
- Limit construction activities to approved working hours that adhere to the intent of both North Saanich and Town of Sidney Noise Bylaws.

Residual Effects

Any removal of contaminated sediments is considered to be a beneficial effect of the Project on both people and public health. Given the information provided and the mitigation measures listed above, no residual adverse effects of the Project are anticipated.

7.0 SEVERITY ASSESSMENT

The severity of residual environmental effects was evaluated using the general criteria outlined in Table 13 and the rating matrix presented in Table 14.

**Table 13:
General criteria used to guide interpretation of the severity of adverse effects**

Criteria	Definition	Rating
Magnitude	Severity of the adverse effect	High – the effect causes a $\geq 25\%$ change in VECs abundance/function/process/value Low – the effect causes a $\leq 25\%$ change in VECs abundance/function/process/value
Spatial extent	A description of over how large an area the adverse effect occur.	High – the effect occurs in an area $\geq 25\%$ of the study area. Low – the effect occurs in an area $\leq 25\%$ of the subject property
Duration	The duration of the effects.	High – the effect is long-lasting, and/or occurs frequently Low – the effect is short term and does not occur frequently.
Likelihood	The chance that a particular effect may occur.	The rating uses probability data, where available, or if not available, professional judgment is applied based on an understanding of past scenarios that are similar to those predicted here.

**Table 14:
Effect Severity Rating Matrix**

Spatial Extent	Duration	Magnitude	Description of potential effect	Is the effect significant?
H	H	H	A strong effect that is long lasting and/or frequent and covers a large area.	Yes
H	H	L	A weak effect that is long lasting and/or frequent and covers a large area.	Yes
H	L	H	A strong effect that covers a large area but does not last long or occur frequently.	Yes
L	H	H	A strong effect that is long lasting and/or frequent but does not cover a large area.	Yes
H	L	L	A weak effect that covers a large area but does not last long or occur frequently.	No
L	H	L	A weak effect that is long lasting and/or frequent but does not cover a large area.	No
L	L	H	A strong effect that is not long lasting and/or frequent and does not cover a large area.	No
L	L	L	A weak effect that is not long lasting and/or frequent and that does not cover a large area.	No

Adverse effects that are severe and likely will be subject to mitigation measures to reduce the effects to insignificant levels. The proposed mitigation measures must be directly related to the predicted effects, or they will not have the desired goal of eliminating or reducing the effect significance. The effectiveness of the mitigation measures is evaluated by re-assessing the residual effect assuming the implementation of the mitigation measures. Residual effects after mitigation have been assigned “Levels of Residual Effects” as summarized below (Table 15). Residual effects ranked as high or moderate (i.e. which cannot be mitigated to an adequate level) need to be compensated.

**Table 15:
 Summary of Levels of Residual Effects**

Level of Residual Effect	Definition
High	Potential effect results in a decline/change in the environmental resource considered and cannot be offset by the implementation of BMPs.
Moderate	Potential effect results in a decline/change in the environmental resource considered and mitigation measures result in partial mitigation only.
Low	Potential effect may results in a slight decline/change in resource in study area but the effect can be fully mitigated and the resource should return to levels similar (or better) to those observed as part of the existing conditions.

Table 16 summarizes the potential impacts of the Project, proposed mitigation measures, and residual effects. The severity of residual effects (both negative and positive) is ranked as either not significant or significant.

**Table 16:
Summary of Project Effects, Mitigation and Overall Residual Effects Severity**

Factor	Potential Effect	Severity of Effect Without Mitigation				Mitigation	Residual Effects Ranking	Overall Residual Effects Significance
		Spatial Extent	Duration	Magnitude	Overall Significance			
Atmosphere	<ul style="list-style-type: none"> Decreased ambient air quality due to emissions and dust. 	L	L	L	Low Negative Effect	<ul style="list-style-type: none"> Vehicles / equipment kept in good working condition Use of low sulphur fuels and emission controls when possible Limit idling to a minimum; Implement dust control measures as required Cover stockpiles and transport trucks No burning of waste material 	Low	Not Significant
Ambient Noise	<ul style="list-style-type: none"> Increased ambient noise in immediate vicinity of remedial activities Disturb wildlife and adjacent residences near the Project site 	L	L	L	Low Negative Effect	<ul style="list-style-type: none"> Limit operation of equipment to specified locations and approved work hours Equip vehicles, machinery, equipment with noise emission controls as applicable Implement idle reduction strategy Noise monitoring completed on a complaint-driven basis 	Low	Not Significant
Surface Water	<ul style="list-style-type: none"> Exposed soils leading to sedimentation and erosion into waterways Suspension of particles in on site watercourses during Project activities Stream diversion techniques may alter flow downstream Increase in TSS levels Increase in contaminant concentrations Introduction of other contaminants through spills or leaks 	H	L	H	High Negative Effect	<ul style="list-style-type: none"> Full time monitoring by a QEP Install and maintain erosion and sediment control structures Contractor to complete Spill Response Plan Obtain a BC WSA Water Use Approval and Change Approval (<i>Section 10 and Section 11, WSA</i>) authorizations (i.e., dewatering construction works and approval for changes in and about a stream) Work in dry summer months during reduced risk timing windows (June 15 to Sept 15) Divert water around remedial areas and maintain downstream flow. Contractor to meet federal and provincial water quality guidelines for TSS / turbidity downstream of Project Dewatering to be done according to Water Management Plan. Contractor to collect, treat, test and discharge/dispose of site waste water. Place fill/ stockpiles away from watercourses and ditches Minimize stockpiles by coordinating construction and disposal activities Dispose of sediment, water or waste generated during construction appropriately Clean equipment in designated areas only Washing, refueling and servicing equipment will be conducted > 30 m from waterbodies and conveyance structures (e.g., storm drains, ditches, etc.) Use environmentally-friendly hydraulic fluids Minimize vehicle activity on disturbed site surfaces during and after wet weather Minimize disturbance to riparian vegetation along channel banks Ensure work proceeds rapidly, to ensure that disruptions are minimized Stabilize and re-vegetate the site as soon as construction is complete. 	Low Permanent removal of contaminated sediments has net benefit on surface water quality	Significant Positive Effect
Sediment	<ul style="list-style-type: none"> Disturbed sediments have the potential to migrate downstream. Settlement of suspended sediments can disrupt benthic communities Potential effects to the aquatic habitat (stress to fish, disrupt fish feeding behaviours, smothering of sessile organisms, and reduction in photosynthesis) Potential for spread of contamination due to improper handling, transport, storage or disposal of contaminated sediments 	H	L	H	High Negative Effect	<ul style="list-style-type: none"> Full time monitoring by a QEP Install and maintain erosion and sediment control structures Divert water around remedial areas and maintain downstream flow Use proper contaminated material handling, transport and disposal methods in accordance with Contractor's Soil and Contaminated Materials Management Plan Track and dispose of contaminated sediments at an appropriate licensed facility. 	Low Permanent removal of contaminated sediments has net benefit on surrounding system	Significant Positive Effect

Factor	Potential Effect	Severity of Effect Without Mitigation				Mitigation	Residual Effects Ranking	Overall Residual Effects Significance
		Spatial Extent	Duration	Magnitude	Overall Significance			
Soils	<ul style="list-style-type: none"> Soil erosion, compaction and rutting from equipment Soil contamination from accidental release of contaminants 	L	L	L	Low Negative Effect	<ul style="list-style-type: none"> Use of smaller track equipment during excavation where possible Restore areas of compaction or rutting. Use established construction routes and equipment storage areas. Stockpile material on 6 mm poly sheeting or plastic liner and cover Do not stockpile soils within 30 m of a waterbody. A Spill Response Plan will be developed as part of the Project specific EPP Re-fueling completed in designated area and must have secondary containment in place. Place drip pans under equipment and machinery left on site overnight Provide proof of testing of imported material 	Low	Not Significant
Terrestrial Habitat	<ul style="list-style-type: none"> Removal of riparian vegetation Reduction of available habitat for local wildlife and bird species Disturbed and exposed soils are susceptible to colonization by invasive plants 	L	H	L	Low Negative Effect	<ul style="list-style-type: none"> Wherever possible, trees shall be retained Removed significant trees shall be replanted at a 2:1 ratio Replace vegetation with native species Remove invasive plants and dispose off-site Revegetate disturbed soils to prevent invasive plant colonization 	Low Site Restoration activities shall replace removed terrestrial vegetation with native varieties of plants.	Significant Positive Effect
Vegetation	<ul style="list-style-type: none"> Vegetation will be removed in remedial access locations Large native trees may be removed Danger trees may be removed if they pose a hazard. Disturbed and exposed soils are susceptible to colonization by invasive plants 	L	H	L	Low Negative Effect	<ul style="list-style-type: none"> Use of small track equipment and protective matting where possible Limited remedial access locations in order to reduce vegetation removal Follow approved construction routes Use hand tools when working within root zones of significant trees Contractor to complete Site Restoration Plan for approval by the PSPC DR Remove invasive species in identified areas and re-plant with native plant species Clean equipment between areas to limit spread of invasive plant species Reinstate public park spaces to pre-construction state Replant significant trees at 2:1 ratio using native species Stop work and consult QEP if incidental SAR plant observation occurs 	Low Temporary loss in vegetation at remedial access locations, followed by replanting. Removal of invasive plant species followed by replanting of native plants will contribute to a gain in the native plant population.	Significant Positive Effect
Terrestrial Animals	<ul style="list-style-type: none"> Construction equipment may disrupt terrestrial animals, migratory birds and resident species Loss of habitat from Site Preparation activities Removal of vegetation could result in harm to nesting birds 	L	L	L	Low Negative Effect	<ul style="list-style-type: none"> Pre-construction breeding bird nest surveys to be completed within 7 days prior to vegetation removal Nest management plan to be created by a QEP if nests are observed. The Contractor shall obtain a qualified arborist to complete any necessary tree removal. Wildlife handling procedures shall be clearly detailed in the EPP, and procedures shall adhere to the conditions outlined in the General Wildlife Permit and accompanying Animal Care Form QEP will oversee removal of vegetation to monitor for small mammals and amphibians If an incidental observation of a migratory bird nest or terrestrial animal SAR occurs in the vicinity of the Project Area, project activities near the sighting must stop and an appropriate QEP must be consulted 	Low Temporary loss of mature trees for local nesting bird species. Replacement trees planted at 2:1 ratio, therefore effect is considered minimal and reversible.	Not Significant

Factor	Potential Effect	Severity of Effect Without Mitigation				Mitigation	Residual Effects Ranking	Overall Residual Effects Significance
		Spatial Extent	Duration	Magnitude	Overall Significance			
Aquatic Habitat	<ul style="list-style-type: none"> Water depths will be altered Potential to alter aquatic habitats and/or change population dynamics of wildlife Temporary changes in light penetration resulting in changes in water temperature, DO, primary productivity and food supply. Temporary changes in habitat structure and cover Potential to impact fish movements, obstruct flows Erosion and sedimentation. Suspended sediments can smother and alter aquatic habitat substrate. Removal of riparian vegetation, instream vegetation and habitat Accidental fuel or chemical spills can pollute aquatic habitat. 	H	H	H	High Negative Effect	<ul style="list-style-type: none"> Contractor's Water Management Plan shall provide details on dewatering and management of turbid water Preserve existing vegetation where possible. Replace removed vegetation with native plantings Install and maintain erosion and sediment control structures Complete work during the reduced risk timing window (June 15th to September 15th) Complete fish salvage program by a QEP Isolate flow and pump around construction to maintain flow in downstream areas Install instream habitat enhancement features following remediation Retain existing instream habitat features on Airport Lands Increased water depth will improve aquatic habitat and reduce average water temperatures Full time monitoring by a QEP - will be equipped to rescue stranded or isolated fish Submit DFO Request for Review prior to remedial activities. Incorporate recommendations into future planning of the Project. 	Low Temporary Disturbance; Ultimate Net Benefit to Aquatic Habitat	Significant Positive Effect
Fish	<ul style="list-style-type: none"> Removal of aquatic vegetation can alter water temperature, DO, primary productivity, habitat structure and food supply. Suspension of contaminated sediments could migrate downstream. Increase in turbidity can disrupt feeding behaviours in fish and smother gills, leading to asphyxiation. Fish can become entrained in pumps/machinery Alteration of water depths will improve Pond habitat conditions to support fish 	H	H	L	High Negative Effect	<ul style="list-style-type: none"> Install erosion and sediment control structures Complete work during the reduced risk timing window (June 15th to September 15th) Obtain Scientific Fish Collection Permit Complete fish salvage program by a QEP Isolate flow and pump around construction to maintain flow in downstream areas Allow instream aquatic vegetation to recolonize from upstream sources Install instream habitat enhancement features following remediation Retain existing instream habitat features on Airport Lands Increased water depth will improve aquatic habitat and reduce average water temperatures Full time monitoring by a QEP - will be equipped to rescue stranded or isolated fish Submit DFO Request for Review prior to remedial activities. Incorporate recommendations into future planning of the Project. 	Low Temporary dislocation and removal of fish from remedial areas. Positive impact in Pond for fish	Significant Positive Effect
Reptiles and Amphibians	<ul style="list-style-type: none"> Project timing may affect species overland migration Removal of riparian vegetation may disrupt breeding sites Removal of sediments will directly affect animals living in remedial extents 	L	H	L	Low Negative Effect	<ul style="list-style-type: none"> Preserve existing vegetation where possible. Replace removed vegetation Obtain General Wildlife Permit and accompanying Animal Care Form Full time monitoring by a QEP to monitor for stranded reptiles or amphibians during creek and Pond dewatering, sediment piling and sediment dewatering; Transfer collected amphibians and reptiles to suitable downstream habitat Maintain water flow in downstream areas Install instream habitat enhancement features following remediation If an incidental observation of reptile or amphibian SAR occurs in the vicinity of the Project Area, project activities near the sighting must stop and an appropriate QEP must be consulted 	Low	Not Significant
Benthic Communities	<ul style="list-style-type: none"> Removal of existing benthic community through sediment excavation Siltation and smothering can cause direct mortality to benthic communities Siltation and smothering can reduce the photosynthetic capacity of aquatic vegetation. Accidental fuel or chemical spills can pollute aquatic habitat and negatively impact downstream benthic communities. 	H	H	H	High Negative Effect	<ul style="list-style-type: none"> Imported fill material and clean sediment surfaces to provide diversity of substrates that are uncontaminated for future colonization Maintain water flow in downstream areas; Install erosion and sediment control structures A Spill Response Plan will be developed as part of the Project specific EPP 	Low Temporary Disturbance from Sediment Removal Ultimate Long-Term Net Benefit to Benthic Communities	Significant Positive Effect

Factor	Potential Effect	Severity of Effect Without Mitigation				Mitigation	Residual Effects Ranking	Overall Residual Effects Significance
		Spatial Extent	Duration	Magnitude	Overall Significance			
Heritage and Historical Resources	<ul style="list-style-type: none"> Archaeological sites / artifacts may be uncovered during the Project works. Potential impacts to visitors and staff of the BC Aviation Museum from increased construction traffic. 	L	L	L	Low Negative Effect	<ul style="list-style-type: none"> Employ full time archaeological monitors during construction activities; Limit construction vehicles to established trucking routes; Establish a route and/or alternate parking area for museum visitors during Project work affecting Norseman Road; Consult with BC Aviation Museum staff throughout the duration of the Project; and Reduce idling when vehicles and equipment are adjacent to the museum. 	Low	Not Significant
Recreation, Services, and Aesthetics	<ul style="list-style-type: none"> Temporary negative impact on the general aesthetics of Reay Creek Use of the Reay Creek Park adjacent to the Pond will be restricted during the Project period. 	L	L	H	Low Negative Effect	<ul style="list-style-type: none"> Minimize the duration of Project activities to the extent practical; Store and secure construction wastes generated from the Project; Dispose of wastes at approved off-site facility regularly Maintain general housekeeping of the Project area at all times Stockpile materials in designated stockpile area Stage equipment in designated staging area Conduct site clean-up and restoration immediately following remediation activities. 	Low	Not Significant
People and Public Health	<ul style="list-style-type: none"> Temporary disturbance to private landowners adjacent to remedial areas Public safety may be affected by Project activities Private properties potentially affected by Project activities Removal of contaminated sediment will have net benefit for people, public health and ecosystem resources (i.e., fish) 	H	L	L	Low Negative Effect	<ul style="list-style-type: none"> Contractor to maintain lines of communication with private land owners The Contractor shall direct complaints made by adjacent private land owners to the PSPC DR Complete site maintenance and housekeeping at all times Limit construction activities to approved working hours The Contractor shall maintain setbacks and not impede on private property The Contractor shall secure the work areas to prevent public access 	Low	Not Significant

8.0 CUMULATIVE EFFECTS

Cumulative effects represent the incremental effects of an action on the environment when the effects are combined with those from other past, existing or future actions. The assessment of cumulative environmental effects presented in this section considered residual effects resulting from the proposed Project combined with those of other past, existing and known imminent projects and activities.

8.1 Historic and Future Projects

The following section details known projects that have been undertaken in the recent past as well as future potential projects within the Reay Creek Remediation Project area. The VAA are engaged in a number of construction and environmental enhancement projects in different areas of the Airport; however, only those projects that directly impact Reay Creek were considered in the cumulative effects assessment.

8.1.1 Historic Projects

The following historic projects were considered:

Reay Creek Channel Diversion and Restoration Project. 2012.

In an effort to reduce potential for new contaminant inputs into downstream areas of Reay Creek, a 200 m long diversion channel was built (Reach 1B) to isolate the most contaminated areas of the creek (Reach 1A). The diversion channel incorporated aquatic habitat features such as rocks, riffle structures and riparian vegetation plantings to provide habitat for a variety of aquatic species.

The diversion channel was designed to allow for clean storm water to bypass the historically contaminated areas while enhancing riparian plantings to help remediate the existing creek. The old creek channel (Reach 1A) was converted into a bio-remediation linear wetland and was used as a catch basin for stormwater inputs. Creation of the bypass channel involved installing isolation berms with spill gates to help reduce the risk of any event or spill in the future that may impact the lower creek reaches that run through Town of Sidney and North Saanich.

Reay Creek Detention Pond Project. 2017 – 2018

In spring 2018, the newly construction detention pond within Reach 2 was created ground-side within VIA property. A 5,000 m³ detention pond was constructed to help control stormwater flows from impermeable surfaces located on Airport Lands. At the downstream end of the detention pond, an outlet structure was constructed that provides a controlled rate of water discharge aimed at reducing peak flows in downstream areas in an effort to mitigate flooding and soil erosion.

The previous channel along the detention pond was excavated of all potentially contaminated sediments and the new channel was lined with gravel and cobble substrates. During low flows, the creek channel maintains flow to downstream areas. Higher flow events back up at the outlet weir and inundate the pond area which slowly draws down to alleviate large pulses in flow during storm events. A sediment trap was also constructed to reduce future sedimentation leaving Airport Lands.

8.1.2 Future Projects

The following projects have the potential to occur within the Reay Creek system, although have not been confirmed:

- Potential aquatic habitat enhancement projects within Reach 3 (Tributary Channel) may be completed by VAA;
- Potential further remediation of Reay Creek downstream of the Pond dam may be completed to address historical sediment contamination in this area;
- Potential upgrades to the Reay Creek Dam may be conducted by the Town of Sidney following Pond remediation activities; and
- Potential ongoing salmon enhancement within Reay Creek from local Streamkeepers Associations (i.e., Sidney Anglers Association, Peninsula Streams Society).

8.2 Cumulative Effects Assessment

The historic projects as well as the future potential projects listed above all provide benefits to VECs, either through habitat enhancement, reduction in contaminated sediment migration, or reduction in storm surge flows.

The proposed Reay Creek Remediation Project will provide an ultimate net benefit to the surrounding environment. The cumulative effects of past sediment and surface water enhancement programs, future potential habitat enhancement programs and the current sediment remediation and habitat enhancement program will provide a net benefit to the surrounding environment and VECs listed in Section 5.0.

9.0 ACCIDENTS AND MALFUNCTIONS

Section 6.0 described the proposed mitigation measures to avoid and minimize environmental effects as a result of the remediation Project. Infrequent and unplanned accidents and malfunctions can, however, occur during the implementation of the Project, and these potentially can affect the environment. This section describes the potential for malfunction and accidents and contingency measures that will be implemented to minimize their occurrence and consequence.

9.1 Spills of Toxic or Hazardous Materials

Accidental spills of toxic or hazardous materials to water bodies or storm sewers can cause acute or chronic effects to aquatic life (including plants) and aquatic dependent birds and mammals as well as their food source. Accidental spills can involve gasoline, diesel, propane, hydraulic oil, lubricating oils and greases, and may occur during construction activities or operation. To prevent and minimize the potential effects of accidental spills, the Contractor shall create and submit an EPP prior to the construction works. A Spill Response Plan shall be included within the EPP and mitigation measures outlined within the plan shall be in place during the construction phases of the Project and should outline spill prevention, detection and response measures.

Details regarding mitigation measures to limit the potential for contamination to soils, groundwater and surface water from accidental spills can be referenced in Section 6.1.5. The implementation of the Spill Response Plan including the mitigation measures outlined in Section 6.1.5 will reduce the likelihood of occurrence of many accidents and malfunctions and confirm

that, should they occur, adverse environmental effects will be prevented or minimized. Therefore, accidental spills associated with the proposed Project are not expected to occur with any regularity or result in any measurable long-term effects on the receiving environment.

9.2 Damage to Utilities

Damage to utilities (e.g. buried natural gas pipes, water conveyance structures, and telecommunication cables), can be a safety hazard during construction and cause disruption to commercial services during construction. All applicable rights of way will be identified prior to construction to minimize accidental damage to utilities. Therefore, damages to utilities are expected to be unlikely. Generally, potential damage to utilities has low consequences to the environment, but may be harmful to human health or safety and public services.

The Contractor will be responsible to complete a utility locate using a certified utility locate sub-Contractor prior to site preparation activities. The Contractor shall develop a Health and Safety Plan that shall contain contingency and mitigation measures to minimize damage to utilities.

9.3 Sediment and Erosion Control Failure

Sediment and erosion mitigation measures will be implemented to prevent sediment discharge to water bodies during construction activities. The procedures outlined in the EPP and Sediment and Erosion Control Plan will be in place before the site preparation and construction activities start to minimize sediment transport to nearby water bodies. The sediment control measures for the Project will be inspected by an appropriately qualified environmental monitor and maintained by the Contractor to verify they are installed and functioning correctly. The Contractor will also be responsible for meeting federal and provincial water quality guidelines for TSS and turbidity in areas downstream of Project activities.

With the implementation of the Water Management Plan and Sediment and Erosion Control Plan, the likelihood of failures in the mitigation measures is considered to be low. Should a failure in erosion and sediment control measure occur, it will likely be of short-duration and reversible. The Contractor shall maintain enough adequate additional sediment and erosion control material (e.g. filter fabric, silt fencing, hay bales, etc.) on site to deal with an emergency.

10.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Environmental conditions potentially affecting the Project adversely during construction are described briefly and assessed for risk in the following subsection. Such effects may include erosion and flooding hazards and implication of climate change (including extreme weather events). SLR outlines proposed mitigation measures below that may be incorporated into the Project design to reduce environmental effects on the Project and assesses the extent that potential effects can be either eliminated or minimized to acceptable levels.

10.1 Erosion and Flooding Hazards

Erosion and flooding protection are not anticipated to cause a large impact on the Project.

There is a low flooding risk downstream of Reach 2 where a detention pond has been constructed to control stormwater flows from impermeable surfaces located on Airport Lands. At the downstream end of the detention pond, an outlet structure has been constructed that

provides a controlled rate of water discharge aimed at reducing peak flows in downstream areas in an effort to mitigate flooding and soil erosion.

A low erosion risk is associated within the Airport Lands catchment area because they are routinely maintained to limit flooding and ponding to control for waterfowl. Removal of riparian vegetation will be necessary along remedial access locations to Reay Creek and Reay Creek Pond. Implementation of sediment and erosion controls, and re-vegetation activities will contribute to long-term bank stability and help minimize erosion (see Section 3.2.4).

10.2 Climate Change

Over the last six decades, Canada has become warmer, with average temperatures over land increasing by 1.5°C between 1950 and 2010 (Werner & Lemmen, 2014). A general increase in temperature has the potential to affect the Project area through an increase in extreme weather events, particularly increases in average annual precipitation.

10.2.1 Extreme Weather Events

Many researchers point to an increase in severe weather events as a likely outcome of global climate change. In Canada, the frequency of warm days (when the daily maximum temperature is above the daily 90th percentile) during the summer has increased nationally since 1950, while the frequency of cold nights (when the daily minimum temperature is below the daily 10th percentile) during the winter has decreased nationally since 1950 (Werner & Lemmen, 2014).

An increase in extreme weather events is expected to generate a greater frequency of large storms as well as an overall increase in the magnitude of storm intensity (Werner & Lemmen, 2014). Climate change is also predicted to influence the rainfall distribution pattern. These changes would likely be associated with less precipitation falling as snow; more frequent, high intensity precipitation events (especially in December and January); and more drought conditions (Werner & Lemmen, 2014). Large rain events are predicted to occur less frequently in summer months.

10.2.2 Greenhouse Gas Emissions and Air Contaminants

The emissions of greenhouse gases such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons have increased along with rapid industrialization, resulting in an increase in the average surface temperature of the Earth over time. Strategies for the reduction in greenhouse gas releases will be employed to the extent practicable during the execution of the remediation project. Idle reduction policies will be followed and machinery that is in proper working condition will be used to limit emissions. Sediments provide long-term sinks for carbon and provide a global carbon sink of about 10 million tonnes each year (Lim *et al.*, 2010). The removal of contaminated sediments from Reay Creek may remove the current carbon sink from the Reay Creek system; however, the deeper channel and pond will provide future opportunities to accumulate sediments and further the benefit of having a carbon sink within the pond and creek substrates.

Terrestrial vegetation improves air quality by removing carbon dioxide and releasing oxygen. The temporary removal of riparian vegetation at remedial access locations will reduce air quality in the immediate area for a short time. Terrestrial habitat restoration activities and replanting of native plant species will improve long-term air quality. Furthermore, replanting trees at a 2:1 ratio will provide net benefits to improving air quality and reducing air contaminants.

11.0 FOLLOW-UP PROGRAM

A DFO Request for Review shall be submitted for approval during the Project planning and preparation phase. Based on the mitigation measures outlined within this EMS and the significance assessment of residual effects, SLR has concluded that a *Fisheries Act* authorization is likely not required given that serious harm to fish can be avoided by following the mitigation measures as outlined in this EMS.

Follow-up monitoring is not required under the *Fisheries Act* but may be recommended by DFO or provided as conditions of approval or authorization. However, environmental monitoring of the implementation of mitigation measures identified in this EMS and the Contractor's compliance with all Terms and Conditions of contracts, permits and approvals issued for the Reay Creek Remediation Project will be conducted by PSPC's independent QEP.

A confirmatory sampling program will also be implemented to confirm and verify results of the sediment remediation program prior to reinstating creek and Pond areas. Furthermore, installed riparian vegetation will also be monitored for survival and establishment for the warranty period of one year post-planting.

In addition, it is anticipated that for up to two years following remediation, a qualified professional will conduct qualitative monitoring of the riparian plantings, fish habitat enhancement efforts and water flow rate and create a follow-up post-remediation report describing the findings and recommendations of the monitoring effort. It is anticipated that regular water quality and flow monitoring will continue to be conducted by VAA which will likely satisfy any water volume and quality monitoring requirements.

12.0 CONCLUSIONS AND RECOMMENDATIONS

Reay Creek is a sinuous linear channel that originates at the VIA in North Saanich, BC. It runs through the Town of Sidney and terminates in Bazan Bay in North Saanich, BC. Reaches 1 to 4 are confined on all sides by VIA property. Reay Creek flows in a southeast direction below Canora Road through a culvert toward Reay Creek Pond on the Town of Sidney lands. Reay Creek Pond (Reach 5) is bounded by approximately seven residential dwellings located along the southwest and north bank edges. A grassed park boulevard and vegetated riparian fringe is maintained to the north and east bounds of Reay Creek Pond that is further bound by Wesbrook Drive. A dam, owned and operated by the Town of Sidney, is located at the downstream end of Reay Creek Pond.

The proposed Project is located on Airport Lands and Town of Sidney lands and consists of removal and off-site disposal of contaminated sediment that exceed the CSR SedFS Standards from Reaches 1A to 1C and Reaches 3 to 4 in the summer of 2019. Remediation of Reach 5 is planned to occur during subsequent years. Remediation of contaminated sediments for all aspects of the Project will be in accordance with the construction design drawings (Appendix A).

Surface water quality within Reay Creek (i.e., on Airport Lands) and Reay Creek Pond is generally considered poor (in terms of supporting aquatic life) based on low oxygen levels, high summer temperatures, and fluctuating pH levels. The temperature in the middle of Reay Creek Pond exceeded all optimum temperatures for incubation, rearing, migration and spawning life stages for coho and cutthroat trout. Dissolved oxygen levels were suitable to sustain aquatic wildlife, but were too low to accommodate spawning activities and healthy populations of food sources for salmonids. Large fluctuations in pH were identified throughout Reay Creek. These factors combined suggest that Reay Creek Pond is not suitable to support or sustain population of coho salmon and cutthroat trout.

The sediments encountered within Reay Creek are composed of mainly gray clay and sand with organics and some brown/orange mottling. Historic sediment quality data shows that the sediments within the Project area are contaminated with the following primary contaminants of concern: arsenic, cadmium, chromium (total), copper, lead, mercury and zinc. Removal of the contaminated sediments will provide a net benefit to the Project areas of Reay Creek, as well as downstream of the remedial extents.

Most of the riparian vegetation surrounding the upper reaches of Reay Creek within Airport Lands consists of woody shrub species and some shorter trees such as willows, alders and black cottonwoods. Select areas contain considerable concentrations of invasive species such as Himalayan blackberry. Adjacent to Reaches 3 and 4, the riparian habitat is comprised of mainly taller alders and Douglas fir trees. Surrounding Reach 5, the riparian habitat is made up of a number of woody shrub species lining the banks as well as large deciduous trees such as big leaf maple, red alder, black cottonwood, western redcedar and ornamental weeping willow. A large proportion of invasive species including Himalayan blackberry and/or English ivy as well as other native woody shrub species and herbs are present along the banks of Reach 5. The Provincially Blue-listed ecological community, black cottonwood - red alder / salmonberry, exists within the floodplain of Reay Creek, along Reaches 5 and further downstream; the listed ecological community is not designated under the SARA.

The riparian vegetation in the Project area offer spring/summer forage and nesting habitat for birds, and breeding and feeding habitat for small mammals. Potential effects on birds and wildlife include habitat alteration (e.g. loss, fragmentation and change in quality), sensory disturbance and mortality. Mitigation measures have been identified to reduce harm to nesting birds during the Project timeframe. Many of the terrestrial animal SAR that were identified as potentially occurring within the Project area are transient and are not likely to occur within the land or waters in and around Reay Creek during remedial works.

The aquatic habitat potential of the upper Reaches of Reay Creek (Reaches 1 to 4) have been described as functioning properly, although not at their potential condition due to channel modification (i.e., ditching), removal of taller trees, and the prevalence of invasive species. Reach 5 is of marginal aquatic habitat due to high temperatures and low DO levels that occur in the summer months. Cutthroat trout and coho salmon have been known to spawn and occur within Reay Creek; both of these species are provincially listed (blue and yellow, respectively) but are not designated under SARA and are not federally protected. Aquatic habitat, including fish, reptiles and amphibians, and benthic communities represent the ecosystem components that will be affected the most by the Project.

Potential effects on aquatic habitat include the temporary loss of wetted area resulting from channel isolation and sediment remediation, changes in the physical structure and habitat of Reay Creek Pond (i.e., greater wetted depths, decreased water temperatures), removal of instream aquatic vegetation, and removal of riparian vegetation at remedial access locations. Mitigation measures will offset these effects and the remedial program will ultimately lead to a long-term net benefit in aquatic habitat and ecosystem function of the remedial areas and entire Reay Creek system.

Measures including fish salvage operations and construction timing windows to avoid disturbing fish and wildlife during sensitive periods can mitigate most direct effects of construction activities on fish and wildlife. Other measures including sediment and erosion control, and storm water best management practices can protect fish and wildlife habitat if installed and maintained adequately. These and other mitigation measures have been described above and will be implemented as the Project proceeds.

Potential effects on social components, including heritage resources, recreation services, and people and public health have been deemed to be not significant given the provided mitigation measures are followed.

Potential cumulative effects associated with this Project in conjunction with past and future potential projects were assessed. The cumulative effects of past sediment and surface water enhancement programs, future potential habitat enhancement programs and the current sediment remediation and habitat enhancement program will provide a net benefit to the surrounding environment and VECs.

Based on the information presented in this EMS report, the proposed Reay Creek Remediation Project is not expected to cause significant residual adverse environmental effects. This expectation is based on the implementation of mitigation measures developed for this Project, and application and approval of associated permits and authorizations. Long-term benefits to aquatic habitat, fish and wildlife resources, and public enjoyment of Reay Creek Pond are anticipated to result from the Project.

13.0 REFERENCES

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14.0 STATEMENT OF LIMITATIONS

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HO/MC/DM/cn

N:\Victoria\Projects\PWGSC\205.03892.00003 Reay Cr Remed FY18-19 Added Scope\Deliverables\Env Mitigation Strategy\205.03892.00003 Reay Creek EMS_FINAL_2019-03-31.docx

PHOTOGRAPHS

Environmental Mitigation Strategy – Reay Creek
Reay Creek Remediation Project, Sidney BC
SLR Project No.: 205.03892.00003



Photo 1: Flow controller at upstream end of Reach 1A, looking south.



Photo 2: Instream vegetation consisting primarily of reed canarygrass in Reach 1A, looking west.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 3: Typical riparian vegetation present along north bank of Reach 1A, looking east.



Photo 4: Large patch of Himalayan blackberry along north bank of Reach 1A, looking west.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 5: Headwaters of Reay Creek daylight from culvert at upstream end of Reach 1B, looking west.



Photo 6: Instream aquatic vegetation (duckweed, sedges and rushes) in low flow areas of Reach 1B, looking east.



Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00003



Photo 7: Typical riparian vegetation present along south bank of Reach 1B, looking east.



Photo 8: Typical riparian vegetation present along north and south banks of Reach 1C to the east of the access road, looking west.



Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SITE PHOTOGRAPHS

SLR Project No: 205.03892.00003



Photo 9: Typical riparian vegetation present along north bank of Reach 2, looking east.



Photo 10: Typical riparian vegetation present along north and south banks of Reach 3, looking west.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 11: Typical riparian vegetation present along north and south banks of Reach 4, looking west.



Photo 12: Reay Creek Pond Dam, looking west.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 13: Spillway to the southwest of Reay Creek Pond Dam, looking west.



Photo 14: Instream aquatic vegetation in Reay Creek Pond during summer months, looking north.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 15: Typical riparian vegetation present along north bank of Reay Creek Pond, looking east.



Photo 16: Patches of invasive species (Himalayan blackberry, English ivy) present along banks of Reay Creek Pond, looking south.



SITE PHOTOGRAPHS

Environmental Mitigation Strategy
 Reay Creek Remediation
 Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003



Photo 17: Reay Creek Park lined with ornamental trees and grassed areas adjacent to Westbrook Drive, looking north.



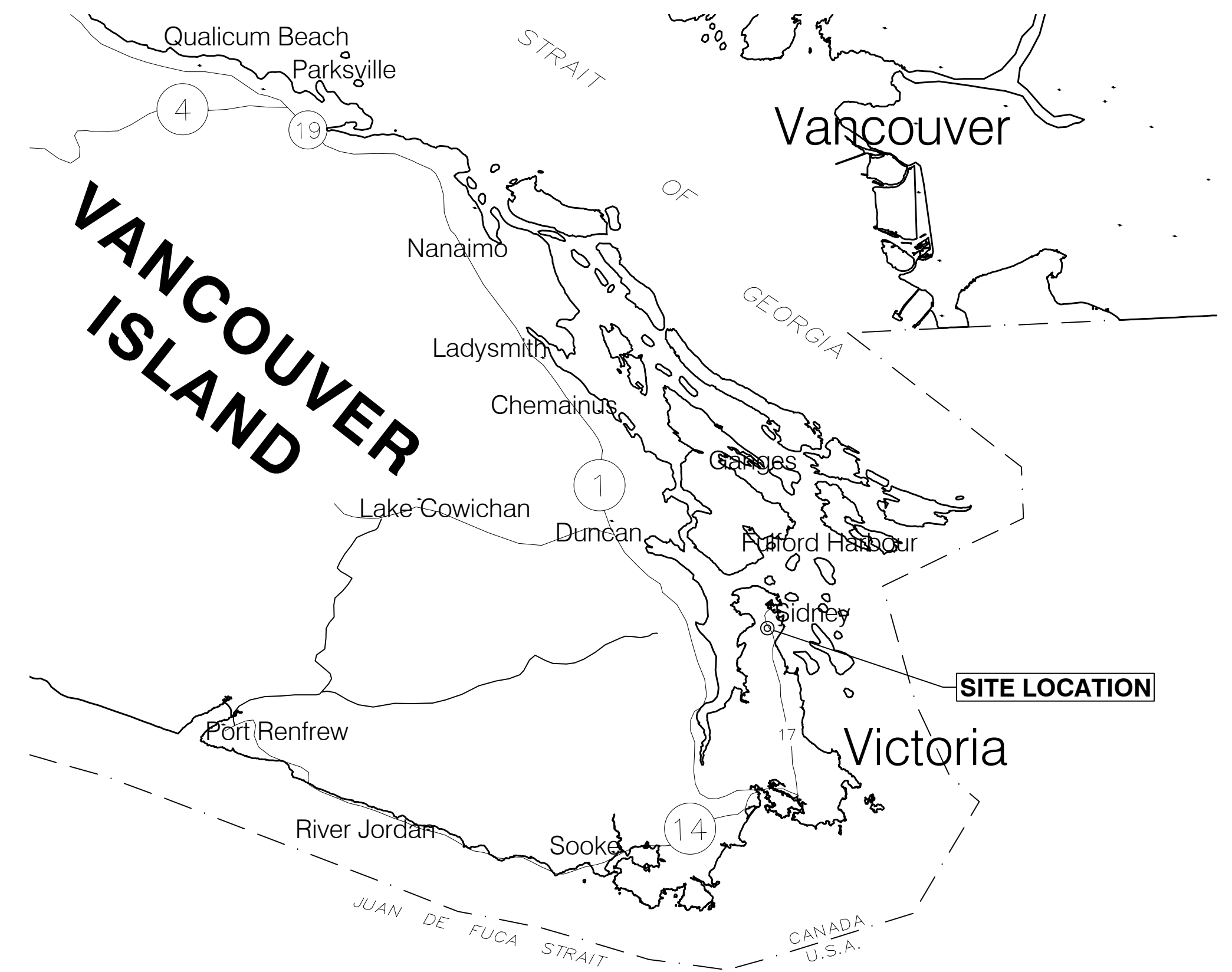
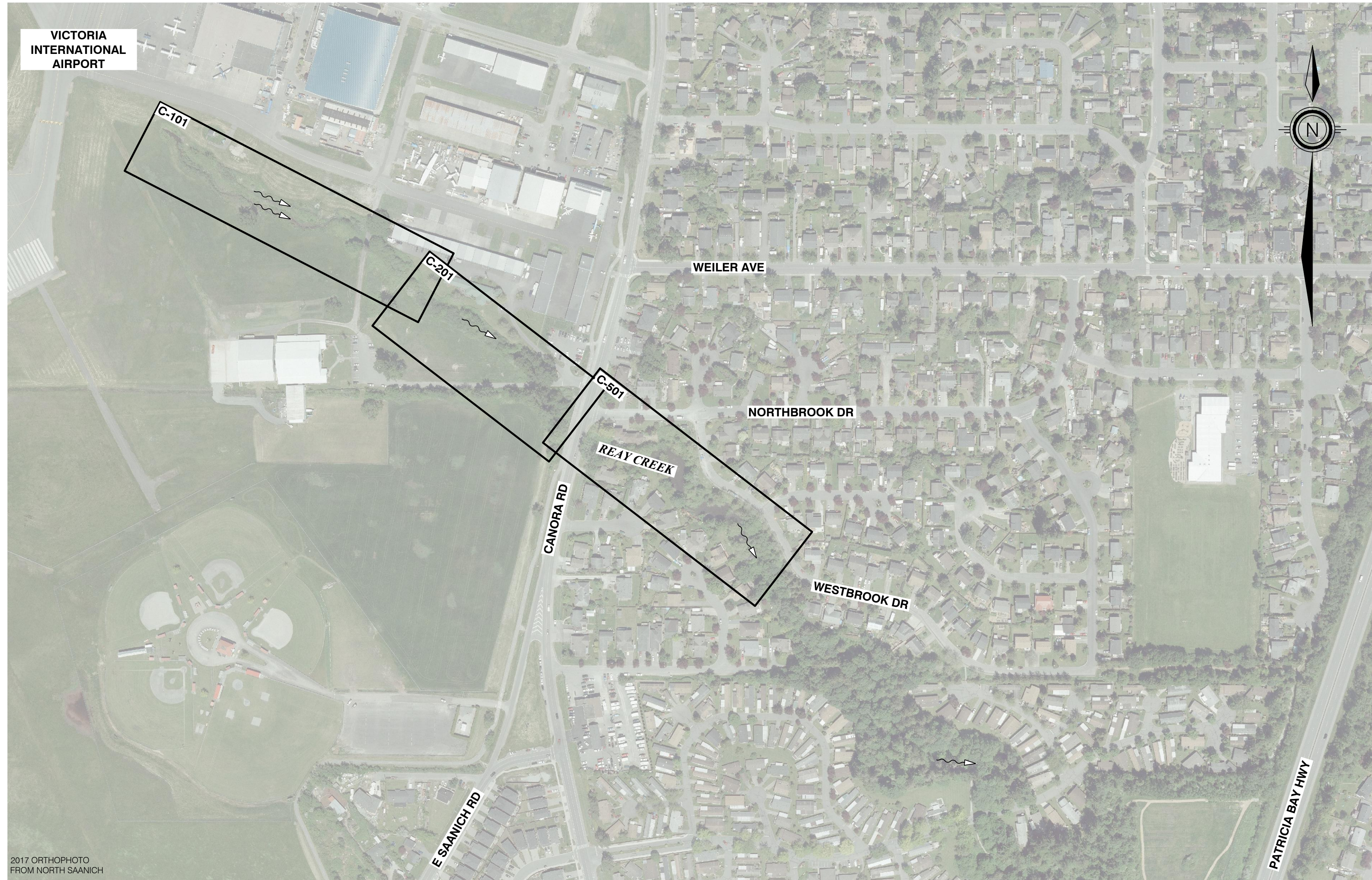
SITE PHOTOGRAPHS

Environmental Mitigation Strategy
Reay Creek Remediation
Reay Creek, Sidney, BC

SLR Project No: 205.03892.00003

APPENDIX A
90% Construction Design Drawings

Environmental Mitigation Strategy – Reay Creek
Reay Creek Remediation Project, Sidney BC
SLR Project No.: 205.03892.00003



KEY PLAN
N.T.S.

TRANSPORT CANADA 2019 REAY CREEK REMEDIATION

DRAWING LIST	
Sheet Number	Sheet Title
G-001	SITE PLAN, KEY PLAN, & DRAWING LIST
G-002	TOWN OF SIDNEY / POND AREA - CONSTRUCTION SITE BOUNDARY
G-003	VICTORIA AIRPORT AUTHORITY LANDS - CONSTRUCTION SITE BOUNDARY & ACCESS AREAS
C-100	REACH 1A, 1B, & 1C - EXISTING CONDITIONS
C-101	REACH 1A, 1B, & 1C - EXCAVATION PLAN & SECTIONS
C-200	REACH 2, 3, & 4 - EXISTING CONDITIONS
C-201	REACH 2, 3, & 4 - EXCAVATION PLAN & SECTIONS
C-500	REACH 5 - EXISTING CONDITIONS
C-501	REACH 5 - EXCAVATION PLAN, PROFILE, & TYP. SECTIONS
C-502	REACH 5 - SECTIONS



**Issued for
Review**
2019-03-29

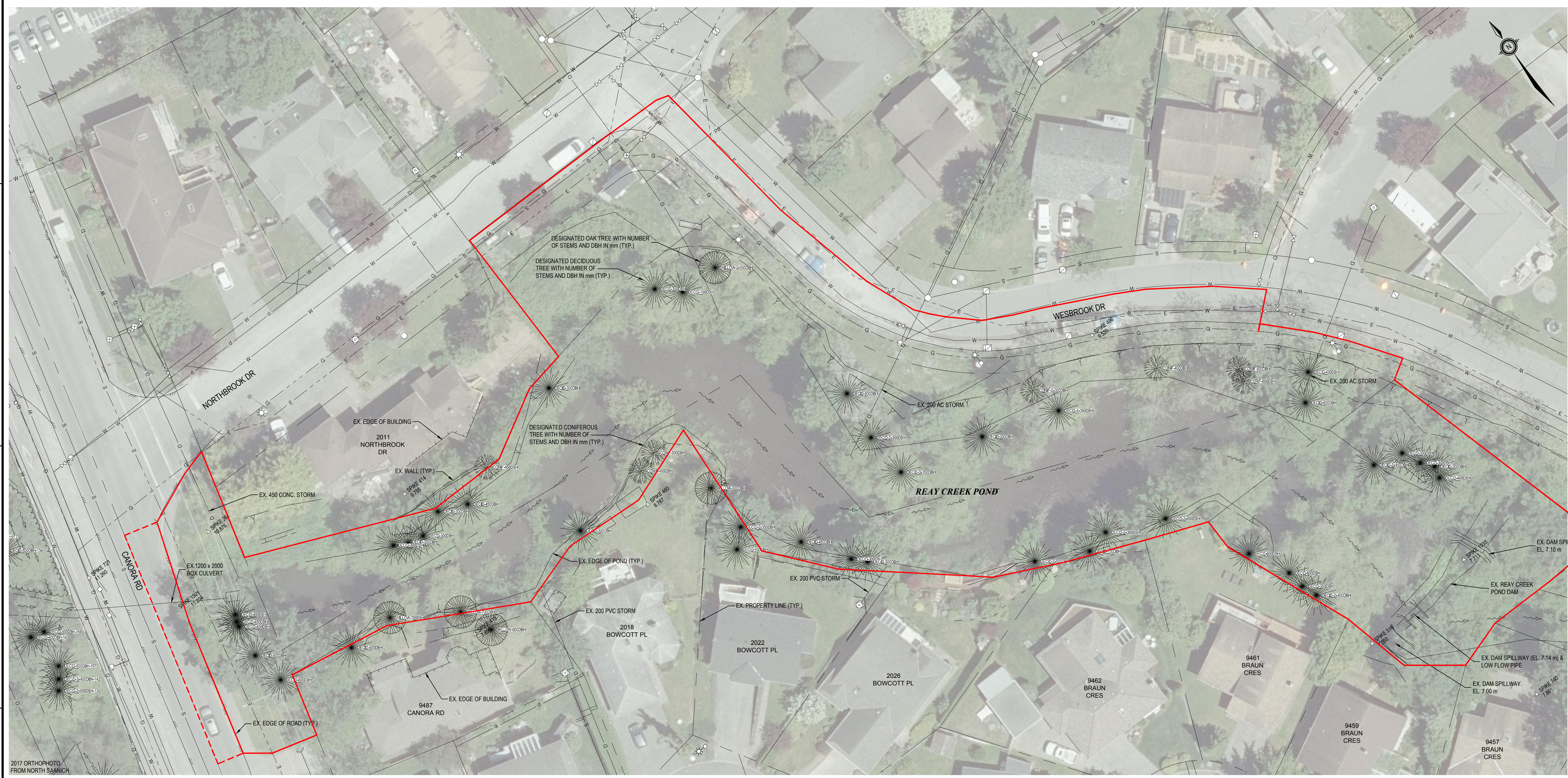
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B	2019-03-12	CS	PAC	DNM	ISSUED FOR 70% DESIGN
C	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN

**TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK**

SITE PLAN, KEY PLAN, & DRAWING LIST

Project No. 2396-009	Drawing No.	Rev. C
Group GENERAL	G-001	

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 2017 ORTHOPHOTO FROM NORTH SAANICH
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NOTE: WORKSITE IS BOUNDED BY PRIVATE PROPERTY BOUNDARIES AROUND THE POND UNLESS OTHERWISE NOTED ON THE PLAN.

- CONSTRUCTION ACCESS AREA - CONTRACTOR MAY USE DEFINED AREA FOR ACCESS/EGRESS TO THE CONSTRUCTION SITE. HOWEVER, AT ALL OTHER TIMES THE AREA MUST BE KEPT CLEAR OF ALL EQUIPMENT AND MATERIALS TO MAINTAIN ACCESS FOR PUBLIC. TRAFFIC MANAGEMENT WILL BE REQUIRED DURING PERIODS WHEN CONSTRUCTION ACCESS AREAS ARE BEING OCCUPIED BY CONTRACTOR AS OUTLINED IN TRAFFIC MANAGEMENT PLAN TO BE PREPARED BY THE CONTRACTOR.
- CONSTRUCTION SITE - THE AREA CONTAINED WITHIN THE SOLID LINES ON THE PLAN DEFINED AS THE CONSTRUCTION SITE FOR THE PURPOSE OF CONTRACT.

PLAN
Scale 1:300

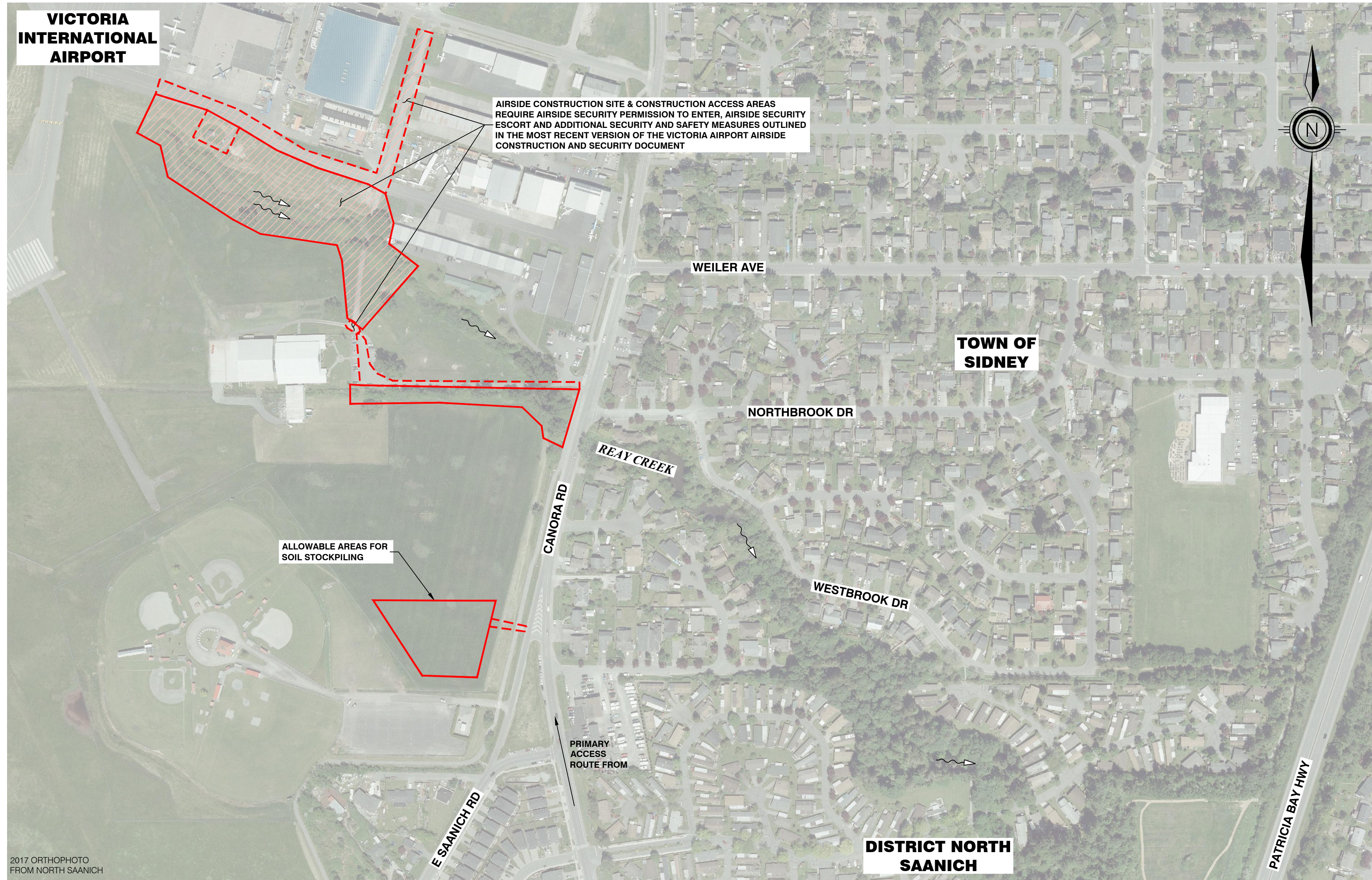
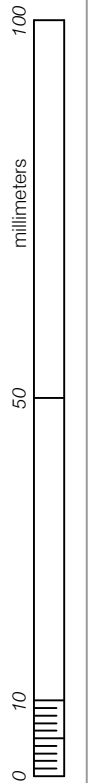


Issued for Review
 2019-03-29

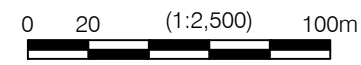
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TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK TOWN OF SIDNEY / POND AREA CONSTRUCTION SITE BOUNDARY



Project No. 2396-009	Drawing No. G-002	Rev. A
Group CIVIL		



2017 ORTHOPHOTO
FROM NORTH SAANICH



ACCESS PLAN
Scale 1:2,500

-  CONSTRUCTION ACCESS AREA - CONTRACTOR MAY USE DEFINED AREA FOR ACCESS/EGRESS TO THE CONSTRUCTION SITE. HOWEVER, AT ALL OTHER TIMES THE AREA MUST BE KEPT CLEAR OF ALL EQUIPMENT AND MATERIALS TO MAINTAIN ACCESS FOR PUBLIC. TRAFFIC MANAGEMENT WILL BE REQUIRED DURING PERIODS WHEN CONSTRUCTION ACCESS AREAS ARE BEING OCCUPIED BY CONTRACTOR AS OUTLINED IN TRAFFIC MANAGEMENT PLAN TO BE PREPARED BY THE CONTRACTOR.
-  CONSTRUCTION SITE - THE AREA CONTAINED WITHIN THE SOLID LINES ON THE PLAN DEFINED AS THE CONSTRUCTION SITE FOR THE PURPOSE OF CONTRACT.

Issued for Review
2019-03-29

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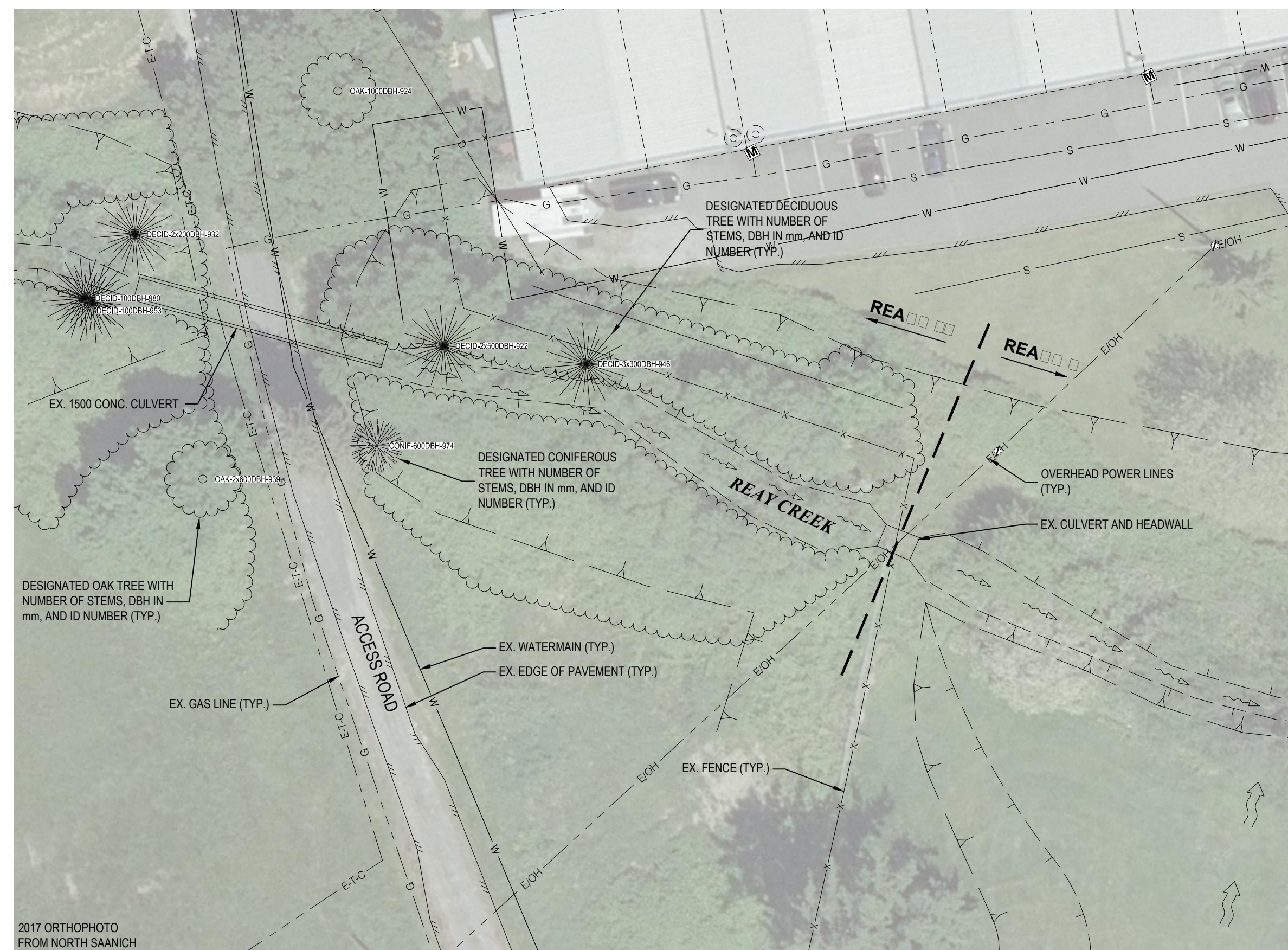
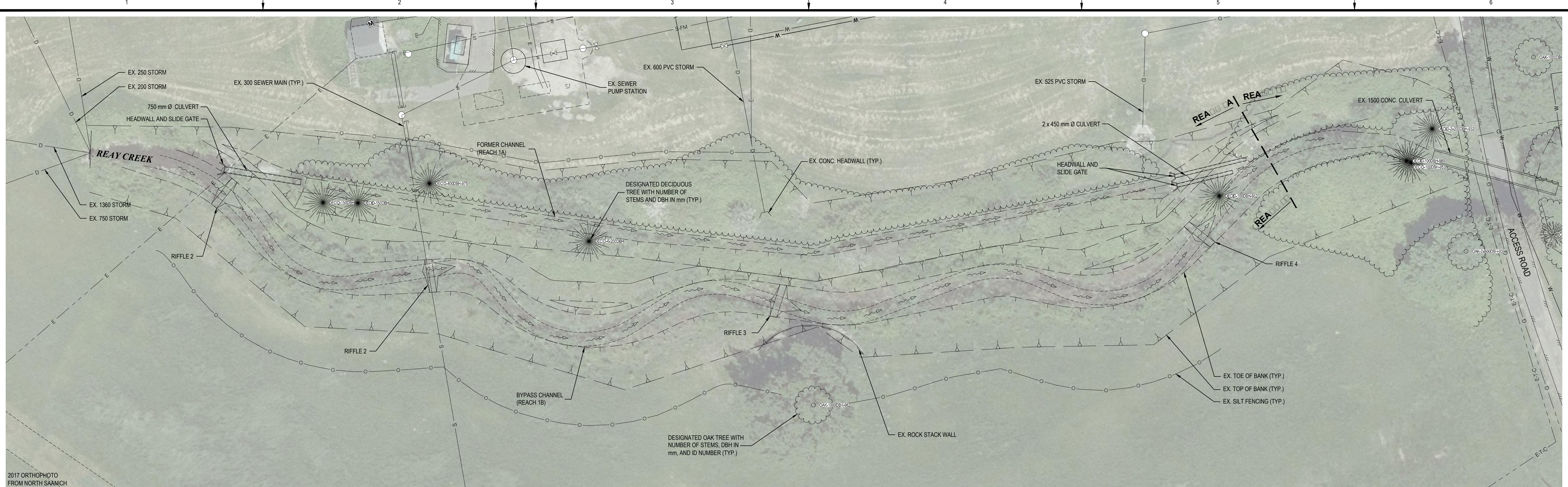
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TRANSPORT CANADA
REAY CREEK REMEDIATION

VICTORIA AIRPORT AUTHORITY LANDS
CONSTRUCTION SITE BOUNDARY & ACCESS AREAS

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Group GENERAL		

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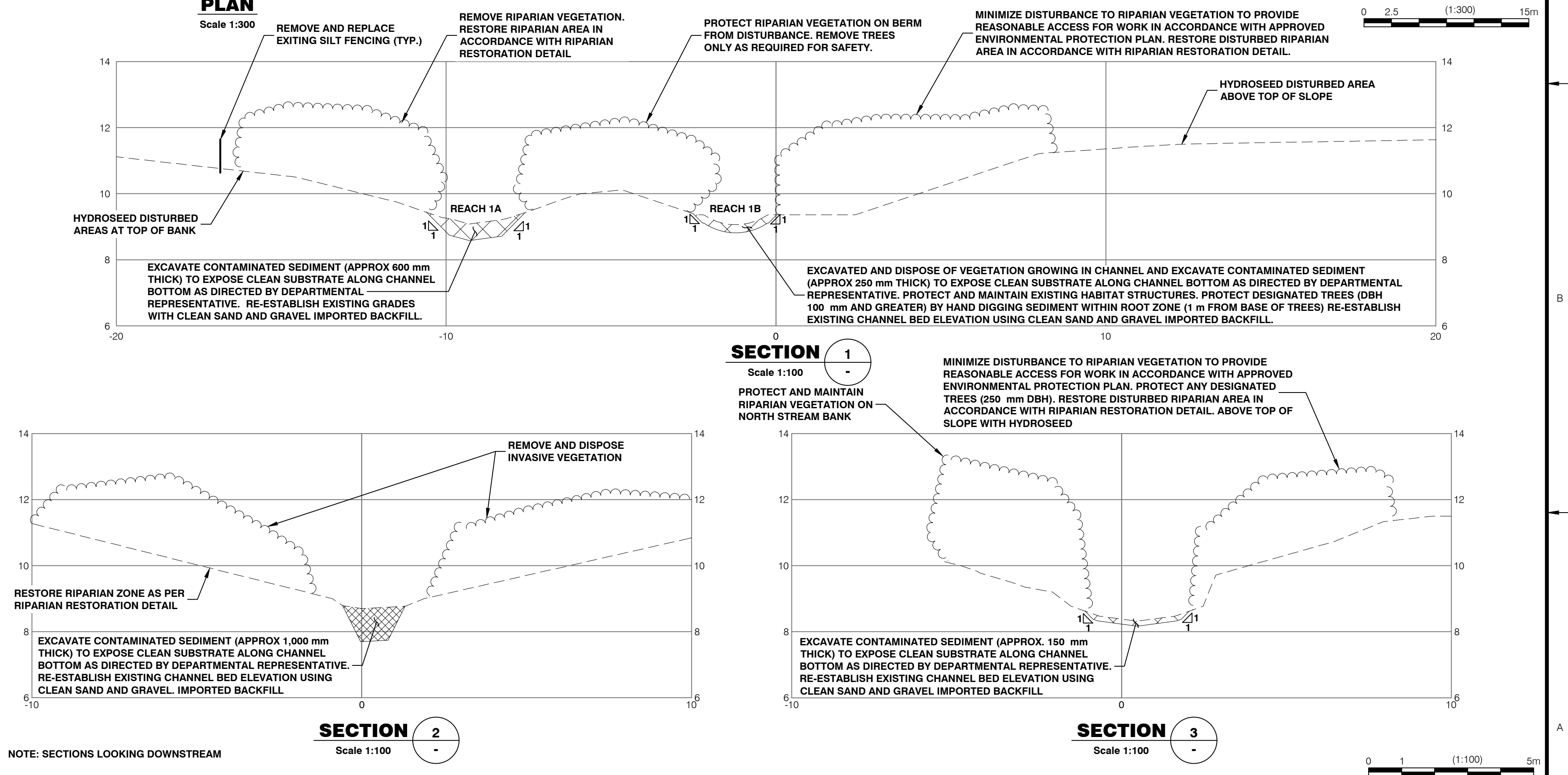
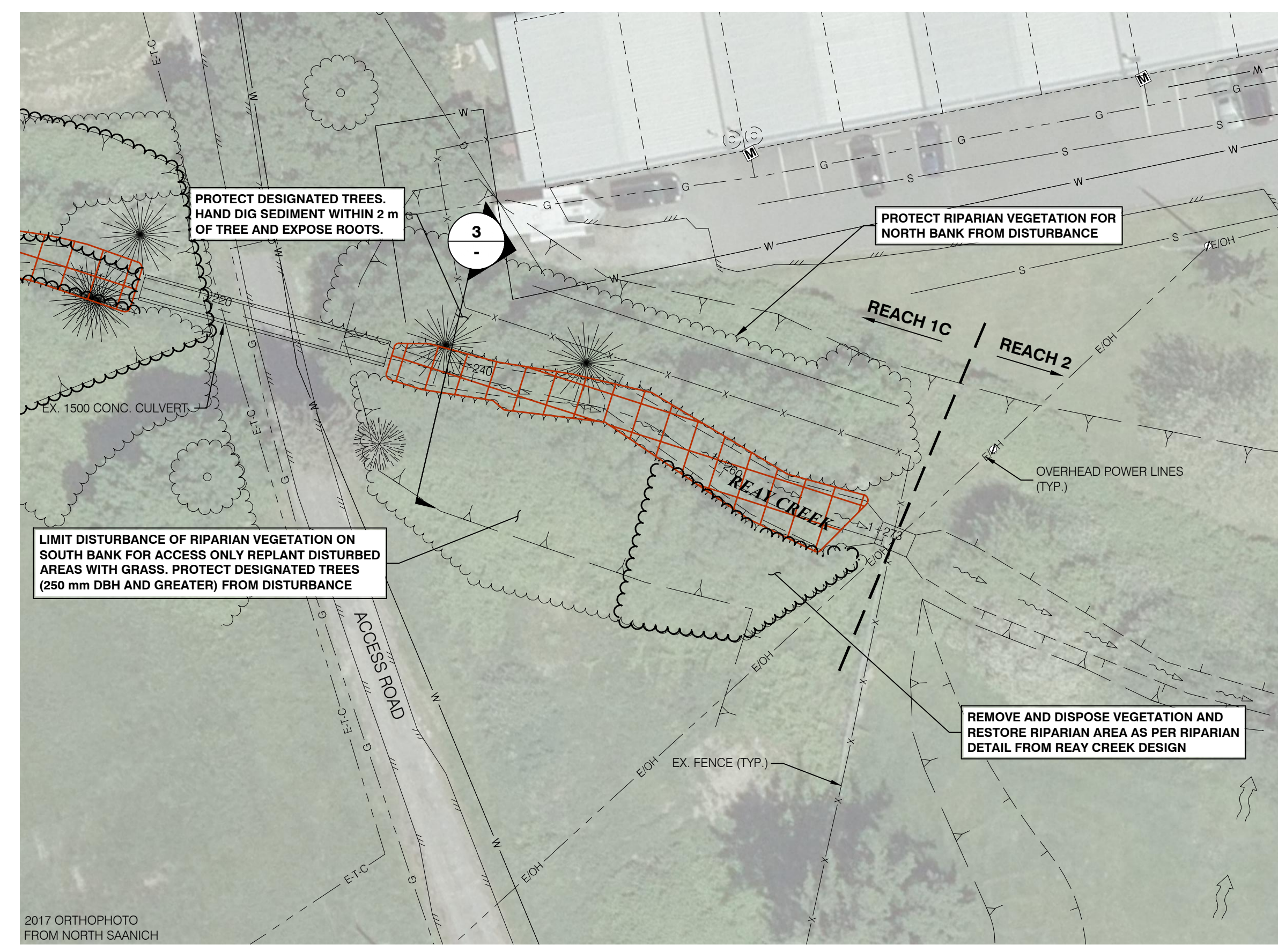
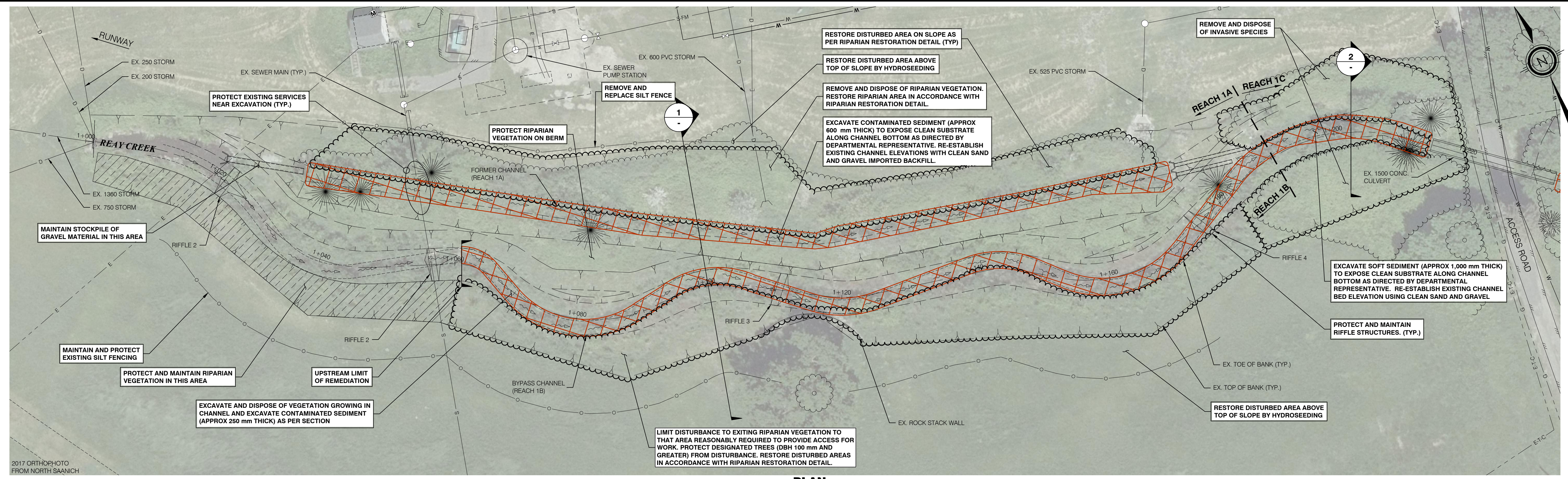
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 2019-03-29

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B	2019-03-29	CS PAC DNM	ISSUED FOR 90% DESIGN				

TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK
REACH A B C
ERITING CONDITIONS SERVICES

Project No. 000000 Drawing No. C-00 Rev. B
 Group IL



Issued for Review
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B	2019-03-12	CS	PAC	DNM	ISSUED FOR 70% DESIGN						
C	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN						

TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK
REACH 1A, 1B, & 1C
EXCAVATION PLAN & SECTIONS

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Group: **CIVIL**

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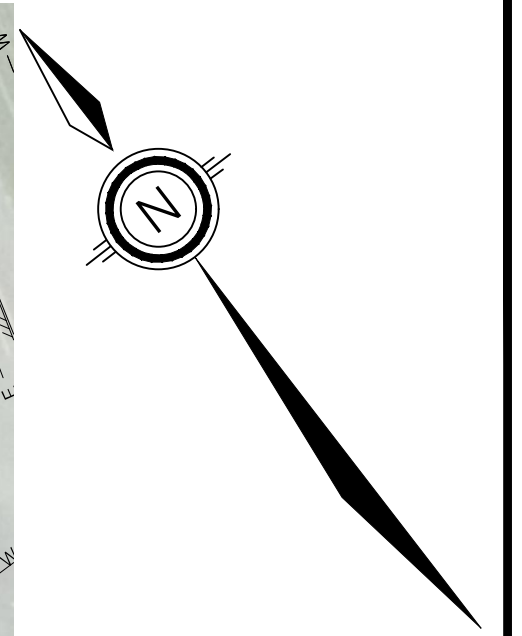
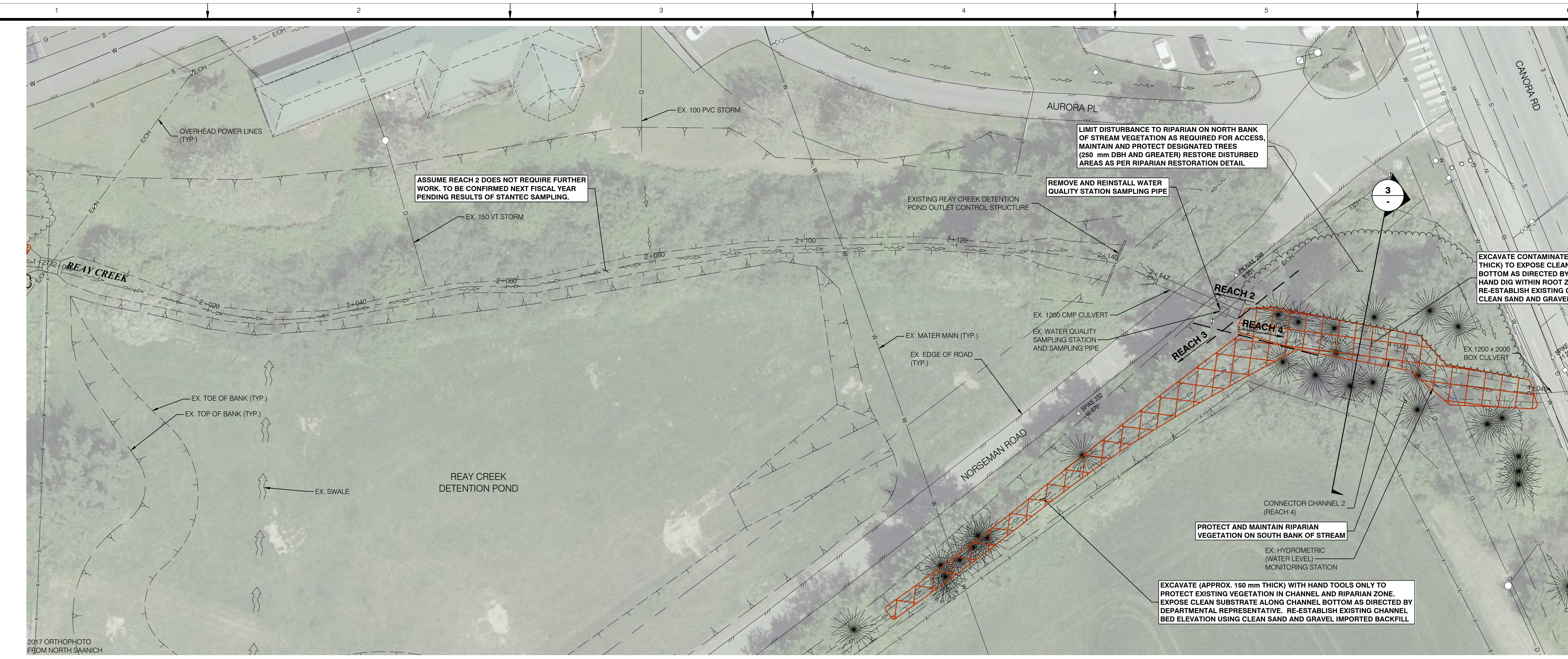
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B	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN						

TRANSPORT CANADA			
REAY CREEK REMEDIATION			
REAY CREEK			
REACH 2, 3, & 4			
EXISTING CONDITIONS & SERVICES			
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Group	CIVIL		
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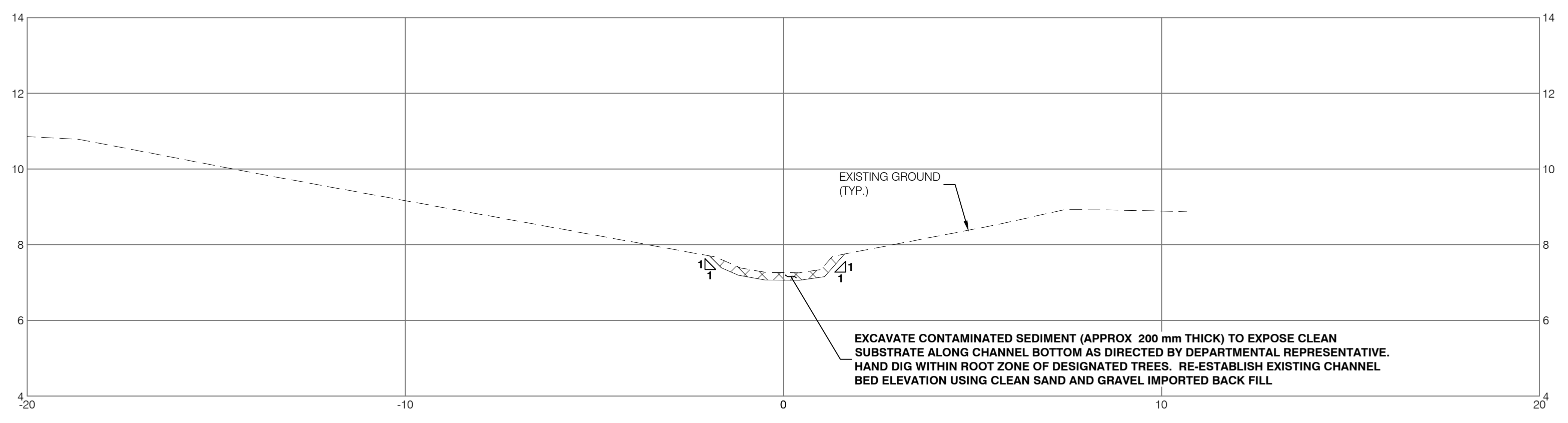
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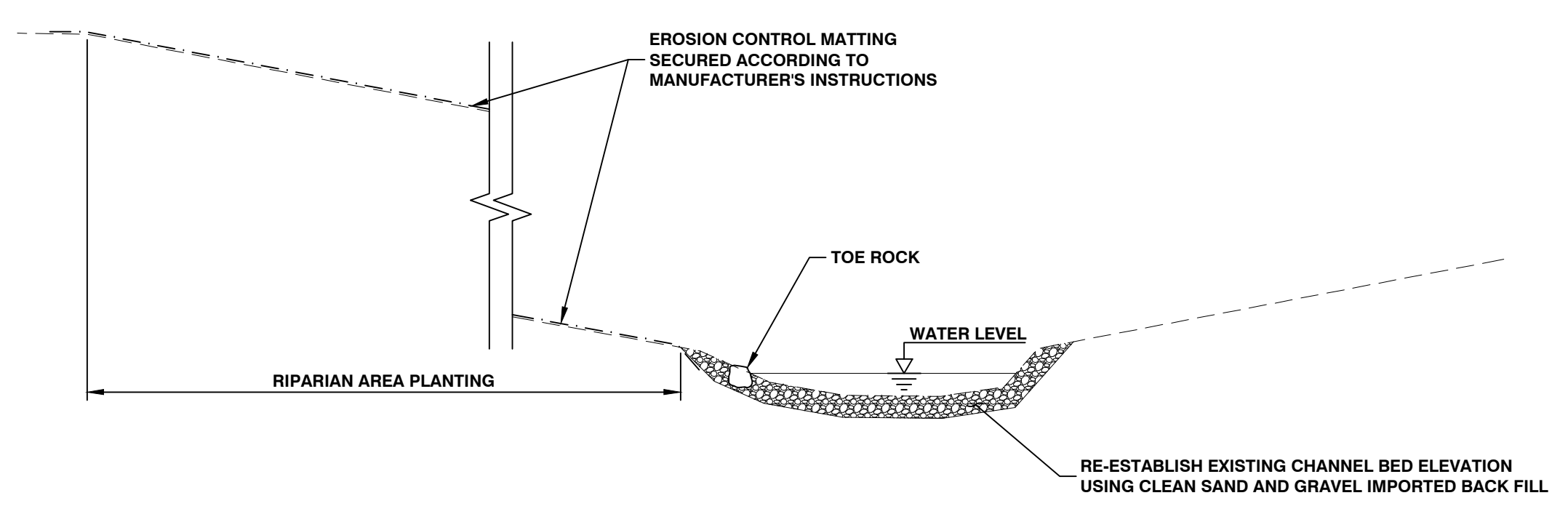
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PLAN
Scale 1:300



SECTION 3
Scale: 1:100

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CHANNEL RIPARIAN RESTORATION DETAIL
Scale: 1:50



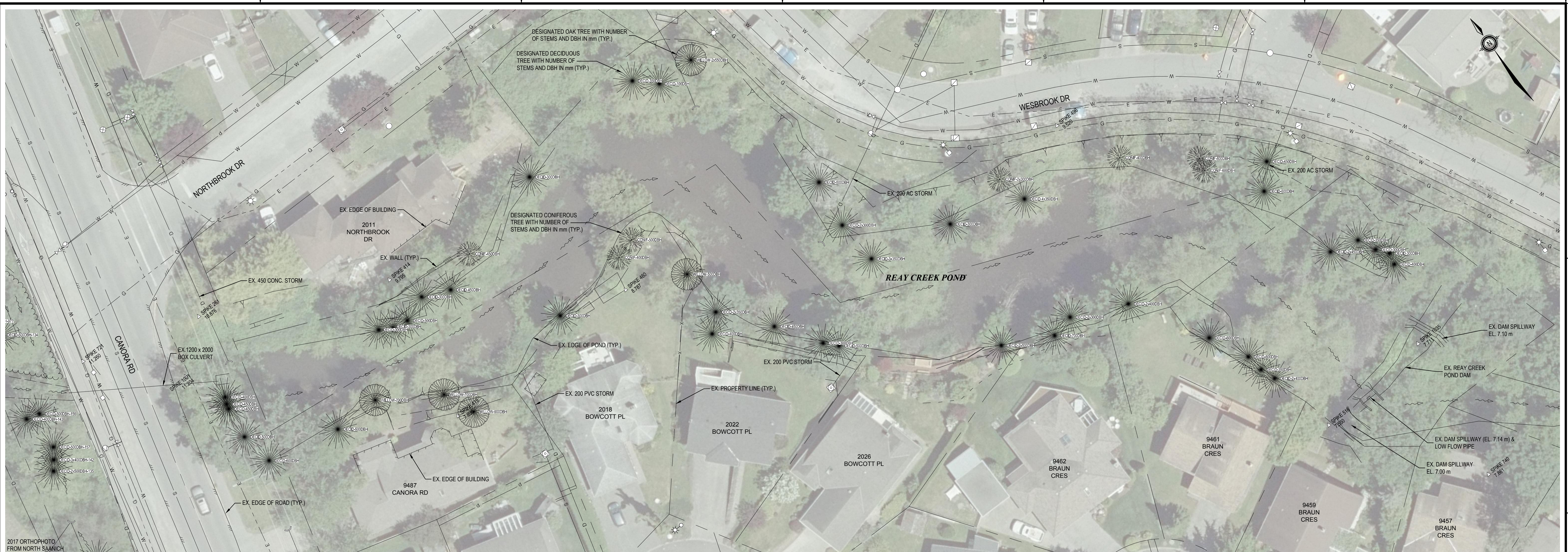
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B	2019-03-12	CS	PAC	DNM	ISSUED FOR 70% DESIGN						
C	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN						

TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK
REACH 2, 3, & 4
EXCAVATION PLAN & SECTIONS

Project No. **2396-009** Drawing No. **C-201** Rev. **C**
Group **CIVIL**

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B	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN

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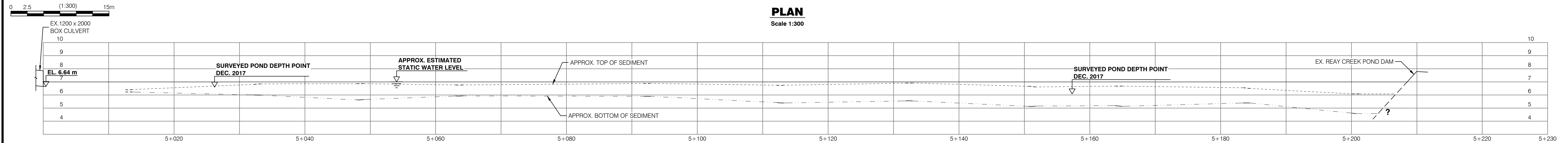
TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK POND
REACH 5
EXISTING CONDITIONS

Project No. 2396-009	Drawing No.	Rev.
Group CIVIL	C-500	B

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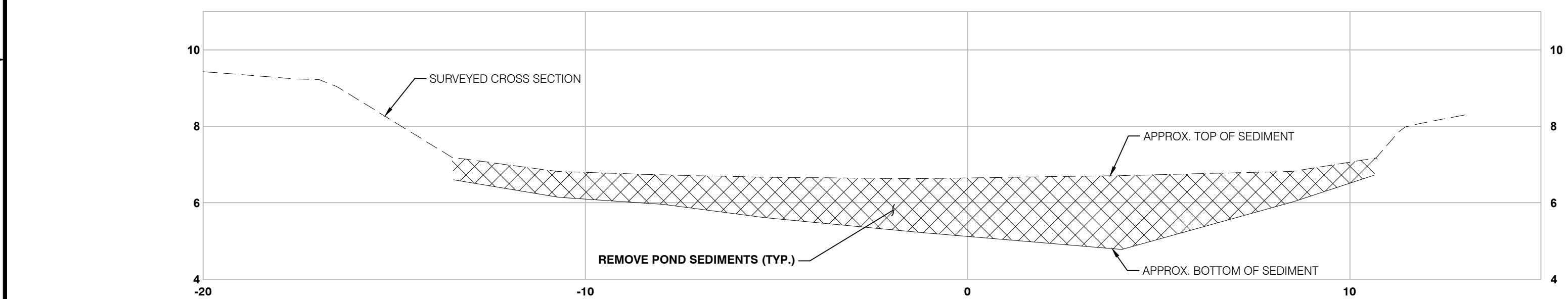


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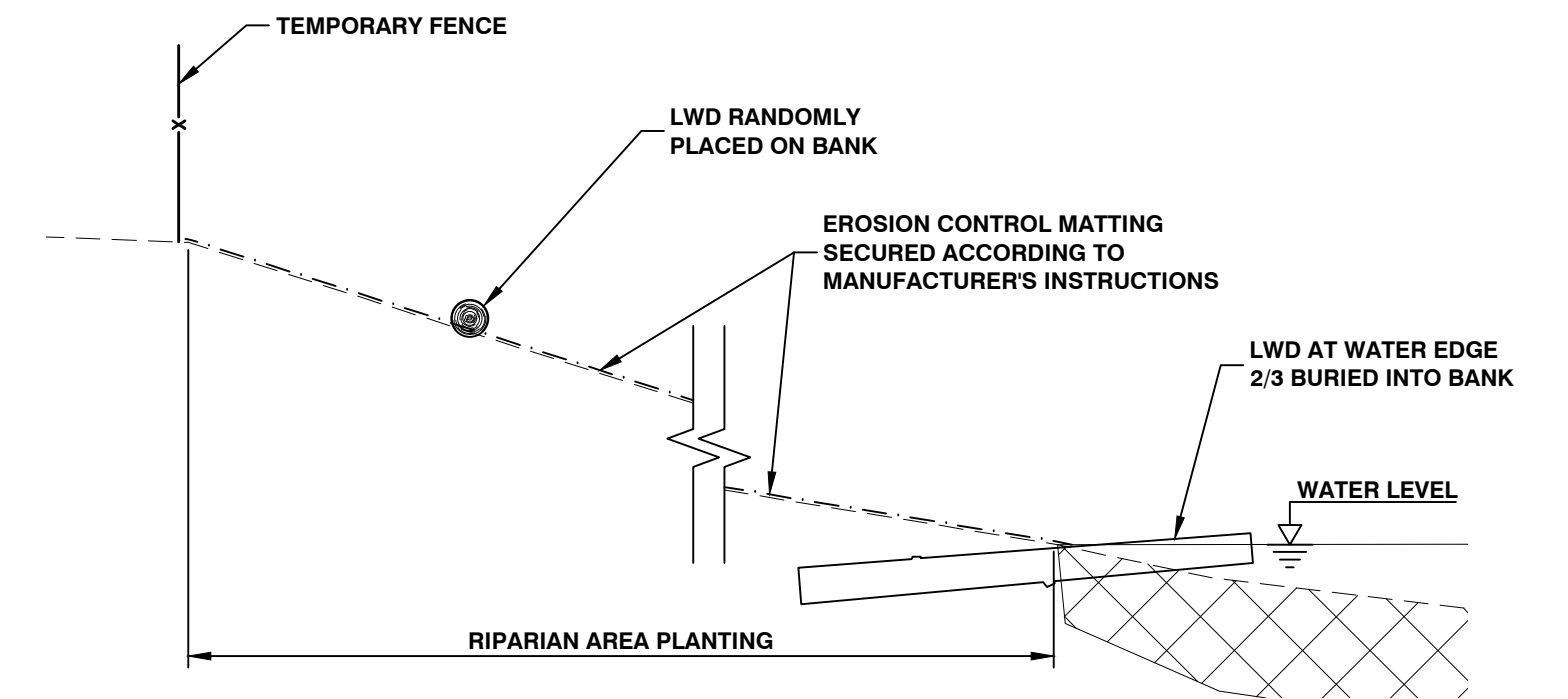


PROFILE
Scale H 1:300, V 1:150

NOTES:
 1. ACTUAL STATIC WATER LEVEL IS UNKNOWN AND SHOULD BE INVESTIGATED IN THE NEXT FISCAL YEAR.
 2. DEPTH OF REMOVAL FOR DESIGN CONCEPT IS BASED ON BATHYMETRY AND SEDIMENT DEPTHS PROVIDED BY J.E. ANDERSON (DECEMBER 2018).



SECTION 4
Scale: 1:100



POND RIPARIAN RESTORATION DETAIL
Scale: 1:50

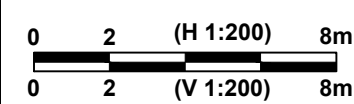
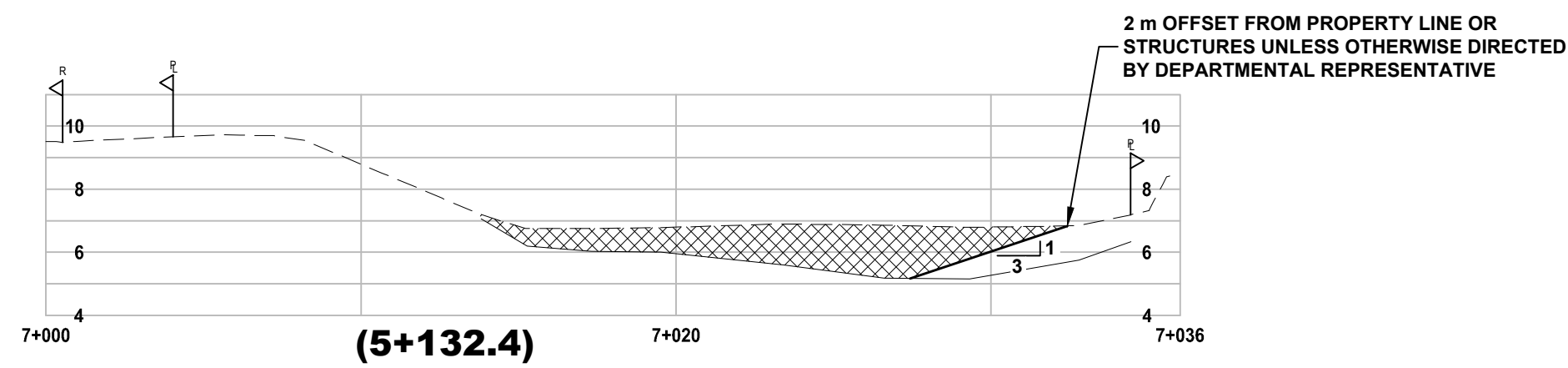
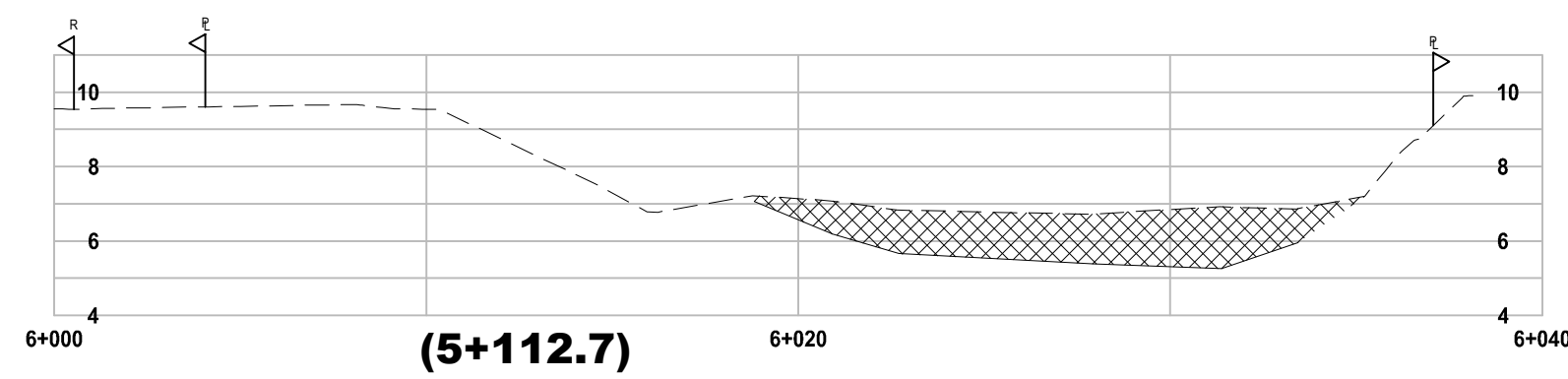
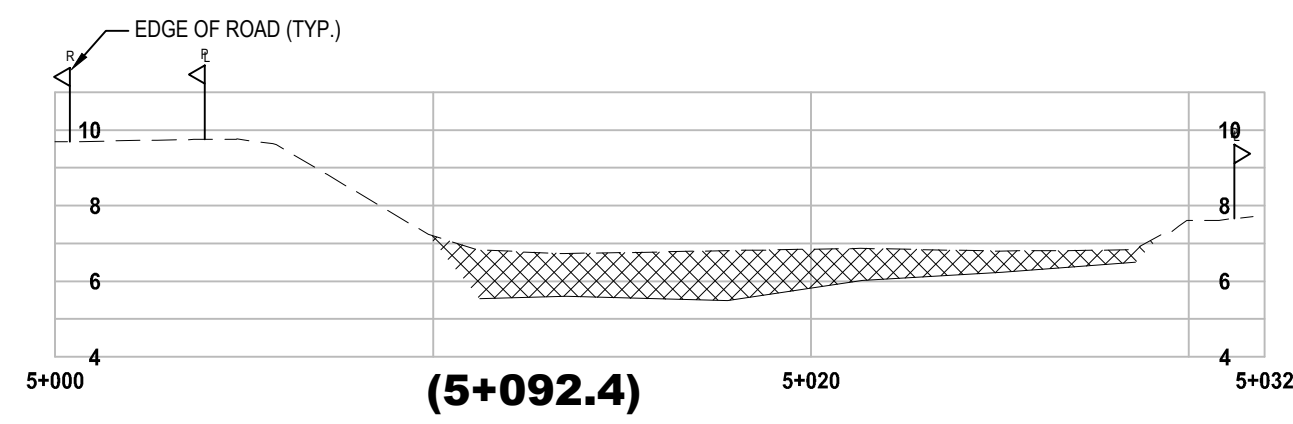
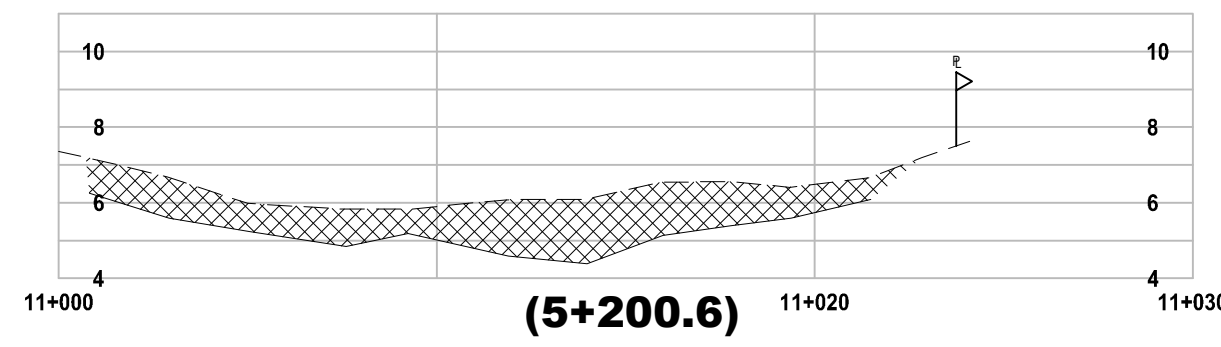
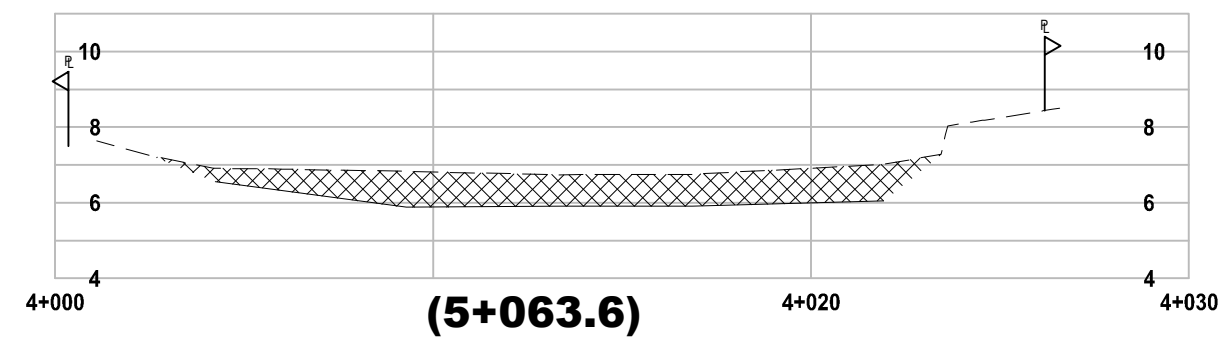
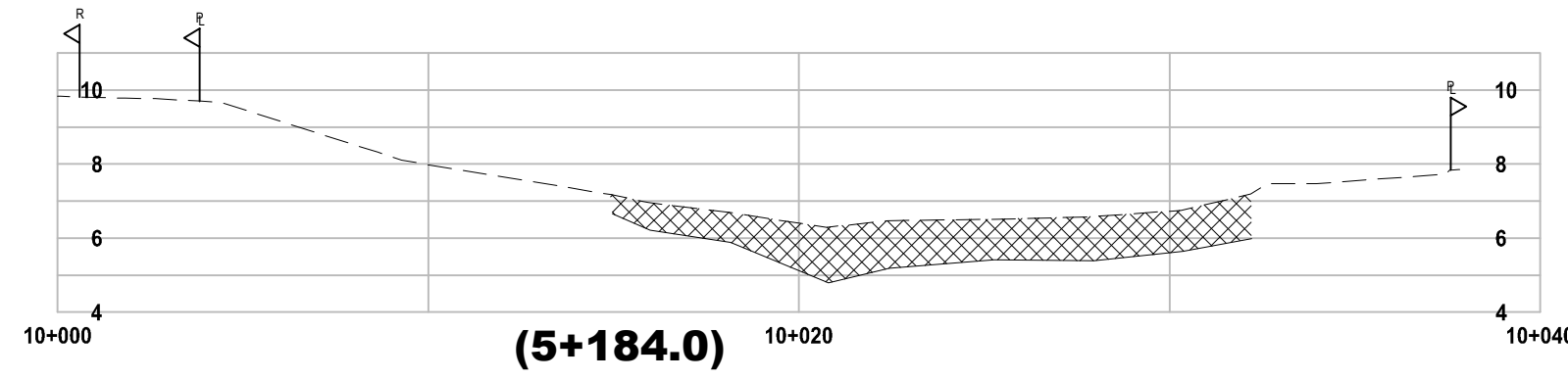
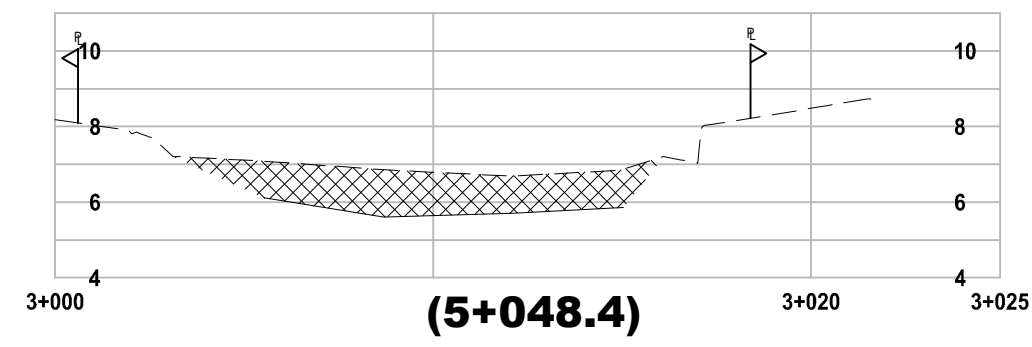
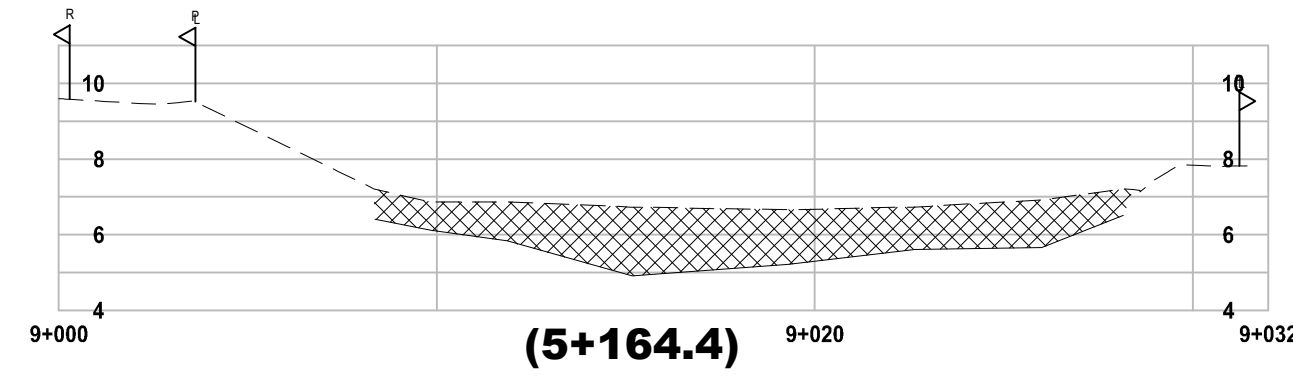
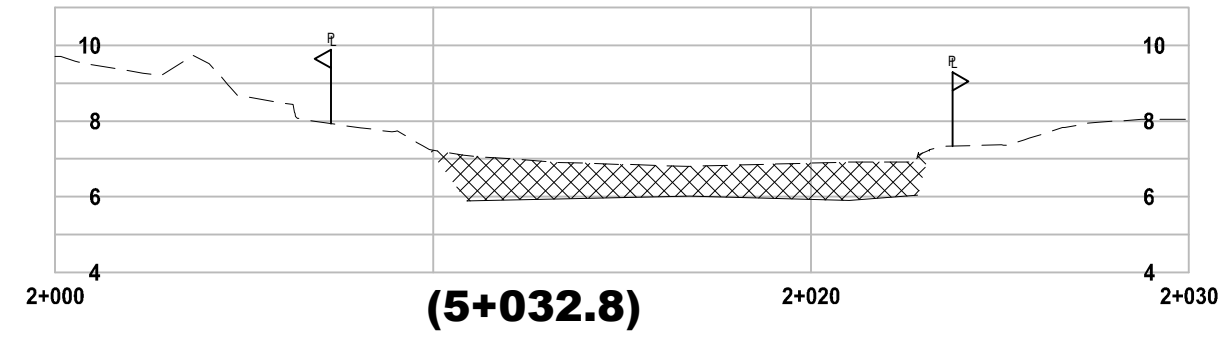
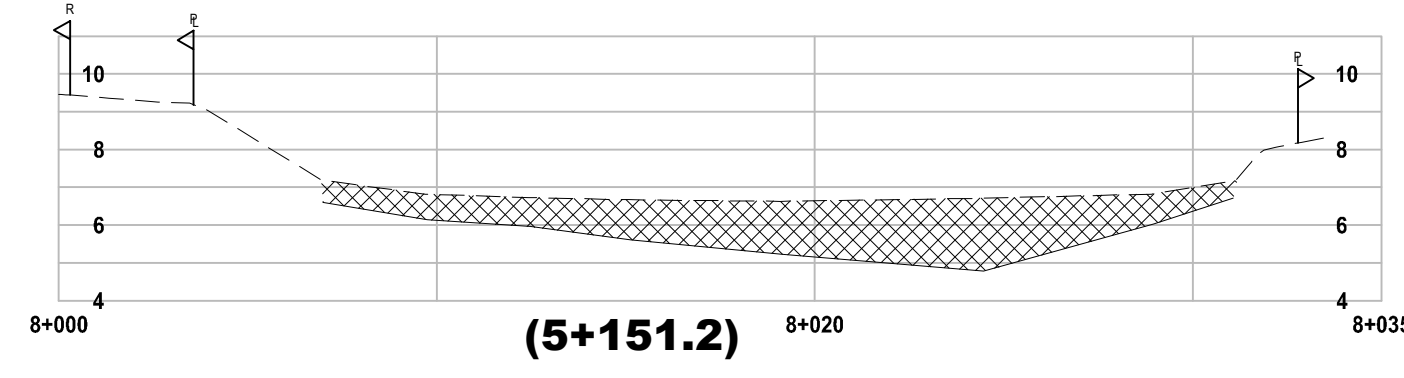
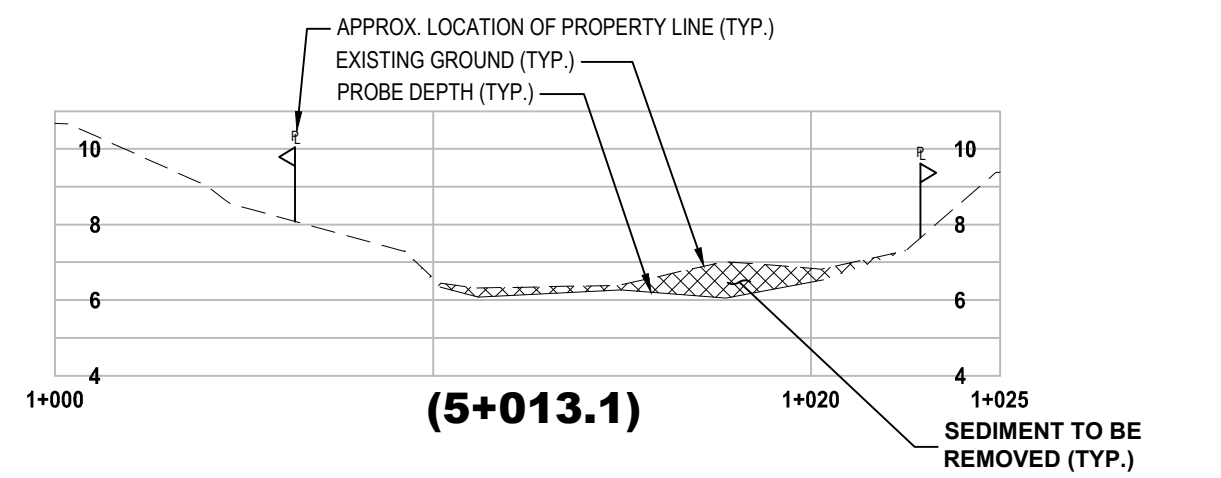


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B	2019-03-12	CS	PAC	DNM	ISSUED FOR 70% DESIGN						
C	2019-03-29	CS	PAC	DNM	ISSUED FOR 90% DESIGN						

TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK POND
REACH 5
EXCAVATION PLAN, PROFILE, & TYP. SECTIONS

Project No. **2396-009** Drawing No. **C-501** Rev. **C**
 Group **CIVIL**



Issued for Review
2019-03-29

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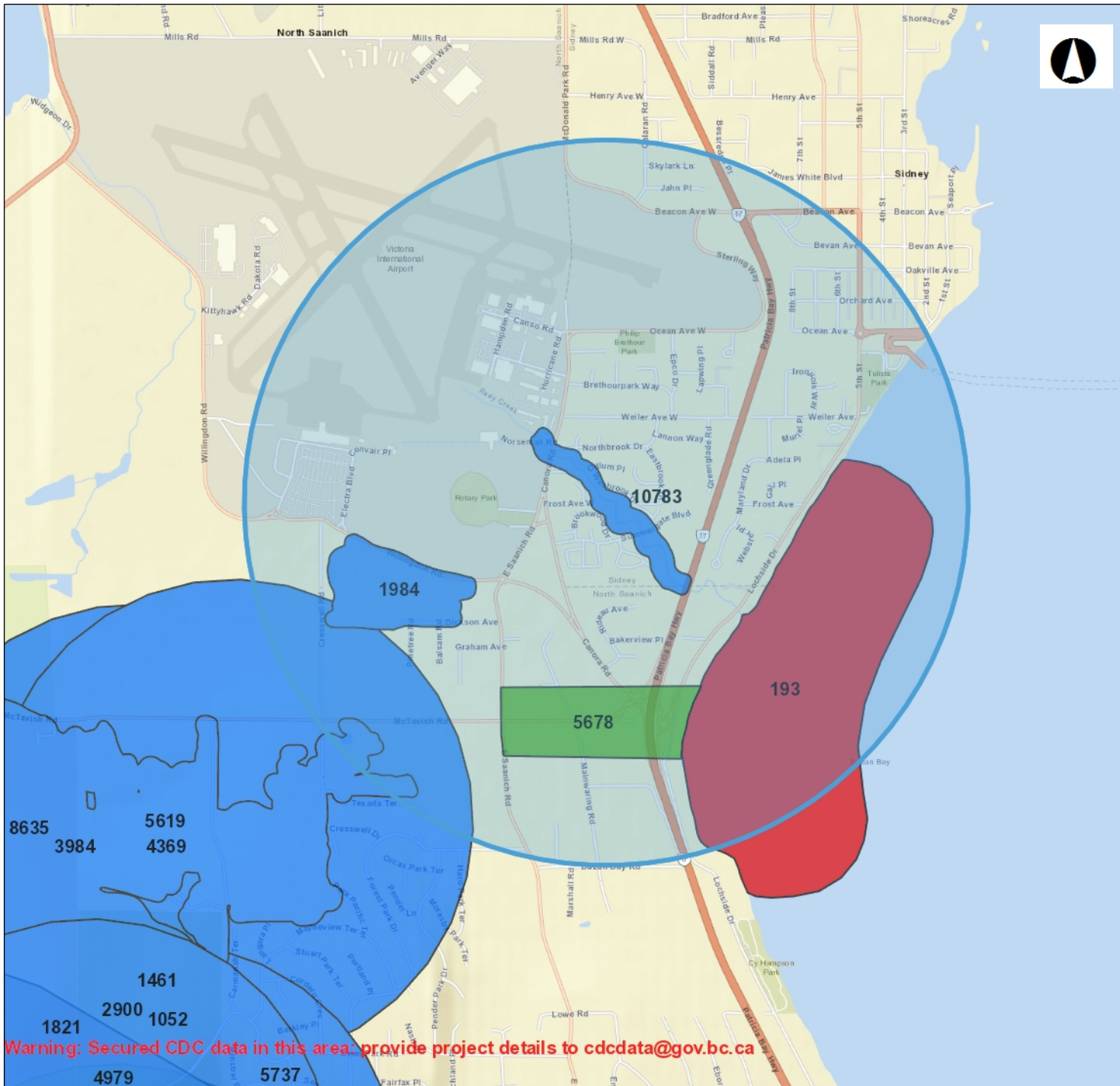
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**TRANSPORT CANADA
REAY CREEK REMEDIATION
REAY CREEK POND
REACH 5
SECTIONS**

Project No. 2396-009	Drawing No. C-502	Rev. B
Group CIVIL		

APPENDIX B
Search Information and Resources

Environmental Mitigation Strategy – Reay Creek
Reay Creek Remediation Project, Sidney BC
SLR Project No.: 205.03892.00003



Warning: Secured CDC data in this area: provide project details to cdclata@gov.bc.ca

CDC Occurrence Map

Legend

Species and Ecosystems at Available Occurrences - CD

FEATURE_CODE

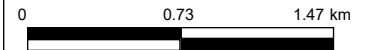
- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

■ Species and Ecosystems at Secured) Publicly Available

Species and Ecosystems at and Historical) Publicly Available CDC

FEATURE_CODE

- Animal - Vertebrate



1: 36,112

Copyright/Disclaimer

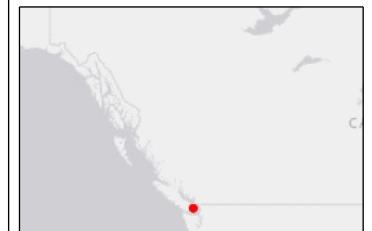
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Datum: NAD83

Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

Key Map of British Columbia





BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 1588

Scientific Name: *Thuja plicata* / *Achlys triphylla*

English Name: western redcedar / vanilla-leaf

Identifiers

Occurrence ID: 3984

Shape ID: 1588

Element Group: Ecological Community

Status

Provincial Rank: S1

BC List: Red

Global Rank: G1

Locators

Survey Site: MOUNT NEWTON, DUNSMUIR LODGE

Directions: "near small stream east of present Dunsmuir Lodge" - no small stream on map, put dot east of lodge

Biogeoclimatic Unit: CDF mm

Ecosection: SGI

Occurrence Information

First Observation Date: 1968

Last Observation Date: 1968

Occurrence Data:

VTAB Plot No. RO 188

General Description:

Stand occurs near small stream, stand occurs on north-facing mid to lower slopes.

Environmental Summary:

Occurrence Rank and Occurrence Rank Factors

Rank*:

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Version

Version Date: 1993-06-22

Version Author: RAMSAY, L.

Mapping Information

Estimated Representation Accuracy:

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence:

Confidence extent Definition:

Additional Inventory Needed:

N

Inventory Comments:

Documentation

References:

Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.

University of British Columbia Department of Forest Sciences. 1991. Vegetation and Site Classification for Coastal British Columbia. Vegetation and Environment Summaries. Univ. B.C., Vancouver, BC.

VTAB data files. 1991. Vegetation and environment data for the biogeoclimatic ecosystem classification. B.C. Minist. For. Res. Branch, Victoria.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 1588, western redcedar / vanilla-leaf. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 4072

Scientific Name: *Thuja plicata* / *Oemleria cerasiformis*

English Name: western redcedar / Indian-plum

Identifiers

Occurrence ID: 4369

Shape ID: 4072

Element Group: Ecological Community

Status

Provincial Rank: S1

BC List: Red

Global Rank: G1

Locators

Survey Site: MOUNT NEWTON, DUNSMUIR LODGE

Directions: "near small stream east of present Dunsmuir Lodge" - (no small stream on map), mapped east of lodge

Biogeoclimatic Unit: CDF mm

Ecosection: SGI

Occurrence Information

First Observation Date: 1968

Last Observation Date: 1968

Occurrence Data:

VTAB Plot No. RO 189

General Description:

Stand occurs near small stream on north-facing mid to lower slope.

Environmental Summary:

Occurrence Rank and Occurrence Rank Factors

Rank*:

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Version

Version Date: 1992-02-04

Version Author: RAMSAY, L.

Mapping Information

Estimated Representation Accuracy:

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence:

Confidence extent Definition:

Additional Inventory Needed:

N

Inventory Comments:

Documentation

References:

Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.

University of British Columbia Department of Forest Sciences. 1991. Vegetation and Site Classification for Coastal British Columbia. Vegetation and Environment Summaries. Univ. B.C., Vancouver, BC.

VTAB data files. 1991. Vegetation and environment data for the biogeoclimatic ecosystem classification. B.C. Minist. For. Res. Branch, Victoria.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 4072, western redcedar / Indian-plum. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 1532

Scientific Name: *Abies grandis* / *Berberis nervosa*

English Name: grand fir / dull Oregon-grape

Identifiers

Occurrence ID: 5619

Shape ID: 1532

Element Group: Ecological Community

Status

Provincial Rank: S1

BC List: Red

Global Rank: G1

Locators

Survey Site: MOUNT NEWTON, DUNSMUIR LODGE

Directions: "Northeast side of Mt. Newton, northeast of present Dunsmuir Lodge."

Biogeoclimatic Unit: CDF mm

Ecosection: SGI

Occurrence Information

First Observation Date: 1968

Last Observation Date: 1968

Occurrence Data:

VTAB Plot No. RO 183, RO 182.

General Description:

Environmental Summary:

Occurrence Rank and Occurrence Rank Factors

Rank*:

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Version

Version Date:

Version Author:

Mapping Information

Estimated Representation Accuracy:

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence:

Confidence extent Definition:

Additional Inventory Needed:

N

Inventory Comments:

Documentation

References:

Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.

University of British Columbia Department of Forest Sciences. 1991. Vegetation and Site Classification for Coastal British Columbia. Vegetation and Environment Summaries. Univ. B.C., Vancouver, BC.

VTAB data files. 1991. Vegetation and environment data for the biogeoclimatic ecosystem classification. B.C. Minist. For. Res. Branch, Victoria.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 1532, grand fir / dull Oregon-grape. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 80021

Scientific Name: *Populus trichocarpa* - *Alnus rubra* / *Rubus spectabilis*
English Name: black cottonwood - red alder / salmonberry

Identifiers

Occurrence ID: 10783
Shape ID: 80021
Element Group: Ecological Community

Status

Provincial Rank: S3
BC List: Blue
Global Rank: GNR

Locators

Survey Site: REAY CREEK, SIDNEY
Directions:
Biogeoclimatic Unit: CDF mm
Ecosection: SGI

Occurrence Information

First Observation Date: 2007 **Last Observation Date:** 2015-10-06

Occurrence Data:

This middle bench floodplain forest occurrence is based on Terrestrial Ecosystem Mapping (TEM) and has been verified by a field visit. It is comprised of a young forest. This ecological community occupies approximately 4.0 ha or 44 % of the area shown.

General Description:

This occurrence is located on the floodplain of Reay Creek between Victoria Airport and the highway. The surrounding area is mostly urban, with the occurrence being a narrow strip between urban housing.

Environmental Summary:

Field data indicates the occurrence is on level, fluvial materials.

Occurrence Rank and Occurrence Rank Factors

Rank*: E : Verified extant (viability not assessed)

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

4.02 ha

Landscape Context:

Version

Version Date: 2013-01-29

Version Author: de Groot, A.

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments: The ecological community occupies 44.4% (4.02 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: The field data is from a visit to verify the element occurrence.

This element occurrence is based on available ecosystem mapping. Many factors influence the reliability of an ecosystem map. Depending on the scale of aerial images used to capture the ecosystems, very small ecosystems and some types of disturbance may not be visible and will not be mapped. If the air photos are not current, new disturbance may have occurred since the time of mapping and the inventory may not accurately represent the current state of the landscape. Other factors, such as the skill and experience of the mapper within the study area, and the field survey intensity level will also influence the reliability of the map.

Documentation

References:

- Madrone Environmental Services Ltd. 2008. Terrestrial Ecosystem Mapping of the Coastal Douglas-Fir Biogeoclimatic Zone. Unpublished report prepared for Integrated Land Management Bureau (ILMB), Duncan, B.C. 123pp.
- Terrestrial Ecosystem Mapping [TEM] of the Coastal Douglas-fir Biogeoclimatic Zone. 2008. Prepared for B. Zinovich, Integrated Land Management Bureau, B.C. Minist. of Agric. and Lands, Nanaimo B.C. by Madrone Environmental Services, Duncan B.C. 1:20,000 spatial data.
- de Groot, A., and C.M. Cadrin. 2013. Element occurrence and element occurrence rank specifications for riparian deciduous forests and shrublands of coastal British Columbia. Unpublished document. Version January, 2013. B.C. Minist. Environ., Conservation Data Centre, Victoria, B.C. 5 pp.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 80021, black cottonwood - red alder / salmonberry. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 55764

Scientific Name: *Pseudotsuga menziesii* / *Berberis nervosa*

English Name: Douglas-fir / dull Oregon-grape

Identifiers

Occurrence ID: 8635

Shape ID: 55764

Element Group: Ecological Community

Status

Provincial Rank: S1

BC List: Red

Global Rank: G2

Locators

Survey Site: MOUNT NEWTON, SAANICH PENNINSULA

Directions:

Biogeoclimatic Unit: CDF mm

Ecosection: SGI

Occurrence Information

First Observation Date: 1968

Last Observation Date: 2008

Occurrence Data:

The occurrence (based on Terrestrial Ecosystem Mapping) is predominantly of mature (68%) forest and also has one of the few old forest stands (3%) remaining for this ecosystem. Stands of young forest (26%) and inclusions of shrub and early regenerating forest are also present. Field samples indicate the stands can be mixed, and may contain in addition to Douglas-fir, western redcedar, arbutus, bigleaf maple and western yew, varying by soil-moisture availability at different sites.

General Description:

The occurrence occupies a substantial portion of Mt. Newton, including much of John Dean Park, located on Saanich Peninsula, B.C.

Environmental Summary:

Much of the terrain is covered in morainal veneers or blankets, or glaciomarine thin veneers, veneers or blankets, with some areas of colluvial veneers or undulating bedrock.

Occurrence Rank and Occurrence Rank Factors

Rank*: BC : Good or fair estimated viability

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date: 13-01-18

Rank Comments:

This large sized occurrence is located within an area of fairly poor landscape context but is in relative good condition (mature and old forest with large area of contiguous vegetation). The Ecological Integrity is assessed as Good to Fair.

Condition of Occurrence:

Mature forests are dominant (68%) including small patches of very old trees. Young forest (26%) is also present with minor area of early seral forest. Vertical stand structure is well developed, contributing to wildlife habitat values. The forest patches are mostly contiguous in this occurrence, but there is moderate fragmentation (more than 25%) due to roads, rural development and recreational trails and infrastructure. Condition is assessed as Good to Fair.

Size of Occurrence:

The size of this occurrence is near the lower threshold of large size within this fragmented landscape (564.46 ha).

Landscape Context:

This occurrence is surrounded to the north, east and south in a modified landscape of agricultural areas, airport infrastructure, urban and rural residential areas. To the west is the coastline of the Saanich Inlet. Connectivity to other occurrences is compromised by areas of developed and agricultural land. Landscape Context is assessed as Fair to Poor.

Version

Version Date: 2013-01-18

Version Author: de Groot, A. and C.M. Cadrin

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments: The ecological community occupies 67.09% (564.46 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: In addition to TEM field plots from the Terrestrial Ecosystem Mapping [TEM] of the Coastal Douglas-fir Biogeoclimatic Zone, this element was confirmed by field survey (VTAB Plot RO 355) for Roemer (1972).

This element occurrence is based on available ecosystem mapping. Many factors influence the reliability of an ecosystem map. Depending on the scale of aerial images used to capture the ecosystems, very small ecosystems and some types of disturbance may not be visible and will not be mapped. If the air photos are not current, new disturbance may have occurred since the time of mapping and the inventory may not accurately represent the current state of the landscape. Other factors, such as the skill and experience of the mapper within the study area, and the field survey intensity level will also influence the reliability of the map.

Documentation

References:

- Canadian Wildlife Service, Ministry of Environment, Lands and Parks Vancouver Island Region, and B.C. Conservation Data Centre. 1993-1996. Sensitive Ecosystems Inventory groundtruthing forms. Unpub. field forms.
- Canadian Wildlife Service, Ministry of Environment, Lands and Parks Vancouver Island Region, and B.C. Conservation Data Centre. 1993-1996b. Sensitive Ecosystems Inventory site photographs. Unpub. slides and prints.
- Canadian Wildlife Service, Ministry of Environment, Lands and Parks Vancouver Island Region, and B.C. Conservation Data Centre. 1997. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands. Clover Point Cartographics Ltd., Victoria.
- Madrone Environmental Services Ltd. 2008. Terrestrial Ecosystem Mapping of the Coastal Douglas-Fir Biogeoclimatic Zone. Unpublished report prepared for Integrated Land Management Bureau (ILMB), Duncan, B.C. 123pp.
- Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.
- Sensitive Ecosystems Inventory [SEI] of East Vancouver Island and Gulf Islands: Sensitive Ecosystems Mapping, Disturbance Mapping and Re-evaluation of Major Riparian Corridors. 2004. Prepared by Axys Environ. Consulting Ltd. for Environ. Can., Can. Wildl. Serv., B.C. Minist. Sustainable Resour. Manage., and B.C. Minist. Water, Land and Air Prot., and the Habitat Conserv. Trust Fund. 66 mapsheets, 1:20 000 scale.
- Terrestrial Ecosystem Mapping [TEM] of the Coastal Douglas-fir Biogeoclimatic Zone. 2008. Prepared for B. Zinovich, Integrated Land Management Bureau, B.C. Minist. of Agric. and Lands, Nanaimo B.C. by Madrone Environmental Services, Duncan B.C. 1:20,000 spatial data.
- University of British Columbia Department of Forest Sciences. 1991. Vegetation and Site Classification for Coastal British Columbia. Vegetation and Environment Summaries. Univ. B.C., Vancouver, BC.
- VTAB data files. 1991. Vegetation and environment data for the biogeoclimatic ecosystem classification. B.C. Minist. For. Res. Branch, Victoria.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 55764, Douglas-fir / dull Oregon-grape. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 1536

Scientific Name: *Abies grandis* / *Tiarella trifoliata*
English Name: grand fir / three-leaved foamflower

Identifiers

Occurrence ID: 1984
Shape ID: 1536
Element Group: Ecological Community

Status

Provincial Rank: S1
BC List: Red
Global Rank: G1

Locators

Survey Site: VICTORIA INTERNATIONAL AIRPORT
Directions: Piece of airport south of airport access road.
Biogeoclimatic Unit: CDF mm
Ecosection: SGI

Occurrence Information

First Observation Date: 1968 **Last Observation Date:** 2015-10-06

Occurrence Data:

This coniferous forest element occurrence is based on terrestrial ecosystem mapping and field inventory data. It has been verified by two plots from 1968 and confirmed by notation in a 2015 field plot in an adjacent ecological community. The occurrence is dominated by grand fir, western redcedar, and Douglas-fir in the overstory, with some western hemlock and big leaf maple. There is a limited shrub cover, mostly of regenerating trees, minor salal and dull Oregon-grape, and minor English holly. The herb layer is dominated by English ivy. Native species composition in the herb layer is still high, swordfern, three-leaved foamflower, vanilla-leaf. There is a very low cover of mosses, Oregon beaked moss, step moss and one sighting of palm tree moss, where the ground surface is free of ivy. The element occupies 30% (5.0 ha) of the mapped occurrence.

General Description:

This occurrence is located on a level area on the Saanich Peninsula. It is surrounded by rural, agricultural and industrial development.

Environmental Summary:

The occurrence is on a gentle slope with medium-textured soils. The site is rich and mesic.

Occurrence Rank and Occurrence Rank Factors

Rank*: E : Verified extant (viability not assessed)

Note: in the case of Ecological Communities, "viability" should read as "ecological integrity".

Rank Date: August 30, 2016.

Rank Comments:

Final EO rank cannot be assigned until the element occurrence specifications represent the full range of this ecological community (depending if the Ecological community is designated as a large patch or small patch type, the Size factor is poor and fair, respectively. Condition could be improved by active restoration (control and removal of English ivy). Much of the forest structure is that of mature forest. However, occurring within a highly developed landscape and the lack of connectivity to natural vegetation reduces the overall ecological integrity.

Condition of Occurrence:

Size of Occurrence:

5.05 ha

Landscape Context:

Version

Version Date: 2016-03-26

Version Author: Iverson, K. A. Haney, and C. Cadrin

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments: The element occupies 29.8% (5.05 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: The two RO plots (1968) are from Hans Roemer's (1972) thesis> Plot 02-3011 is an ecosystem plot completed by CDC while sampling the forest south of Willingdon Rd. near the VIctoria Airport. The plot is mmediately adjacent to the occurrence of *Abies grandis* / *Tiarella trifoliata*. Plot 02-3011 represents the *Abies grandis* / *Mahonia nervosa* and the comments for this plot confirm the occurrence of the *Abies grandis* / *Tiarella trifoliata* sampled by Roemer (RO plots) in 1968.

Documentation

References:

Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.

Terrestrial Ecosystem Mapping [TEM] of the Coastal Douglas-fir Biogeoclimatic Zone. 2008. Prepared for B. Zinovich, Integrated Land Management Bureau, B.C. Minist. of Agric. and Lands, Nanaimo B.C. by Madrone Environmental Services, Duncan B.C. 1:20,000 spatial data.

University of British Columbia Department of Forest Sciences. 1991. Vegetation and Site Classification for Coastal British Columbia. Vegetation and Environment Summaries. Univ. B.C., Vancouver, BC.

VTAB data files. 1991. Vegetation and environment data for the biogeoclimatic ecosystem classification. B.C. Minist. For. Res. Branch, Victoria.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 1536, grand fir / three-leaved foamflower. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Species Occurrence Report

Shape ID: 2164

Scientific Name: Epilobium torreyi
English Name: brook spike-primrose

Identifiers

Occurrence ID: 5678
Shape ID: 2164
Taxonomic Class: dicots
Element Group: Vascular Plant

Status

Provincial Rank: SH
BC List: Red
Global Rank: G5
COSEWIC: E (DEC 2018)
SARA Schedule: 1

Locators

Survey Site: BAZAN BAY, WEST OF
Directions: Near McTavish Road.
Biogeoclimatic Zone:
Ecosection: SGI

Area Description

General Description:

Vegetation Zone: Lowland
Min. Elevation (m): 50 **Max. Elevation (m):** 50
Habitat: TERRESTRIAL: Grassland/Herbaceous

Occurrence Information

First Observation Date: 1966-08-01

Last Observation Date: 1966-08-01

Occurrence Data:

2004: Last observed in 1966, this population occurred in an open, grassy meadow along the eastern end of McTavish Road. Much of this stretch has been converted to residential use and the remainder is either forested, used for intensive agriculture or has suffered from ditching and invasion by highly competitive non-native grasses like *Agrostis capillaris* and shrubs such as *Rubus armeniacus* (COSEWIC 2006d). 1966-08-01: With grasses, rushes, slope 0 (University of Victoria herbarium).

Occurrence Rank and Occurrence Rank Factors

Rank: X : Extirpated

Rank Date: 2004

Rank Comments:

All suitable habitat for *Epilobium torreyi* appears to have been converted and the population is considered extirpated.

Condition of Occurrence:

All suitable habitat for *Epilobium torreyi* appears to have been converted (COSEWIC, 2006d) and the population is considered Extirpated.

Size of Occurrence:

[No data provided].

Landscape Context:

The surrounding landscape is not likely to support additional populations of this species since much of the remainder is either forested, agricultural land or ditched and dominated by highly competitive non-native grasses like *Agrostis capillaris* and shrubs such as *Rubus armeniacus* (COSEWIC 2006d).

Version

Version Date: 2006-11-07

Version Author: Donovan, M.

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence: ?

Confidence Extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: Although no plants have been seen at the site after intensive directed surveys, there is a possibility that some seeds may remain in the soil seed bank or that previously overlooked populations may be found (COSEWIC, 2006d). However, this possibility is remote since the habitat is so altered (M. Fairbairns, pers. comm. 2004).

Documentation

References:

COSEWIC. 2006d. COSEWIC assessment and status report on the brook spike-primrose *Epilobium torreyi* in Canada. Comm. on the Status of Endangered Wildl. in Can. Ottawa. vi + 17 pp.

Ceska, A. Personal Communication. Ceska Geobotanical Consulting. Victoria, BC.

University of Victoria Herbarium. Biol. Dep., Univ. of Victoria, P.O. Box 3020, Victoria, BC, V8W 3N5.

Specimen: Turner, B. (1334). 1966. UVIC.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 2164, brook spike-primrose. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).



BC Conservation Data Centre: Species Occurrence Report

Shape ID: 1026

Scientific Name: Branta bernicla

English Name: Brant

Identifiers

Occurrence ID: 193

Shape ID: 1026

Taxonomic Class: birds

Element Group: Vertebrate Animal

Status

Provincial Rank: S3M

BC List: Blue

Global Rank: G5

COSEWIC:

SARA Schedule:

Locators

Survey Site: BAZAN BAY

Directions:

Biogeoclimatic Zone:

Ecosection: SGI;SOG

Area Description

General Description:

Vegetation Zone:

Min. Elevation (m):

Max. Elevation (m):

Habitat: MARINE; NEARSHORE; BAY

Occurrence Information

First Observation Date: 1988

Last Observation Date: 1993-04-27

Occurrence Data:

1988, 1990, 1993: seen April 8-27 in numbers up to 500+ (B.C. Vertebrate Record File 1991).

Occurrence Rank and Occurrence Rank Factors

Rank:

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Version

Version Date: 1993-08-29

Version Author: RAMSAY, L.R.

Mapping Information

Estimated Representation Accuracy:

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence:

Confidence Extent Definition:

Additional Inventory Needed: N

Inventory Comments:

Documentation

References:

British Columbia Vertebrate Record File. 2001. Royal B.C. Mus., Victoria, BC. V8V 1X4.

Specimen: Begg, B. 19?? Obs.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 1026, Brant. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 22, 2019).

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Biogeoclimatic Units	Status					Provincial FRPA	Land Use Objectives
			Provincial	BC List	Global	COSEWIC	SARA		
<i>Accipiter gentilis laingi</i>	Northern Goshawk, <i>laingi</i> subspecies	CDF CWH	S2 (2010)	Red	G5T2 (2008)	T (2013)	1-T (2003)	Y	
<i>Anaxyrus boreas</i>	Western Toad	BG BWBS CDF CWH ESSF ICH IDF PP SBS SWB	S4 (2016)	Yellow	G4 (2008)	SC (2012)	1-SC (2018)		
<i>Aneides vagrans</i>	Wandering Salamander	CDF CWH	S3 (2016)	Blue	G4 (2005)	SC (2014)	1-SC (2018)		
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> subspecies	CDF CWH	S2S3B,S4N (2018)	Blue	G5T4 (1997)	SC (2008)	1-SC (2010)	Y	
<i>Asio flammeus</i>	Short-eared Owl	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3B,S2N (2015)	Blue	G5 (2014)	SC (2008)	1-SC (2012)	Y	
<i>Botaurus lentiginosus</i>	American Bittern	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S3B, SNRN (2015)	Blue	G5 (2016)				
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	CDF CWH MH	S3B,S3N (2015)	Blue	G3 (2013)	T (2012)	1-T (2003)	Y	
<i>Butorides virescens</i>	Green Heron	BG CDF CWH ICH IDF PP SBS	S3S4B (2015)	Blue	G5 (2014)				
<i>Chordeiles minor</i>	Common Nighthawk	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4B (2015)	Yellow	G5 (2014)	SC (2018)	1-T (2010)		
<i>Chrysemys picta</i>	Painted Turtle	BG CDF CWH ICH IDF MH PP SBS	S3 (2018)	No Status	G5 (2016)	E/SC (2006)	1-E/SC (2007)		
<i>Chrysemys picta</i> pop. 1	Painted Turtle - Pacific Coast Population	CDF CWH MH	S1S2 (2018)	Red	G5T2 (2007)	T (2016)	1-E (2007)		
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	BG BWBS CDF CWH ESSF ICH	S5 (2015)	Yellow	G5 (1996)	SC (2016)			

		IDF MH MS PP SBPS SBS SWB						
<i>Contopus cooperi</i>	Olive-sided Flycatcher	BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4 (2008)	SC (2018)	1-T (2010)	
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	BG CDF CWH ICH IDF PP	S3S4 (2015)	Blue	G4 (2015)			
<i>Cryptomastix devia</i>	Puget Oregonian	CDF CWH	SX (2015)	Red	G3 (2005)	XT (2013)	1-XX (2005)	
<i>Falco peregrinus anatum</i>	Peregrine Falcon, <i>anatum</i> subspecies	BG BWBS CDF CWH IDF MS PP SBS	S2? (2011)	Red	G4T4 (2006)	NAR (2017)	1-SC (2012)	
<i>Glaucidium gnoma swarthi</i>	Northern Pygmy-owl, <i>swarthi</i> subspecies	CDF CWH MH	S3S4 (2018)	Blue	G4G5T3Q (2016)			Y
<i>Hemphillia glandulosa</i>	Warty Jumping-slug	CDF CWH	S2? (2015)	Red	G3G4 (2005)	SC (2013)	1-SC (2005)	
<i>Hirundo rustica</i>	Barn Swallow	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G5 (2014)	T (2011)	1-T (2017)	
<i>Hydroprogne caspia</i>	Caspian Tern	BG BWBS CDF CWH ICH IDF PP SBS	S3B (2015)	Blue	G5 (1996)	NAR (1999)		
<i>Megascops kennicottii kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> subspecies	CDF CWH MH	S2S3 (2017)	Blue	G5T4 (2003)	T (2012)	1-T	
<i>Mustela erminea anguinae</i>	Ermine, <i>anguinae</i> subspecies	CDF CWH MH	S3 (2010)	Blue	G5T3 (2015)			
<i>Myotis keenii</i>	Keen's Myotis	BWBS CDF CWH MH	S3? (2015)	Blue	G3 (2014)	DD (2003)	3 (2005)	Y
<i>Myotis lucifugus</i>	Little Brown Myotis	BG BWBS CDF CWH ESSF ICH IDF MH MS PP	S4 (2015)	Yellow	G3 (2015)	E (2013)	1-E (2014)	

		SBPS SBS SWB						
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	CDF CWH ICH IDF MS SBS	S3S4 (2015)	Blue	G4 (2000)	SC (2008)	1-SC (2011)	
<i>Plebejus saepiolus insularis</i>	Greenish Blue, <i>insularis</i> subspecies	CDF CWH	SH (2013)	Red	G5TH (2003)	E (2012)	1-E (2003)	
<i>Progne subis</i>	Purple Martin	BWBS CDF CWH ICH	S3B (2015)	Blue	G5 (2014)			
<i>Rana aurora</i>	Northern Red- legged Frog	CDF CWH MH	S3 (2016)	Blue	G4 (2015)	SC (2015)	1-SC (2005)	Y
<i>Sorex navigator brooksi</i>	American Water Shrew, <i>brooksi</i> subspecies	CDF CWH	S2S3 (2018)	Blue	G5T2 (2016)			Y
<i>Sympetrum vicinum</i>	Autumn Meadowhawk	CDF CWH	S3S4 (2015)	Blue	G5 (2015)			
<i>Tramea lacerata</i>	Black Saddlebags	CDF	S2 (2015)	Red	G5 (1985)			
<i>Tyto alba</i>	Barn Owl	BG BWBS CDF CWH ICH IDF PP	S2? (2015)	Red	G5 (1996)	T (2010)	1-T (2018)	

Search Summary

Time Performed Tue Jan 22 14:47:57 PST 2019

Results 32 records.

Search Criteria Animals
AND MOE Regions: 1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Capital (CRD)
AND Habitat Types: Riparian (Restricted to Red, Blue, and Legally designated species)
AND BGC Zone:
Sort Order: Scientific Name Ascending

Notes 1. Citation: B.C. Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jan 22, 2019).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

3. The data contained in the Results Export in BCSEE are provided under the [Open Government License - BC](#).

[Modify Search](#) | [New Search](#) | [Results](#)

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Biogeoclimatic Units	Status			Provincial FRPA	Land Use Objectives
			Provincial	BC List	Global		
<i>Ophioglossum pusillum</i>	northern adder's-tongue	CDFmm CWHvm CWHxm ICHmw IDFxh	S3? (2015)	Blue	G5 (2011)		
<i>Trifolium cyathiferum</i>	cup clover	BGxh CDFmm CWHmm CWHxm ICHdw ICHmw IDFdm IDFxh PPdh	S3 (2017)	Blue	G4 (1990)		
<i>Wolffia columbiana</i>	Columbian water-meal	CDFmm	S3 (2017)	Blue	G5 (2015)		

Search Summary

Time Performed Tue Jan 22 14:52:10 PST 2019

Results 3 records.

Search Criteria Plants

AND MOE Regions: 1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
 AND Regional Districts: Capital (CRD)
 AND Habitat Types: Riparian (Restricted to Red, Blue, and Legally designated species)
 AND BGC Zone:
 Sort Order: Scientific Name Ascending

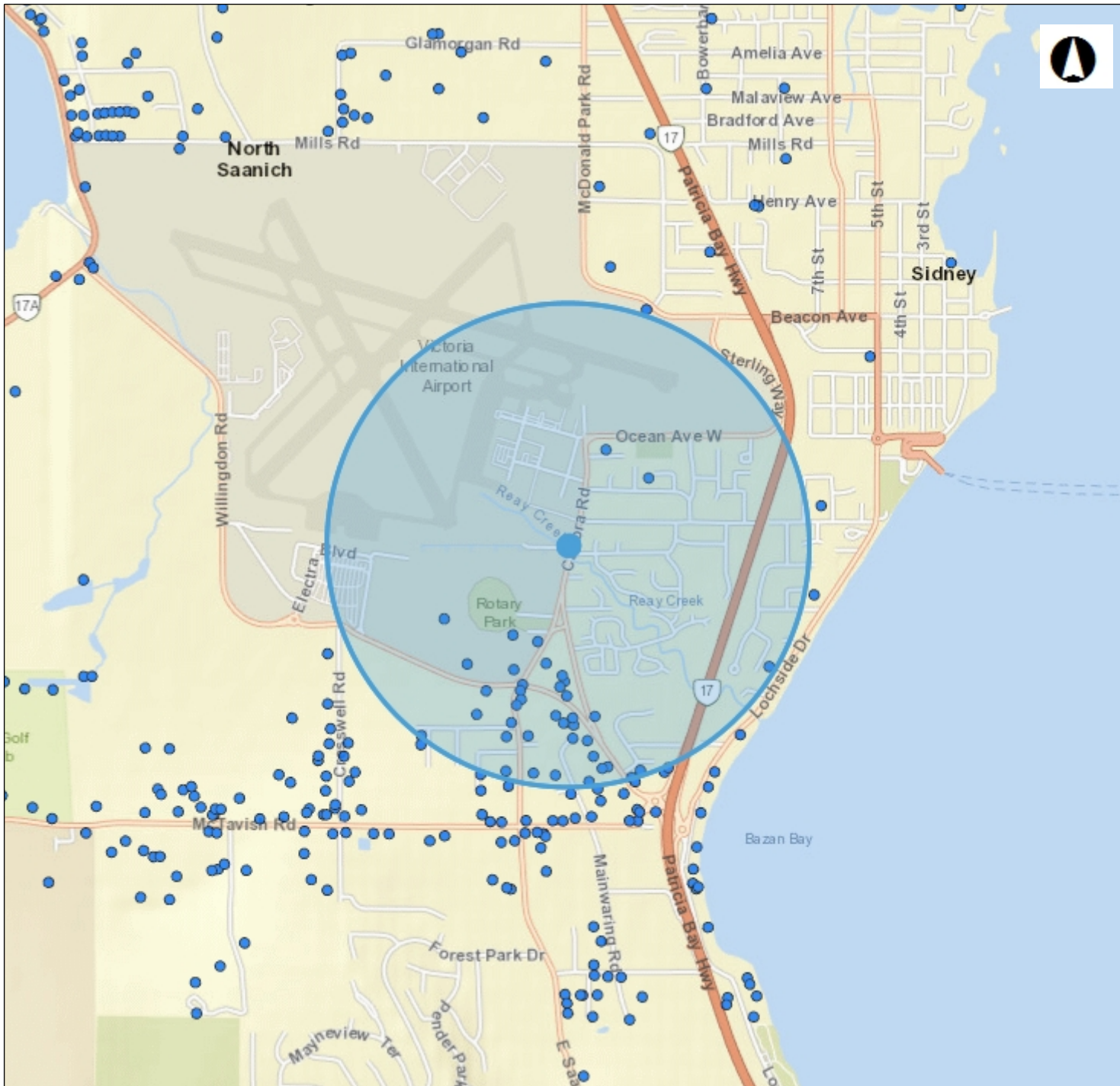
Notes

1. Citation: B.C. Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jan 22, 2019).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

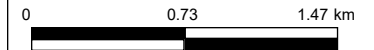
3. The data contained in the Results Export in BCSEE are provided under the [Open Government License - BC](#).

[Modify Search](#) | [New Search](#) | [Results](#)



Water Wells within 1,000
m of Reay Creek
Legend

- Water Wells - All



1: 36,112

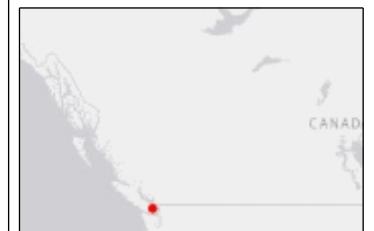
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Datum: NAD83
Projection: BC Albers

Key Map of British Columbia



Well Tag Number	Licence Status	Well Use	Street Name
14185	UNLICENSED	Private Domestic	
23202	UNLICENSED	Unknown Well Use	
36919	UNLICENSED	Unknown Well Use	CANORA RD
13834	UNLICENSED	Other	
18329	UNLICENSED	Unknown Well Use	
20141	UNLICENSED	Unknown Well Use	VICTORIA INTERNATIOI
19829	UNLICENSED	Unknown Well Use	
23796	UNLICENSED	Unknown Well Use	
23520	UNLICENSED	Unknown Well Use	
29994	UNLICENSED	Unknown Well Use	
33085	UNLICENSED	Unknown Well Use	CANORA RD & NEW AIF
33068	UNLICENSED	Unknown Well Use	CANORA RD & NEW AIF
1989	UNLICENSED	Unknown Well Use	
15101	UNLICENSED	Private Domestic	
8999	UNLICENSED	Other	
14481	UNLICENSED	Private Domestic	
30171	UNLICENSED	Unknown Well Use	
31043	UNLICENSED	Unknown Well Use	
30156	UNLICENSED	Unknown Well Use	
38004	UNLICENSED	Unknown Well Use	DICKSON AVE
39809	UNLICENSED	Unknown Well Use	DICKSON AVE
1279	UNLICENSED	Unknown Well Use	
1345	UNLICENSED	Unknown Well Use	
1281	UNLICENSED	Unknown Well Use	
1313	UNLICENSED	Unknown Well Use	
1280	UNLICENSED	Unknown Well Use	
15425	UNLICENSED	Unknown Well Use	
2174	UNLICENSED	Unknown Well Use	
71928	UNLICENSED		9585 PAT BAY HIGHWA
34960	UNLICENSED	Unknown Well Use	LOCHSIDE DR
19869	UNLICENSED	Unknown Well Use	
33054	UNLICENSED	Unknown Well Use	CANORA RD & NEW AIF
8948	UNLICENSED	Other	
37761	UNLICENSED	Unknown Well Use	CANORA RD
32341	UNLICENSED	Unknown Well Use	
32475	UNLICENSED	Unknown Well Use	
20144	UNLICENSED	Other	VICTORIA INTERNATIOI
34539	UNLICENSED	Unknown Well Use	
1613	UNLICENSED	Other	
8974	UNLICENSED	Private Domestic	

Finished Well Depth (ft)	Diameter (in)	Depth to Water (ft)	Depth to Bedrock (ft)
14	0.0	9	
22	0.0	6	
367	0.0		43
23	0.0	9	
40	6.0	26	
35	6.0	7	
130	12.0	29	51
275	0.0		54
317	0.0	11	53
500	8.0		54
298	6.5		56
200	6.5		57
70	0.0		16
14	0.0	1	
10	0.0		
14	0.0		
285	0.0		67
250	0.0		57
400	0.0		73
280	6.5		88
184	6.3		64
21	10.0	4	
26	30.0	0	
21	7.0		
187	6.0		21
21	17.0		
38	7.0		
65	0.0		46
70		43	
295	0.0		40
36	12.0	23	
173	6.5		60
18	0.0	1	
450	6.5		65
225	6.5		60
640	8.0	45	41
35	6.0		35
200	0.0		50
18	0.0	7	
22	0.0	3	

Reported Well Yield	Yield Units
0	
0	
10	Gallons per Minute (U.S./Imperial)
0	
5	Gallons per Minute (U.S./Imperial)
0	
35	Gallons per Minute (U.S./Imperial)
8	Gallons per Minute (U.S./Imperial)
150	U.S. Gallons per Minute
100	Gallons per Minute (U.S./Imperial)
2.5	Gallons per Minute (U.S./Imperial)
7	Gallons per Minute (U.S./Imperial)
1.5	Gallons per Minute (U.S./Imperial)
0	
0	
0	
5	Gallons per Minute (U.S./Imperial)
3	Gallons per Minute (U.S./Imperial)
6	Gallons per Minute (U.S./Imperial)
4	Gallons per Minute (U.S./Imperial)
30	Gallons per Minute (U.S./Imperial)
42	Gallons per Minute (U.S./Imperial)
20.8	Gallons per Minute (U.S./Imperial)
17	Gallons per Minute (U.S./Imperial)
7	Gallons per Minute (U.S./Imperial)
24	Gallons per Minute (U.S./Imperial)
0	
0.3	Gallons per Minute (U.S./Imperial)
5	Gallons per Minute (U.S./Imperial)
15	Gallons per Minute (U.S./Imperial)
10	Gallons per Minute (U.S./Imperial)
0	
50	Gallons per Minute (U.S./Imperial)
8	Gallons per Minute (U.S./Imperial)
30	Gallons per Minute (U.S./Imperial)
	DRY HOLE
12	Gallons per Minute (U.S./Imperial)
0	
0	



global environmental solutions

Calgary, AB

1185-10201 Southport Rd SW
Calgary, AB T2W 4X9
Canada
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Fax: (403) 263-7906

Edmonton, AB

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Canada
Tel: (780) 490-7893
Fax: (780) 490-7819

Grande Prairie, AB

10015 102 Street
Grande Prairie, AB T8V 2V5
Canada
Tel: (780) 513-6819
Fax: (780) 513-6821

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Canada
Tel: (250) 374-8749
Fax: (250) 374-8656

Kelowna, BC

200-1475 Ellis Street
Kelowna, BC V1Y 2A3
Canada
Tel: (250) 762-7202
Fax: (250) 763-7303

Markham, ON

200 - 300 Town Centre Blvd
Markham, ON L3R 5Z6
Canada
Tel: (905) 415-7248
Fax: (905) 415-1019

Nanaimo, BC

9-6421 Applecross Road
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Canada
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Fax: (250) 390-5042

Ottawa, ON

43 Auriga Drive, Suite 203
Ottawa, ON K2E 7Y8
Canada
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Fax: (905) 415-1019

Prince George, BC

1586 Ogilvie Street
Prince George, BC V2N 1W9
Canada
Tel: (250) 562-4452
Fax: (250) 562-4458

Regina, SK

1048 Winnipeg Street
Regina, SK S4R 8P8
Canada
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Fax (306) 525-4691

Saskatoon, SK

620-3530 Millar Avenue
Saskatoon, SK S7P 0B6
Canada
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Fax: (306) 374-6077

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Fax: (905) 415-1019

Vancouver, BC (Head Office)

200-1620 West 8th Avenue
Vancouver, BC V6J 1V4
Canada
Tel: (604) 738-2500
Fax: (604) 738-2508

Victoria, BC

303 - 3960 Quadra Street
Victoria, BC V8X 4A3
Canada
Tel: (250) 475-9595
Fax: (250) 475-9596

Winnipeg, MB

1353 Kenaston Boulevard
Winnipeg, MB R3P 2P2
Canada
Tel: (204) 477-1848
Fax: (204) 475-1649

Whitehorse, YT

6131 6th Avenue
Whitehorse, YT Y1A 1N2
Canada
Tel: (867) 689-2021

Yellowknife, NT

Unit 44, 5022 49 Street
Yellowknife, NT X1A 3R8
Canada
Tel: (867) 765-5695



ANNEX F
Permits and Authorizations

R.087575.005 KEL,SET (Reay) Creek Pond Remediation
Sidney, BC
SLR Project No.: 205.03892.00007

Department of Fisheries and Oceans Canada
Fisheries Act Approval

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Pacific Region
Ecosystems Management Branch
3190 Hammond Bay Road
Nanaimo, BC
V9T 6N7

Région du Pacifique
Gestion des écosystèmes
3190 rue Hammond Bay
Nanaimo, CB
V9T 6N7

March 27, 2020

Our file *Notre référence*

20-HPAC-00044

Transport Canada
Attention: Danielle Wensauer
820 – 800 Burrard Street
Vancouver, BC V6Z 2J8

Via email: danielle.wensauer@tc.gc.ca

Subject: Pond Remediation, KEL,SET (Reay) Creek, Sidney – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Danielle Wensauer:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on January 21, 2020. We understand that you propose to conduct pond remediation works in KEL,SET (Reay) Creek in Sidney, BC. Proposed works include:

- Removing approximately 300 m² of riparian vegetation to allow for machinery access points and operation.
- Removing approximately 3,620 m² (3,500 m³) of contaminated sediment from an online pond using excavation or suction dredging and disposing the sediment at a permitted facility. Sediment from the entire pond bed surface will be removed with excavation depths ranging between 0.5 to 2.0 m below the current mudline. Habitat features, such as large woody debris and rock complexes, boulder assemblages and planting benches will be installed and riparian vegetation will be replanted. Prior to remediation works, the pond will be isolated, fish salvaged and the pond dewatered, while maintaining downstream flow.

Our review considered the following information:

- Request for Review Form received January 21, 2020 via email from Eddie Uyeda of Transport Canada;
- Construction Drawings accompanying the Request for Review, numbered G-001 to G-003, and C-501 to C-503;
- *Environmental Mitigation Strategy – Reay Creek Remediation*. Dated March 2019, Prepared by SLR. Originally submitted to support assessment of associated remediation of Reay Creek (DFO File: 19-HPAC-00337); and

- Additional information regarding project footprint and construction methods provided by Eddie Uyeda via email on March 10, 2020, and by project representatives during a March 13, 2020 phone call.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*; and
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the *Species at Risk Act*.

The aforementioned outcomes are prohibited unless authorized under their respective legislation and regulations. As of the date of this letter, no individuals of any aquatic species listed under the *Species at Risk Act* were identified in the vicinity of the proposed project.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures listed in your Request for Review Form and your Environmental Mitigation Strategy, in addition to the measures below:

1. Retain a qualified environmental monitor to be onsite during works below the high water mark to conduct environmental monitoring, including conducting water quality monitoring to ensure turbidity levels are within the applicable provincial water quality guidelines.
2. Conduct instream works during the least risk window (June 15 to September 15).
3. Develop and implement an erosion and sediment control plan to avoid and minimize the potential for introduction of sediment into waterbodies during all phases of the work, undertaking or activity. Inspect sediment and erosion control features as required during the project and undertake modifications/repairs to ensure they remain functional.
4. Limit impacts on riparian vegetation to those approved for the work by clearly marking the clearing boundaries and individual trees that are to be retained to avoid accidental encroachment/disturbance. Prune or limb the vegetation instead of grubbing/uprooting, where practical.
5. Use only clean, non-acid generating or metal leaching rock materials below the ordinary high water mark.
6. Isolate the work area and bypass flow around the work area to maintain 100% of downstream flows at all times and prevent dewatering of downstream habitat.
7. If some form of coffer dam is used (e.g., sand bags, large bulk bags, etc.), it should be lined to prevent erosion and leakage. Only materials free of silt or other fine sediment should be used for this purpose; unlined or uncontained earthen berms should not be used for coffer dams.
8. If pumps are used to maintain downstream flow, ensure enough pumps and bypass materials are on site and appropriately sized to accommodate any increase

- in flows due to unexpected rain events. Have a backup pump on site and ready to use in the event of a pump malfunction.
9. Monitor pumps (including overnight and weekends) continuously to ensure the bypass does not fail, site isolation is maintained and downstream flow is maintained at all time. Issues including, but not limited to, pump failure, generator failure, intake blockage, hose rupture and outlet movement can lead to inadvertent loss of downstream flows and dewatering of fish habitat.
 10. Screen the intake of pumps according to DFO's *Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater* to prevent entrainment and impingement of fish.
 11. Identify habitat of suitable quality and quantity for fish relocation, prior to commencing fish salvages.
 12. Conduct fish salvages prior to flow bypass and dewatering of the pond to ensure that no fish are present in the isolated areas to be excavated. Passive fish salvage measures (e.g., minnow traps, seines, etc.) should be conducted prior to conducting electrofishing removal methods. Conduct regular surveys for stranded fish during pond dewatering. Capture and relocate fish trapped within isolated, enclosed or dewatered areas.
 13. During pond and sediment dewatering, monitor the water quality and if necessary, release the water into a well-vegetated area or settling basin and not directly back into the watercourse unless the water is free of sediment.
 14. During pond dewatering and flow bypass, the discharge area should have a dissipation device to prevent erosion and scouring at the point of discharge. Remove the installed dissipation device at the completion of works.
 15. Conduct pond re-flooding and bypass decommissioning in a slow, controlled manner, which will limit sediment suspension in the pond and to downstream habitat.
 16. To maintain downstream flows during pond re-flooding, continue to bypass water around the pond to downstream habitat allowing only a portion of the flow to be directed into the pond until the pond has been fully flooded.
 17. Remove all materials associated with the coffer dam at the end of the project. If alterations to the natural streambed were required to install the cofferdam, rehabilitate impacted areas to pre-construction conditions and configurations.
 18. All works must be undertaken and completed in such a manner so as to prevent the release of substance deleterious to fish and other aquatic life into fish-bearing waters pursuant to Section 36 of the *Fisheries Act*, which specifically prohibits the deposit of deleterious substances into fish bearing waters. Due diligence is required at all time to prevent such deposits, and adherence to the measures in this letter does not of itself relieve the proponent of this ongoing obligation.
 19. An appropriate spill prevention, containment, and clean up contingency plan for hydrocarbon products (e.g., fuel, oil, hydraulic fluid, etc.), and other substances deleterious to aquatic life should be put in place prior to work commencing, and appropriate spill containment and cleanup supplies should be kept available onsite. Onsite personnel should also be trained in spill prevention, containment and cleanup procedures.

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal will not require an authorization under the *Fisheries Act*.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to (<http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html>) or to the DFO-Pacific Observe, Record and Report phone line at 1-800-465-4336 or DFO.ORR-ONS.MPO@dfo-mpo.gc.ca.

Please notify this office at least 10 days before starting your project. A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

In addition, the Program requests that you provide us with copies of your Contractor's Environmental Protection Plans as they relate to fish and fish habitat (e.g., fish salvage plan, water management plan, erosion and sediment control plan, etc.) to assist the Program in compliance monitoring during this project.

If you have any questions with the content of this letter, please contact Barrie Tuite at our Nanaimo office at 778-268-2476, or by email at Barrie.Tuite@dfo-mpo.gc.ca. Please submit the requested Environmental Protection Plans to Barrie Tuite. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Boone Barber, RPBio
Senior Biologist
Fish and Fish Habitat Protection Program

cc. Eddie Uyeda, Transport Canada, Eddie.Uyeda@tc.gc.ca
Scott Tomlinson, PSPC, Scott.Tomlinson@pwgsc-tpsgc.ca

**British Columbia Water Sustainability Act Section 11 Notification
Terms and Conditions**

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation

**Terms and Conditions For Changes In And About A Stream Specified By
Ministry of Forests, Lands and Natural Resource Operations
Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)
(Updated February, 2011)**

Section 42 (1) of *the Water Regulation* gives authority to a Habitat Officer to add specific conditions to ensure the protection of habitat in addition to the conditions of general application. Under this authority the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) Habitat Officer for West Coast Region requires the following mandatory terms and conditions:

42 (1) To protect habitat, a person making a change in and about a stream under this regulation, other than under section 44(1) (o) to (s) or (2), must make that change in accordance with terms and conditions specified by the habitat officer with respect to

(a) the timing window or the period or periods of time in the year during which the change can proceed without causing harm to fish, wildlife or habitat,

The timing window of least risk to fish and fish habitat must be applied to all activities in fish streams as well as tributaries that have a risk of depositing sediment into fish streams. Windows of least risk are designed to protect all fish species known to occur in a stream. One way fish presence can be confirmed is through a fish inventory database.¹ Please note if using this database that the lack of fish records for a particular area is not necessarily equivalent to fish absence. All streams are assumed to have both spring and fall spawners, until proven otherwise. The Table below represent time periods when instream work must be conducted. Numbers in the Table represent an approved start or end date for instream work.

Reduced Risk Work Windows for Fish and Wildlife for Vancouver Island

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Throughout	All Species*	June 15	September 15
Throughout	Steelhead	June 15	September 15
Throughout	Rainbow Trout	August 15	September 15
Throughout	Cutthroat Trout	August 15	September 15
Throughout	Dolly Varden	June 15	September 1
Throughout	Chinook	July 15	September 15
Throughout	Chum	May 15	September 15
Throughout	Coho	June 15	September 15
Throughout	Pink	May 1	August 15
Throughout	Sockeye	June 1	September 15
Throughout	Kokanee	June 1	September 15

*The general fisheries timing window for instream work on Vancouver Island is June 15th to September 15th. When more detailed information is available w.r.t. fish species present at the (work) site, then the applicable timing window (above) for that species should be applied.

¹ Fisheries Inventory site at <http://www.env.gov.bc.ca/fish/>

Localized exceptions to this table include:

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Not specifically known	Green Sturgeon Red Listed	November 1	April 30
Misty Lake	Giant Black Stickleback Red Listed	No Work Window, Spawns in spring and summer in lakes only	
Enos Lake	Enos Lake Limnetic Stickleback Red Listed	No Work Window. Consult a Registered Professional Biologist	
Cowichan Lake, Mesachie Lake	Cowichan Lake Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist	
Morrison Creek and Tributaries (Puntledge River)	Morrison Creek Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist.	

A qualified professional (Registered Professional Biologist) must be consulted to determine whether the project will have any impact on the above Species at Risk. Please refer to the BC Species and Ecosystems Explorer for details: <http://www.env.gov.bc.ca/atrisk/toolintro.html>

Beaver: The instream work window for beaver dam removal is June 15th to September 15th.² Opening plugged culverts or removing beaver dams and draining ponds between September 15th and June 15th can result in mortalities of both beavers and fish, and will not normally be accepted. Special circumstances may warrant dam removal during this time. Request to modify or remove beaver dams, or unplug culverts outside the work window must be accompanied by a detailed request directed to a Habitat Officer. Such request will be dealt with on a case-by-case basis, and approval may be given.

Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

(b) *The minimum instream flow or the minimum flow of water that must remain in the stream while the change is being made,*

- The natural rate of water flow must be maintained upstream and down stream of the worksite during all phases of instream activity.

(c) *The removal of material from the stream or stream channel in connection with the change,*

- In fish streams, the permanent removal of stable, naturally occurring material from the stream or stream channel is not permitted.

² A beaver dam may be modified or removed only in order to protect property (e.g. a road base), as per Section 9(2) of the *BC Wildlife Act*. A “Habitat Officer” of the Ministry of Forests, Lands and Natural Resource Operations establishes terms and conditions associated with the removal or modification of beaver dams, pursuant to Part 7, Sections 42 and 44 (1) (v) of the *BC Water Act Regulation* and Section 9 of the *BC Wildlife Act*.

- In non-fish streams, the permanent or temporary removal of stable, naturally occurring material must be minimized and completed only as necessary to make the change in accordance with Part 7 of the *Water Regulation*.
- The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.
- Any spoil materials must be placed in a location which ensures that sediment or debris does not enter the watercourse.

(d) The addition of substance, sediment, debris or material to the stream or stream channel in connection with the change,

- Instream activities must be conducted in the dry and the worksite must be isolated from water flowing in the stream channel.
- All equipment must be located and operated in the dry.
- Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks).
- Measures must be taken to ensure that no harmful material (e.g. fuel and other hydrocarbons, soil, road fill, or sediment), which could adversely impact water quality, fish and other aquatic life, and /or fish habitat, can enter the wetted perimeter as a result of the project activities.
- Erosion and sediment control structures are to be available onsite and utilized as necessary.
- Do not work in weather conditions likely to contribute to sediment production to the stream.
- If approved, beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size). All material removed from a beaver dam must be side-cast in such a manner that it cannot re-enter the stream.

(e) The salvage or protection of fish or wildlife while the change is being made or after the change has been made,

- If dewatering of the worksite is necessary, fish salvage must occur on a fish-bearing stream prior to commencing works. A scientific fish collection permit must be obtained from the MFLNRO Permits and Authorization Service Bureau (<http://www.env.gov.bc.ca/pasb/applications.html>) prior to commencing salvage activities. A fish salvage permit is required from Department of Fisheries and Oceans in salmon bearing waters, contact Steve Baillie at 250 756-7227.
- If an area is de-watered as a result of beaver dam removal or modification and results in the stranding of fish, then these fish must be salvaged and returned to the stream.

- Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life.
- Do not disturb wildlife and /or their residences (e.g. beaver lodges³) within the project area.

(f) The protection of natural materials and vegetation that contribute to habitat or stream channel stability,

- Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.
- The Riparian Areas Regulation (RAR), enacted under Section 12 of the *Fish Protection Act* in July 2004, calls on local governments by March 31, 2006 to protect Riparian Areas during residential, commercial, and industrial development by ensuring that proposed activities are subject to a science based assessment conducted by a Qualified Environmental Professional. The Riparian Areas are the 30 meter strip on both sides of the stream, measured from the high water mark. For information on the RAR, and whether it applies to your project, we suggest you visit the Ministry's website and check the Frequently Asked Questions:
http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html#extension

(g) The restoration of the work site after the change has been made, and

- Complete restoration activities (including erosion control), as required, that will lead to natural pre-disturbance conditions.
- Any disturbed areas must be restored to function as they did in their pre-disturbance condition.

(h) The requirement to obtain an approval from the federal Department of Fisheries and Oceans (DFO) in connection with the change.

- Proponents are responsible for complying with the federal *Fisheries Act*. No harmful alteration, disruption or destruction (HADD) of fish habitat is authorized by this document. Be aware that a series of Operational Statements (OS) have been developed to streamline the Habitat Management Program's (HMP) regulatory review of low risk activities. The OS outline measures and conditions for avoiding the harmful alteration, disruption and destruction (HADD) to fish habitat, and thus be in compliance with subsection 35(1) of the *Fisheries Act*.
- Project Review Application Forms (PRAF) and additional information can be found at DFO Habitat Management Website "Working Near Water" at <http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm>.

³ Beaver may only be removed by the registered trapline holder or contract problem beaver trappers. A list of trappers can be obtained through the Nanaimo Regional Office at 250 751-3100.

Proponents are not required to submit their proposal for review by Fisheries and Oceans Canada (DFO) when they incorporate the measures and conditions outlined in the OS into their plans. The Following is a list of Operational Statements:

Aquatic Vegetation Removal
Bridge Maintenance
Clear Span Bridges
Culvert Maintenance
Directional Drilling
Dock Construction
Ice Bridges
Routine Maintenance Dredging
Underwater Cables

To obtain this material, please visit the following website:

http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm

- The central DFO contact telephone number for Vancouver Island is as follows:

DFO Habitat Information Line 250 740-0544

Section 44 of the *Water Regulation* is important, as it provides the requirements for the installation of culverts in streams. **Fish passage in pipe culverts** has historically been a problem in the Pacific Northwest, and Vancouver Island is no exception. This follows in part from the emphasis on culvert efficiency and capacity to convey storm flows. Characteristics of culverts that make them efficient may create high velocities, and shallow flow that are impassable to fish. Perched outlets, inadequate jump pools, culvert obstructions, inlet drops, and inaccessible outlet weirs or rock aprons are examples of problems frequently associated with pipe culverts. Investment in stream enhancement is offset by loss of accessible fish habitat by installation of culverts that do not pass fish. If your project involves the installation of a culvert, please make special reference to Part 7 of the *Regulation*, Section 44, where it states:

44 (1) For the purposes of section 9 of the Water Act, the following changes in and about a stream may be made without the necessity of obtaining an approval or licence for that change, provided that the change is made in accordance with this regulation and in accordance with the terms and conditions, described in section 42, specified by a habitat officer:

(a) the installation, maintenance or removal of a stream culvert for crossing a stream for the purposes of a road, trail or footpath, provided that:

(ii) in fish bearing waters, the culvert allows fish in the stream to pass up or down stream under all flow conditions,

Important terms to note:

"fish bearing waters" means a stream having a fish population present at some time during the year;

"stream" includes a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch;

Fish Passage Criteria:

Fish passage design should provide for weakest swimmers including the smallest fish. If small fish are able to pass, this provides reasonable confidence that the majority of fish can pass through the culvert.

Fish passage includes any related downstream works that may affect access to the outlet of the culvert. If the culvert is accessible and not obstructed, fish passage is determined by the hydraulics of the culvert that affect velocity and depth of flow. This is governed by slope and geometry of the culvert relative to assumed levels of discharge and accounting for backwatering effects.

Mitigation to and/or to reduce inlet and barrel velocities and/or maintain adequate swim depth is likely to be required for most culverts installed at greater than 0.5% slope. Culverts installed above 0.5% are generally likely to require backwatering to mitigate against adverse velocities and shallow depth of flow. This may involve constructing a weir or series of weirs downstream of the outlet or use of an alternative design such as embedding the culvert into the stream, so that 1/3rd of the culvert is filled with natural substrates.

Backwatering requires hydraulic design because it influences culvert capacity and results in varied flow conditions in the culvert. Culverts installed above 0.5% will generally involve hydraulic assessment of fish passage in the design. Proposed use of baffles are subject to maintenance to clear obstructed baffle slots or notches. Similarly, downstream weirs must be sufficiently robust to withstand design storm flows. Weir structures including baffle weirs need to be maintained and may require repair over the life of the culvert. This may be problematic where the responsibility for long term maintenance cannot be secured. Local government should be consulted to determine acceptance.

Culverts at less than 0.5% slope may require backwatering if depth of flow is inadequate at the inlet. Culverts should not be installed flat if there is a difference in slope between the culvert and the stream of more than 2% resulting in an inlet drop exceeding 30cm or outlet drop.

Where feasible, open bottom structures, or embedded culverts that preserve or simulate the natural stream bed, are preferred. These structures are generally more likely to be fish passable and are not subject to the same degree of hydraulic design considerations as bare pipe culverts. Provincial guidelines are contained in the Fish Stream Crossing Guidebook available for download at:

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>.

These guidelines were developed for the forest industry, but have equal applicability in other settings.

Assessment of fish passage in non-embedded pipe and closed bottom box culverts is based on the following criteria that have been adapted from similar criteria used in Oregon. While they are not in regulation, they are considered to be based on best available science and research on fish passage.

Fish passage should be based on juvenile fish swimming capabilities:

- Generally, this will require limiting velocities in the culvert to less than 0.6m/sec^2 .
- The minimum swim depth is 20cm to facilitate both juvenile and adult fish passage.
- Maximum outlet jump or hydraulic drop at the inlet or within the culvert should not exceed 15cm. If an outlet drop exists there must be a jump pool. Outlet jumps are not a desired feature, but may be present as a mitigating measure to a previously installed culvert. The jump pool should be the greater of 1.5 times the outlet drop or 60cm. Added depth is required to facilitate fish accelerating into a jump. The deep point of the pool must be close enough to the outfall for fish to utilize the full depth of the pool to make the jump into the culvert barrel.
- Backwatering to the inlet is important to ensure that fish do not become exhausted short of the inlet. This may happen as a result of accelerated flows at the inlet caused by inlet constriction relative to stream width, steepness of the culvert, or increased velocity associated with high fish passage flows.
- The flow velocities of the culvert need to be checked against a high fish passage discharge estimate for the culvert. Flows that are not exceeded more than 10 percent of the time during the maximum discharge month when fish may be present may be used as a high fish passage flow guideline.
- A range of low flows should be examined to ensure that the culvert will have sufficient depth of flow during low flow periods when fish may be present based on expected flows in the adjacent stream.

The foregoing considerations do not replace the need for adequate professional design or input from a professional biologist with fisheries experience. They do not cover all circumstances that may be encountered. Local government may have additional bylaws or requirements that restrict what is acceptable. Fisheries and Oceans Canada also has requirements and policies relating to fish passage pursuant to the federal *Fisheries Act*.

Confirming Fish Bearing Status of the Stream:

The presence of fish refers to migrating, spawning, and rearing fish and includes all species and life stages that may be present at any time of the year. Fish bearing status is confirmed on the basis of known presence/absence as confirmed by fish observations or inventory.

The alternative to conclusively determining fish absence is to accept that fish may potentially be present and to develop the crossing to pass fish.

Most available information on fish distribution and habitat has been compiled into the Fisheries Information Summary System (FISS) provincial database. FISS provides a standardized, systematic summary of information about fish, fish habitat and resource use (fishing). If information confirming the absence of fish is not available, a reach level survey may be required to prove fish absence.

The Fisheries Information Summary System (FISS) is maintained by the Ministry of Forests, Lands and Natural Resource Operations and Fisheries and Oceans Canada. Information may be accessed through the BC Ministry of Forests, Lands and Natural Resource Operations Fisheries Inventory Data Queries website. Much of the mapping of fish presence is interpreted at a scale of 1:20,000, the FISS misses many small streams that may contain fish in urban and rural areas. Many fish observations are single location spot observations that enable inference of fish presence upstream in the absence of documented barriers.

The Resources Inventory Committee manual Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Manual is an essential reference on data recording protocols for fish-stream identification. The manual is available on the Ministry of Forests, Lands and Natural Resource Operations website: <http://ilmbwww.gov.bc.ca/risc/pubs/aquatic/recon/index.htm>. This manual contains standard data collection forms for stream reaches, reach sample sites, and fish collection records which are recommended for use. The standard for database management is the Field Data Information System (FDIS) which is available to capture and store reach, sample-site, and fish collection data. Copies of the field forms can be obtained from Crown Publications. The RIC manuals contain much more information than that required to identify fish bearing stream reaches.

The basic information needed for fish-stream identification is fish presence or absence; therefore, describing the distribution of fish in a drainage basin is far more important than gathering data on fish abundance or population age structure.

Similarly, habitat quality is not a primary factor for fish-stream identification: fish-bearing status is not based upon the potential of the habitat to produce fish. However, habitat information can provide important clues to the type of fish-habitat use that can occur in an area, and it can identify operational considerations for locating stream crossings.

Fish presence can be determined by a number of acceptable techniques that cover a range of efficiency and sampling intensity. The simplest technique might be sufficient to determine presence. Fish presence is confirmed once an individual specimen of the appropriate species is properly identified.

Determination of the absence of fish from a body of water is much more difficult. While no fish may be captured at successively greater levels of sampling intensity, the ultimate “proof” of absence must be associated with the most intensive and efficient procedure appropriate for the species, life stage and time of year. For example, when sampling for quantitative purposes, baited traps are ideally set over 24 hours for juvenile fish, or two-trial electrofishing is performed. It is recognized that these levels of effort are sometimes difficult to achieve.

Ultimately, an acceptable survey has been performed when there is, in total, sufficient evidence to support the conclusion that fish do not occur in a given stream reach. The evidence must include, *in addition to fish capture results*:

1. Any known information on fish presence upstream and downstream of the reach sampled.
2. Type and location of obstructions to fish migrations.
3. Sampling conditions including stream flow, temperature and conductivity.
4. Sampling methods and effort (include gear selection sample timing).
5. Judgment of seasonal habitat availability.
6. Evaluation of seasonal fish use of stream and off-channel habitats.

A summary of fish presence or absence should reference existing inventories and fish observation mapping. It is recommended that fish sampling results and methods used, be recorded in on standard fish collection forms. Contractors that have the capability are encouraged to enter the information into the FDIS database management system. These data standards will ensure data are captured and available for future uses including the review of the stream classifications.

Sampling should be carried out at least 2 times during the year. The critical sampling periods include:

- Winter periods to capture spawning and fish rearing in headwater streams
- Summer periods during the low flow periods in areas where juveniles may be rearing.

All stream reaches for which non-fish-bearing status is proposed require a short, concise, written justification for this designation. This non-fish-bearing status report contains information that, in the professional opinion of the person responsible for the survey, provides sufficient evidence to support the conclusion that fish do not occur in the stream reach in question. Information that should be provided includes:

1. Date and time of sampling events, including initial and any follow-up sampling efforts.
2. Fish sampling methods and effort employed.
3. Capture methods used (e.g., electrofisher; Gee traps; use of barrier nets at either downstream limit, upstream limit, or at both ends of the sampled site).
4. Sampling area covered (number, length and area of sample site).
5. Sampling effort (e.g., number of traps, electrofishing seconds).
6. Stream conditions during sampling (e.g., specific conductance; flow stage of high, medium or low; temperature; turbidity).
7. Supporting evidence:
 - i. Known fish species presence both upstream and downstream.
 - ii. Type and location of obstructions to fish migrations.
 - iii. Seasonal habitat availability.
 - iv. Seasonal fish use of stream and off-channel habitats.
 - v. Results of any 1:20 000 reconnaissance fish and fish habitat inventory conducted in the watershed.

Downstream barriers must be confirmed as permanent and described as to whether they are assessed as natural or manmade, and whether the barrier is year round or seasonal. Absence of resident fish above barriers must be confirmed.

This document does not supersede the requirements of the *Water Act and Regulations*, *Federal Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments.

Where the West Coast Habitat Officer has an agreement with a company or agency pursuant to the *BC Water Act* Section 9 and Regulation 204/88, Part 7, the agreed Standard Operation Procedures (SOP) will be considered as satisfying the above conditions.

For enquiries regarding Terms and Conditions, please contact:

Habitat Officer
West Coast Region
Ministry of Forests, Lands and Natural Resource Operations
2080A Labieux Road
Nanaimo BC V9T 6J9
250 751-3100

Town of Sidney Access Agreement

R.087575.005 KEL,SET (Reay) Creek Pond Remediation

LICENSE AND ACCESS AGREEMENT

THIS AGREEMENT dated for reference the first day of February 1, 2020.

BETWEEN:

THE TOWN OF SIDNEY, a municipal corporation pursuant to the *Local Government Act* (British Columbia) and having its offices at 2440 Sidney Avenue, Sidney, B.C. V8L 1Y7

(the "Licensor")

AND:

HER MAJESTY THE QUEEN IN RIGHT OF CANADA as represented by the Minister of Transport, having an office at 620-800 Burrard Street, Vancouver, B.C. V6Z 2J8

(the "Licensee")

WHEREAS:

- A. The Licensor is the registered owner of the lands and premises situate in the Town of Sidney within the Province of British Columbia and outlined in bold black ink on the plan attached as **Schedule "A"** to this License and Access Agreement (the "**License Area**");
- B. The Licensee requires, and the Licensor has agreed to provide access to the License Area for the Licensee to undertake extensive remediation of Reay Creek Pond located on the License Area. The remediation work will generally involve removing sediment and material under Reay Creek Pond and vegetation above Reay Creek Pond on the License Area to allow for access and work area. No soil above the limits of Reay Creek Pond will be removed unless it is required for access, work area, maintaining a stable embankment, or remediating additional contaminated material.
- C. At the completion of the sediment removal activities, the bottom of Reay Creek Pond (i.e. the centerline) will be left as deep and wide as possible while maintaining stable slopes up to the former limits of Reay Creek Pond. The Licensee will replace material taken from the License Area with clean material that meets or exceeds existing habitat conditions in the pond, under direction of an environmental professional, and slope the bottom up to the previous natural boundary. The Licensee will replant and landscape in a fashion consistent with the current landscape or as agreed by the Licensor, and (non-invasive) types of vegetation.

NOW THEREFORE in consideration of the mutual covenants and agreements in this License and Access Agreement and other good and valuable consideration, the sufficiency and receipt of which is hereby acknowledged, the parties hereto covenant, promise and agree with each other as follows:

1. Unless otherwise defined in this License and Access Agreement, the following terms shall have the following prescribed meanings:

“Contaminants” means all pollutants, contaminants, wastes, special wastes, hazardous or toxic substances or materials (including, without limitation, asbestos, coal, tar, polyaromatic hydrocarbons, ammonia, metals and other hydrocarbons, or any related or associated substances), and those defined, judicially interpreted or identified in any Environmental Laws or required to be remediated pursuant to Environmental Laws and the storage, handling, transport, treatment, disposal, use, manufacture or release of which into the environment is prohibited, controlled or regulated by Environmental Laws, and the presence of which, in quantities or concentrations above or equal to prescribed standards, or numerical criteria, standards or conditions may require a Government Authority to order remedial or investigatory action under any Environmental Laws;

“Environmental Laws” means any applicable government laws, rules, ordinances, statutes, regulations, orders, bylaws, or codes having the force of law, now or hereafter in force whether federal, provincial, municipal or otherwise relating to the environment or to the environmental conditions in, on, or over land or water in the Province of British Columbia;

“Government Authority” means any applicable federal, provincial, state, municipal, regional or local government or government authority, and includes any department, commission, bureau, board, administrative agency, regulatory body, minister, director, approving officer, manager, or other person of similar authority of any of the foregoing having jurisdiction or legislative authority;

“Monitoring Works” means accessing, drilling and constructing monitoring wells, undertaking environmental testing, and conducting any other post remediation monitoring through, over and on the License Area for the purpose of ensuring the Licensee has remediated the License Area in accordance with Environmental Laws;

“Permitted Work” means Monitoring Works and Remediation Work

“Remediation Work” means:

- i. the movement of vehicles and equipment;
- ii. the removal of vegetation, trees and fish from the License Area;
- iii. the excavation and removal of sediment and other materials under or surrounding Reay Creek Pond located on the License Area;
- iv. the diversion of Reay Creek to facilitate access to the sediments in, under and surrounding Reay Creek Pond;
- v. the transport and short term storage of soils, which must be removed prior to refilling the pond, ground water, vegetation, debris, and other materials containing Contaminants from the License Area;
- vi. the short term storage of supplies, including imported soil stockpiles, shoring materials, vehicles, trailers and equipment;

- vii. site restoration activities including backfilling and compaction of soil, placing sod, planting vegetation and other landscaping;
- viii. miscellaneous construction activities such as placing of fences and gates, traffic control (including but not limited to directing vehicle and pedestrian traffic), installation of lights and signage;
- ix. temporary, partial closures of roads adjacent to Reay Creek Pond to allow movement, storage and construction activities; and
- x. any other activities or actions required to eliminate Contaminants from the License Area

through, over and on the License Area for the purposes of supporting the Licensee's remedial work on the License Area, all subject to and in accordance with Environmental Laws.

2. The Licensor hereby grants to the Licensee, its employees, agents and contractors, the exclusive right and license to at all times, by day and by night, enter, pass and repass upon, over, under, across and through, and to be upon, the License Area, for and during the Term, for the purpose of carrying out the Permitted Work and any and all other matters related to or incidental to the Licensee's environmental remediation activities and environmental monitoring on the License Area, and for no other purpose unless agreed to in writing by the Licensor. Notwithstanding the foregoing, the Licensee acknowledges that:
 - a. the Licensee's rights under this License are at all time subject to the rights of the Licensor as owner of the road and park that form the License Area;
 - b. upon notice to the Licensee and provided that the Licensee determines that it does not interfere with the Remediation Work being conducted by the Licensee, the Licensor, its employees, agents and contractors, may access the License Area for dam renovation and construction, as well as construction of a fish ladder, within the License Area during the term of this License Agreement; and
 - c. upon notice to the Licensee and provided it does not interfere with the Permitted Work being conducted by the Licensee, the Licensor may access the License Area in an emergency for the purpose of construction, operation, maintenance, repair and replacement to the Licensor's works and facilities within the License Area or on adjacent lands.
3. This License and Access Agreement shall come into force on April 1, 2020 for a period of nine months (the "Term") until December 31, 2020 and may be extended, as is reasonably required, upon prior notice to and approval by the Licensor.
4. The Licensor acknowledges that anything left on the surface of the License Area in the vicinity of the Reay Creek Pond will likely be removed and destroyed as part of the Licensee's remediation works.
5. The Licensee is responsible for notifying impacted residents prior to performing the

remediation works.

6. The Licensee covenants and agrees with the Licensor that the Licensee shall:
- (a) only use and occupy the License Area in accordance with the terms and conditions set out in this License and Access Agreement;
 - (b) efficiently fence and secure, light and watch all materials or other obstructions located on the License Area or any part thereof, and shall take all reasonable and necessary precautions to ensure the safety of the public and prevent public access at all times;
 - (c) prior to closing any roads as part of the Permitted Works, provide a traffic management plan to the Licensor for review and approval;
 - (d) obtain approval from the Licensor prior to removing any trees from the License Area;
 - (e) obtain all required approvals, pursuant to the *Water Sustainability Act* (British Columbia) or any other Environmental Laws, prior to diverting the flow of Reay Creek;
 - (f) obtain all required approvals, pursuant to the *Fisheries Act* (Canada) or any other Environmental Laws, prior to removing any fish from Reay Creek;
 - (g) if any legal survey posts placed by the Licensor on the License Area are removed, moved or damaged by the Licensee or by any person for whom it is responsible at law, ensure that they are properly replaced by a registered BC Land Surveyor, at the sole expense of the Licensee;
 - (h) to transport all soils, ground water, vegetation, debris or other materials containing Contaminants off of the License Area prior to the pond being refilled;
 - (i) promptly notify the Licensor of any spill or release of any Contaminants that occurs on, or may migrate to or away from, the License Area as a result of the Permitted Work, or otherwise as a result of the action or inaction of the Licensee or those for whom it is responsible in law, and shall repair such damage and remediate such Contaminants in a good and workmanlike manner, and to the standards required by the applicable Environmental Laws;
 - (j) upon the completion of the Permitted Work, revegetate and landscape the License Area in a fashion consistent with Environmental Effects Determination application submitted to Fisheries and Oceans Canada;
 - (k) promptly repair or replace any public or private infrastructure, including but not limited to roadways, boulevards, curbs, retaining walls, and walkways, damaged

as a result of the performance of the work contemplated by this License and Access Agreement; and

- (l) comply with all Licensor bylaws, regulations, policies and permits applicable to the Permitted Activities.
7. The Licensor or persons appointed by the Licensor shall have access to all parts of the License Area if they have undergone the required safety orientation and have notified the Prime Contractor on site, and the Prime Contractor has agreed that the visit does not pose any safety concerns, to examine the License Area and to determine the Licensee's compliance with the provisions contained in this License and Access Agreement. The Licensor covenants and agrees with the Licensee to take reasonable steps to minimize any disruption of the Licensee's operation under this License and Access Agreement in the conduct of the inspection of the License Area. The Licensor will also notify the Licensee prior to going onto the License Area, and provide a day's notice if possible.
 8. The Licensee shall be responsible for conducting all Monitoring Works on the License Area, which monitoring shall last for 2 or 3 years after the termination of this License Agreement.
 9. The Licensee shall be responsible for providing notification similar to, but not strictly, a notice of independent remediation pursuant to the BC Contaminated Sites Regulation and will deal with other provincial requirements related to the License Area in a similar way.
 10. The Licensor shall not alter the post-remediation restoration of the Reay Creek Pond License Area until the Monitoring Works are completed, excluding dam construction and maintenance and park enhancements and maintenance, as required in an emergency, or as approved by the Licensee. The Licensor shall be responsible for any such enhancements or maintenance works in the License Area.
 11. It is mutually covenanted and agreed by and between the parties hereto that:
 - (a) the Licensee acknowledges that the rights granted by this License and Access Agreement are contractual rights only and do not create or grant to the Licensee any interest in land. Neither the Licensee, nor anyone on its behalf, will register this License and Access Agreement or any other document evidencing any interest herein against the whole or any part of the License Area or any other Licensor lands;
 - (b) the Licensee will not assign this License and Access Agreement (whether by mortgage, transfer, sale of its shares if the Licensee is a corporation, or otherwise) or otherwise part or permit any parting with possession of all or any part of the License Area or grant or permit the granting of any concession, license or other right to all or any part of the License Area without the prior consent of the Licensor, in its sole discretion;

- (c) the Licensee's use and enjoyment of the License Area will be at the Licensee's sole risk, cost and expense unless otherwise expressly provided herein; and
- (d) subject to the *Crown Liability and Proceedings Act (Canada)*, the Licensee covenants with the Licensor to indemnify and save harmless the Licensor against all losses, damages, costs and liabilities arising out of:
 - (i) any breach of this License and Access Agreement by the Licensee; and
 - (ii) any personal injury, death or property damage due to the Licensee's occupation and use of the License Area or due to the negligence or intentional acts or omissions of the Licensee or any of its employees, agents, servants or any other representatives.

The obligation of the Licensee to indemnify the Licensor hereunder shall survive any expiry or termination of this License and Access Agreement, anything in this License and Access Agreement to the contrary notwithstanding.

12. This License and Access Agreement sets out all the covenants, agreements and understandings between the Licensor and the Licensee concerning the License Area and the Licensee's rights with respect thereto and may only be amended by written agreement duly executed by the Licensor and the Licensee.
13. This License and Access Agreement will be binding on and enure to the benefit of the heirs, executors, administrators, successors and permitted assigns of each of the Licensor and Licensee.
14. If any part of this License and Access Agreement is determined by a court of competent jurisdiction to be illegal or unenforceable, then such part will be considered separate and severable from this License and Access Agreement and the remainder of this License and Access Agreement will remain in full force and effect and will be binding on the parties as though such illegal or unenforceable part had never been included.
15. The Licensor and the Licensee each represent and warrant that they have the necessary authority to enter into this License and Access Agreement and to perform their obligations under this License and Access Agreement.
16. This License and Access Agreement and all documents entered into or granted hereunder set out all the covenants, agreements and understandings between the Licensor and the Licensee concerning the License Area and the Licensee's rights with respect thereto and may only be amended by written agreement duly executed by the Licensor and the Licensee.
17. All notices which may be or are required to be given pursuant to this License and Access Agreement shall be in writing and shall be given to the party for whom it is intended either by personal delivery or by double registered mail, addressed as follows:

In the case of the Licensor:

Randy Humble, Chief Administrative Officer
Town of Sidney
2440 Sidney Avenue,
Sidney, B.C.
V8L 1Y7
rhumble@sidney.ca

In the case of the Licensee:

Ian Chatwell, Regional Director, Programs
Transport Canada
820-800 Burrard Street,
Vancouver, BC
V6Z 2L8
ian.chatwell@tc.gc.ca

Any such notice or instrument is exclusively deemed to have been given to and received by the addressee when delivered in the case of personal delivery, or when signed for by the addressee or its agent when delivered by double registered mail.

- 18. This License and Access Agreement shall be interpreted in accordance with the laws in force in the Province of British Columbia, subject always to any paramount or applicable federal laws. Nothing in this License and Access Agreement is intended to or shall be construed as limiting, waiving or derogating from any federal Crown prerogative.
- 19. The Licensee and the Licensor agree that this License and Access Agreement may be executed by the parties signing in counterpart.

IN WITNESS WHEREOF the parties have executed this License and Access Agreement as of the date first above written.

SIGNED, SEALED AND DELIVERED *fl*)
on behalf of the Town of Sidney this *18*)
day of *February*, 2020, in the presence)
of)

Witness (name):)

SANDI NELSON
CORPORATE OFFICER
TOWN OF SIDNEY
2440 SIDNEY AVENUE, SIDNEY, BC V8L 1Y7
A COMMISSIONER FOR TAKING AFFIDAVITS
FOR BRITISH COLUMBIA

THE TOWN OF SIDNEY by its authorized signatory:

Cliff MacNeil Smith
CLIFF MACNEIL-SMITH
MAYOR, TOWN OF SIDNEY

Print Name and Title here

RANDY HUMBLE
CHIEF ADMINISTRATIVE OFFICER

SIGNED, SEALED AND DELIVERED in)
the City of Vancouver in the Province of)
British Columbia this 18 day of)
February, 2020 in the presence of)

Danielle Wensauer)

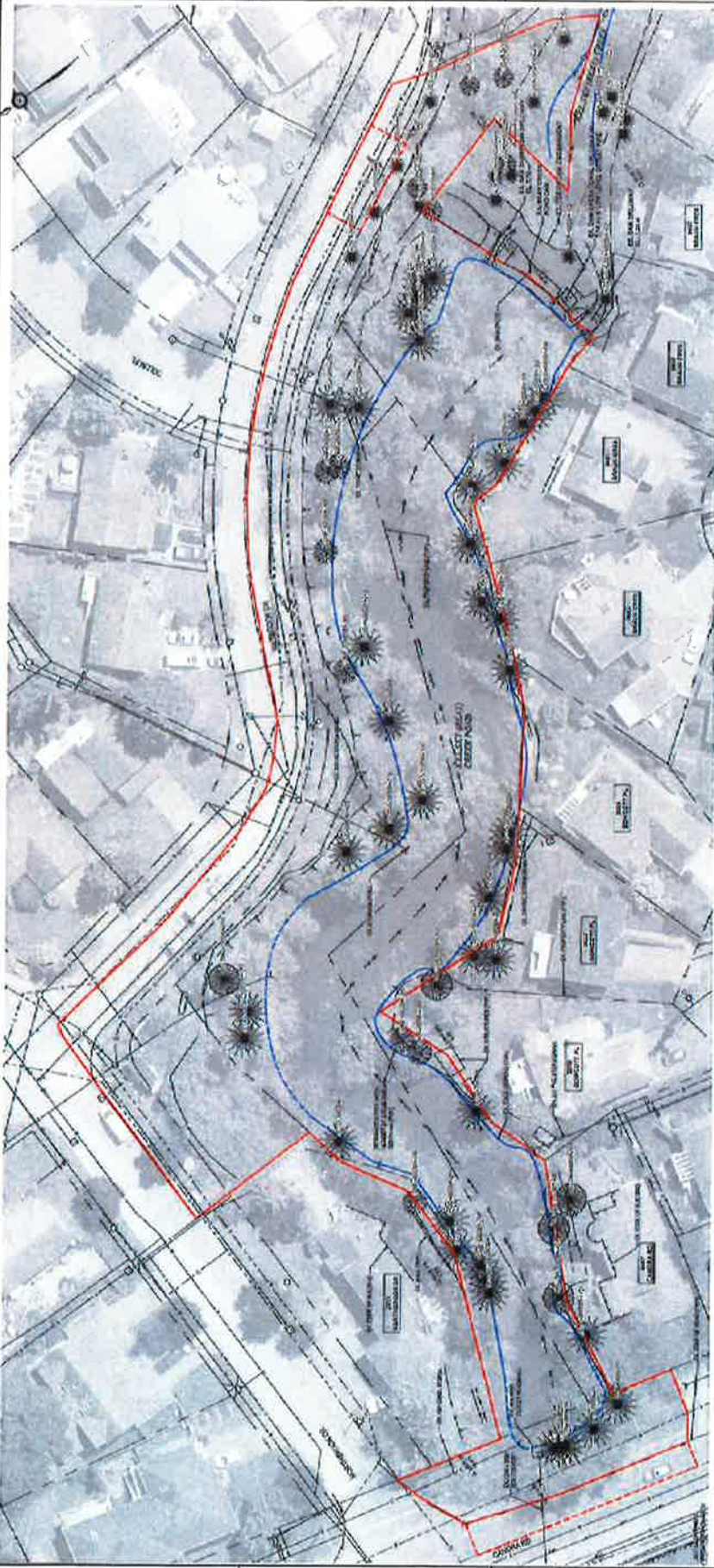
Witness (name):)

HER MAJESTY THE QUEEN IN RIGHT)
OF CANADA as represented by the)
Minister of Transport by Her authorized)
signatory:)



Ian Chatwell, Regional Director, Programs)
Transport Canada)

)
)
)
)
) For the Minister of Transport



PLAN
Scale 1:500

NOTES

1. MODIFIED BOUNDARY OF PROJECT PROPERTY INDICATED BY THE POND (SEE ENGINEER'S LETTER BY THE POND)
2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
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9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED

SCHEDULE "A"
 Re-use Area
 Licence and Access Agreement
 Re-use Check Pond

<p>TRANSPORT CANADA KERR WOOD LEBDAL CONSULTANTS INC. 2250-1000 2250-1000 2250-1000</p>		<p>DATE: 2024-03-20 DRAWN BY: [Name] CHECKED BY: [Name] APPROVED BY: [Name]</p>	
<p>PROJECT: [Project Name] SHEET: [Sheet Number] OF [Total Sheets]</p>		<p>SCALE: 1:500 NORTH: [North Arrow]</p>	



Victoria Airport Authority Access Agreement

R.087575.005 KÉL,SET (Reay) Creek Pond Remediation



Transport Transports
Canada Canada

March 16, 2020

RDIMS # 16358857

Victoria Airport Authority
201 – 1640 Electra Boulevard
Sidney, British Columbia
V8L 5V4

Attention: Ken Gallant, Vice-President, Operations

Dear Sir:

Re: Transport Canada's Remediation of KÉL,SET (Reay) Creek Pond, Town of Sidney

We are writing to confirm the remediation works to be done this year on behalf of Transport Canada on the KÉL,SET (Reay) Creek Pond, located immediately to the east of Victoria Airport, within the Town of Sidney. Although the majority of the works are within the Town of Sidney, areas for temporary storage of contaminated soils and clean backfill will be required on Victoria Airport grounds.

Description of Remediation Works

The remediation project will be similar to work conducted on the upper reaches of KÉL,SET (Reay) Creek on the Victoria Airport grounds in summer and fall of 2019, except that no excavation will be conducted on airport grounds. Generally, Transport Canada will be removing the contaminated sediments on the bottom of KÉL,SET (Reay) Creek Pond; stockpiling on Airport grounds for temporary storage and handling; taking the sediments offsite permanently for treatment and/or disposal; backfilling the pond bed with clean material; and, restoring the vegetation in and adjacent to the pond bed. The works will require access for machinery. Temporary storage areas will be constructed on airport grounds for both clean and contaminated material. All work areas on airport grounds will be restored to prior conditions or conditions acceptable to the Airport.

The location of the excavation works are shown on the sketch attached as Schedule A and the works are described in the attached Schedule B.

Timing

We anticipate that the remediation works will take place from approximately June 1 to December 31, 2020. Fisheries and Oceans Canada has recommended a short construction window for in-water works of June 15 to September 15.

We request that you sign the bottom of the letter in the space provided to acknowledge the matters described above.

Should you have any questions about this matter, either now or as it proceeds, please feel free to contact Eddie Uyeda at (604) 992-2231.

Yours Truly



Ian Chatwell
Regional Director – Programs Branch
Suite 820 – 800 Burrard Street
Vancouver, BC
V6Z 2J8

Victoria Airport Authority acknowledges the above work will be undertaken on the Airport at the times and in the manner described above.

Per:



March 24, 2020

Ken Gallant
Vice-President, Operations
Victoria International Airport
201 – 1640 Electra Boulevard
Sidney, British Columbia
V8L 5V4

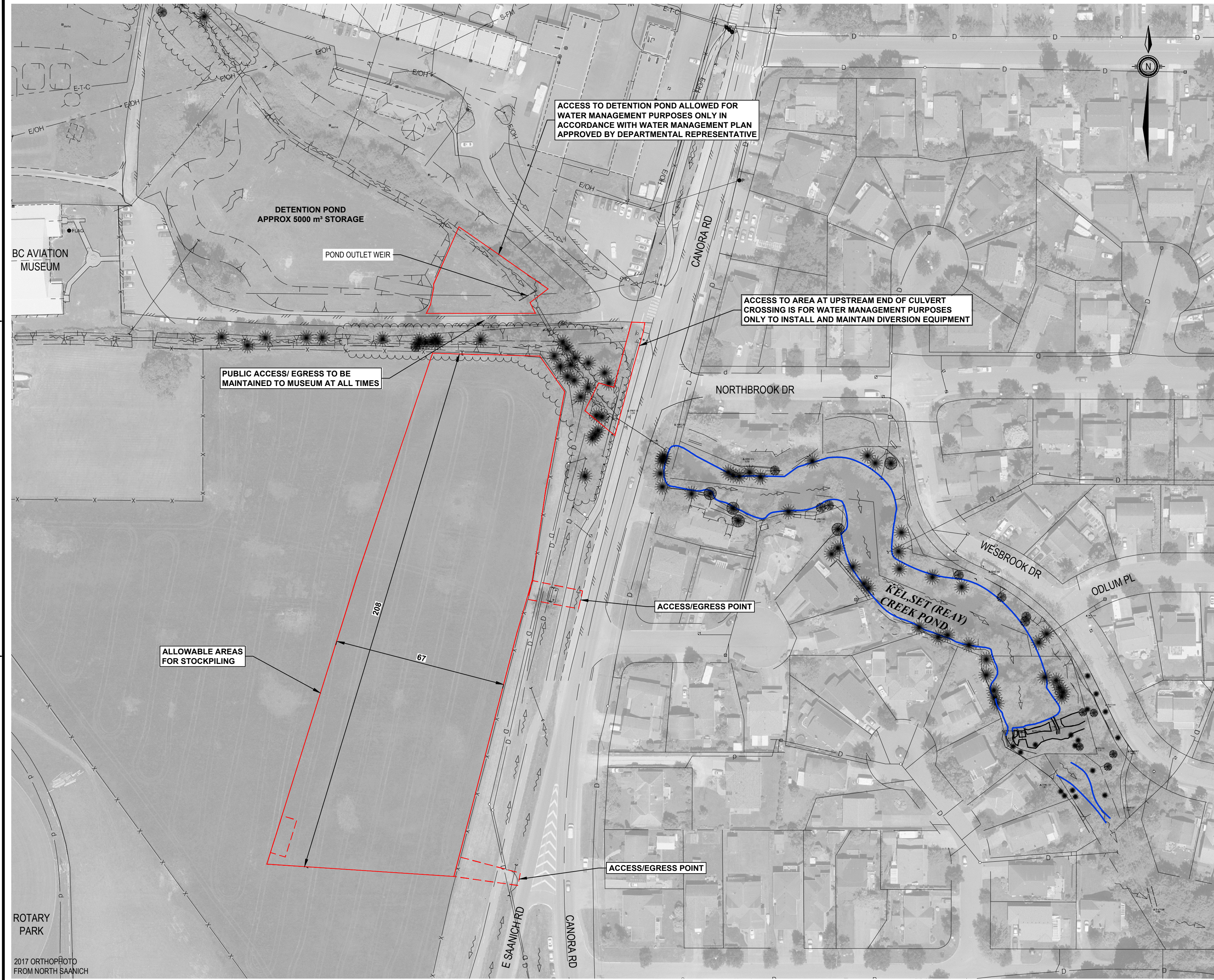
Schedule A – Work Areas on Airport Grounds and Town of Sidney

Schedule B – Description of Works on Airport Grounds and Town of Sidney

Schedule A – Work Areas

**KEL,SET (Reay) Creek Pond Remediation Project
(Town of Sidney and Victoria Airport Grounds)**

(See drawings on following pages)



ALLOWABLE AREAS FOR STOCKPILING

PUBLIC ACCESS/ EGRESS TO BE MAINTAINED TO MUSEUM AT ALL TIMES

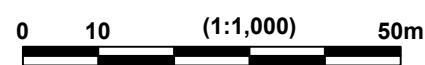
ACCESS TO DETENTION POND ALLOWED FOR WATER MANAGEMENT PURPOSES ONLY IN ACCORDANCE WITH WATER MANAGEMENT PLAN APPROVED BY DEPARTMENTAL REPRESENTATIVE

ACCESS TO AREA AT UPSTREAM END OF CULVERT CROSSING IS FOR WATER MANAGEMENT PURPOSES ONLY TO INSTALL AND MAINTAIN DIVERSION EQUIPMENT

ACCESS/EGRESS POINT

ACCESS/EGRESS POINT

PLAN
Scale 1:1000



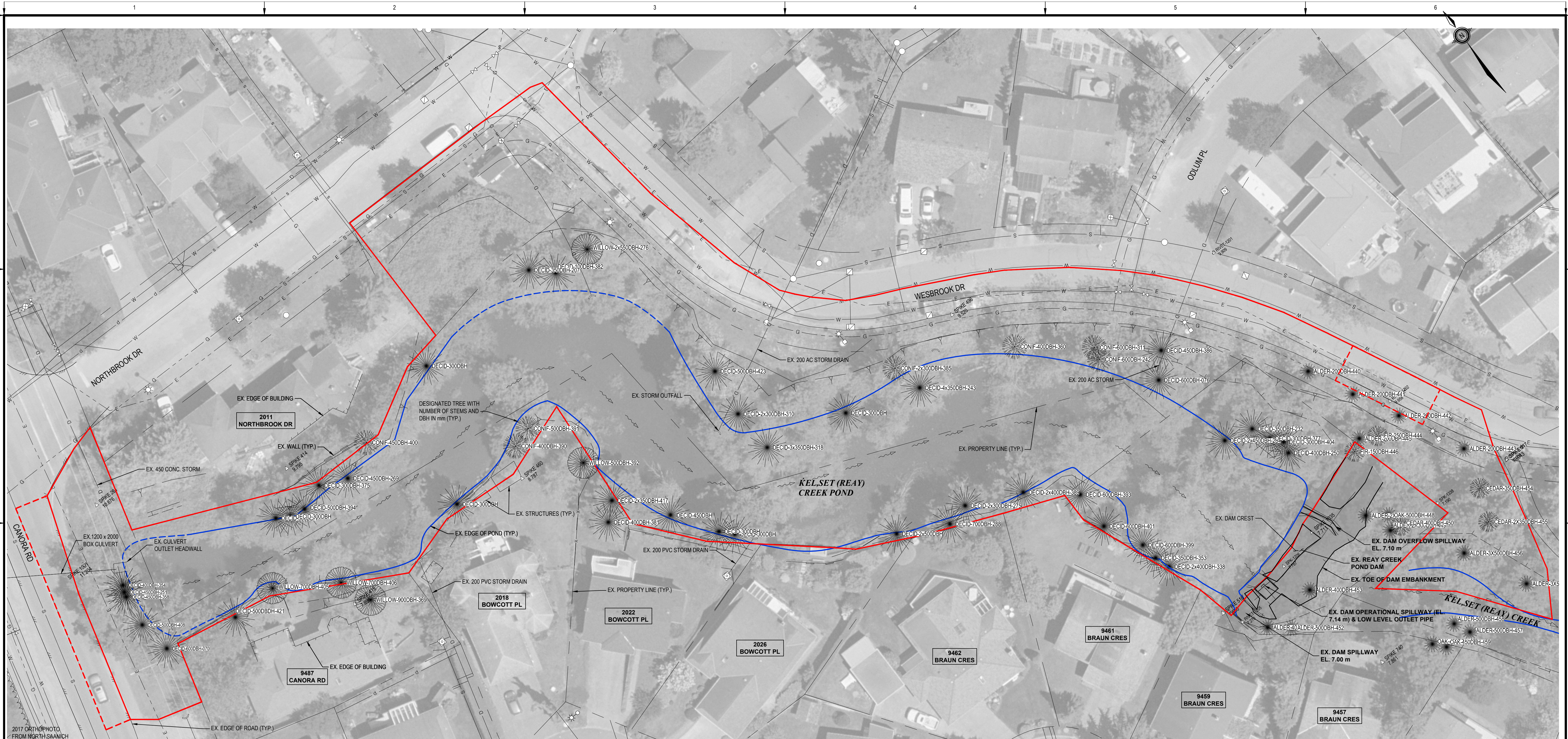
- CONSTRUCTION ACCESS AREA - CONTRACTOR MAY USE DEFINED AREA FOR ACCESS/EGRESS TO THE CONSTRUCTION SITE. HOWEVER, AT ALL OTHER TIMES THE AREA MUST BE KEPT CLEAR OF ALL EQUIPMENT AND MATERIALS TO MAINTAIN ACCESS FOR PUBLIC. TRAFFIC MANAGEMENT WILL BE REQUIRED DURING PERIODS WHEN CONSTRUCTION ACCESS AREAS ARE BEING OCCUPIED BY CONTRACTOR AS OUTLINED IN TRAFFIC MANAGEMENT PLAN TO BE PREPARED BY THE CONTRACTOR.
- CONSTRUCTION SITE - THE AREA CONTAINED WITHIN THE SOLID LINES ON THE PLAN DEFINED AS THE CONSTRUCTION SITE FOR THE PURPOSE OF CONTRACT. PROVIDE CONSTRUCTION FENCING TO CONTROL WORK AREA ALONG ENTIRE CONSTRUCTION BOUNDARY, 1.8 m HIGH, TO BE FABRIC COVERED TO BLOCK SIGHT LINES, TO BE SECURELY FASTENED, FINAL FENCE ALIGNMENT TO BE CONFIRMED WITH DEPARTMENTAL REPRESENTATIVE. CONTRACTOR TO INCLUDE DESIGNATED AREA FOR WATER TREATMENT EQUIPMENT WITHIN CONSTRUCTION BOUNDARY AS PER CONTRACTOR PREPARED WATER MANAGEMENT PLAN APPROVED BY DEPARTMENTAL REPRESENTATIVE.
- APPROXIMATE NATURAL BOUNDARY OF POND



Rev	Date	Des	Dwn	Chk	Description of Revision	Rev	Date	Des	Dwn	Chk	Description of Revision
A	2020-03-09	CS	PAC	DNM	ISSUED FOR AGREEMENT						

TRANSPORT CANADA
 KÉL,SET (REAY) CREEK REMEDIATION
 KÉL,SET (REAY) CREEK POND
 VAA LANDS
 CONSTRUCTION SITE & LAYDOWN AREA BOUNDARY

Project No. 2396-009	Drawing No.	Rev.
Group GENERAL	A2	A



PLAN
Scale 1:300

0 2.5 (1:300) 15m

NOTES:

- WORKSITE IS BOUNDED BY PRIVATE PROPERTY BOUNDARIES AROUND THE POND UNLESS OTHERWISE NOTED ON THE PLAN.
- PROPERTY LINES SHOWN ARE BEST FIT FROM TOWN OF SIDNEY CADASTRAL INFORMATION. CONTRACTOR TO DETERMINE ACTUAL LEGAL LINES AS REQUIRED DURING CONSTRUCTION.

- CONSTRUCTION ACCESS AREA - CONTRACTOR MAY USE DEFINED AREA FOR ACCESS/EGRESS TO THE CONSTRUCTION SITE. HOWEVER, AT ALL OTHER TIMES THE AREA MUST BE KEPT CLEAR OF ALL EQUIPMENT AND MATERIALS TO MAINTAIN ACCESS FOR PUBLIC. TRAFFIC MANAGEMENT WILL BE REQUIRED DURING PERIODS WHEN CONSTRUCTION ACCESS AREAS ARE BEING OCCUPIED BY CONTRACTOR AS OUTLINED IN TRAFFIC MANAGEMENT PLAN TO BE PREPARED BY THE CONTRACTOR.
- CONSTRUCTION SITE - THE AREA CONTAINED WITHIN THE SOLID LINES ON THE PLAN DEFINED AS THE CONSTRUCTION SITE FOR THE PURPOSE OF CONTRACT.



Rev	Date	Des	Dwn	Chk	Description of Revision	Rev	Date	Des	Dwn	Chk	Description of Revision
A	2020-01-22	CS	PAC	DNM	ISSUED FOR AGREEMENT						

TRANSPORT CANADA
KEL, SET (REAY) CREEK REMEDIATION
KEL, SET (REAY) CREEK POND
TOWN OF SIDNEY / POND AREA
EXISTING CONDITIONS & CONSTRUCTION SITE BOUNDARY

Project No. **2396-009** Drawing No. _____ Rev. _____
Group **GENERAL** **A1** **A**

Schedule B – Description of Works

KEL,SET (Reay) Creek Pond Remediation Project

(Town of Sidney and Victoria Airport Grounds)

1.0 DESCRIPTION OF PROPOSED PROJECT AND SCOPE

Project Objectives

The objectives of the planned remedial activities are to reduce potential environmental effects associated with historic contamination resulting from past practices at the Victoria Airport and to reduce liabilities associated with this historic contamination.

General Description of Proposed Project

The KEL,SET (Reay) Creek Pond will be remediated in 2020. Information regarding details of the remediation project is provided below.

Excavation is the preferred method to permanently remove impacted soil or sediments from a property to a secured disposal facility. Areas of anticipated sediment removal shall begin at the natural pond boundary and extend to the bottom of the pond until a stable surface (i.e., native clays) is encountered. Excavation depths will vary depending on depth of accumulated sediments and typically range from 0.5 to 2.0 m within the pond.

The remediation plan involves excavation, removal and off-site disposal of approximately 3,500 m³ of contaminated sediment from the site that exceed the BC Contaminated Sites Regulation (CSR) sediment quality standards for freshwater sensitive sites (SedFS). Table 1 following provides details of the sediment removal activities anticipated within KEL,SET (Reay) Creek Pond. It should be noted that no changes to existing area (m²) of aquatic habitat are anticipated to result from the project.

**Table 1:
Sediment Remediation Areas and Estimated Volumes**

Reach	Estimated Remedial Area (m ²)	Estimated Average Excavation Depth (m)	Estimated Volume (m ³)
KEL,SET (Reay) Creek Pond	3,621	1.0	3,500

Following removal of contaminated sediments, remediation will be verified by collecting confirmatory samples at the base of excavations at predetermined frequencies. Samples will be sent for laboratory analytical testing to confirm removal of contaminated material and will be a condition of completing the sediment removal program.

Project Components, Scope and Timeframe

The remediation of KÉL,SET (Reay) Creek Pond is scheduled to occur in 2020. The remediation project consists of five general stages:

Stage 1 – Planning and Design Activities: refinement of remedial areas and geotechnical conditions along pond side-slopes, detailed design, and logistical support for the remediation project must be considered prior to the development of a remediation specification. Stage 1 is anticipated to be completed by early spring 2020.

Stage 2 – Site Preparation: preparing the site for the remediation including, fish and wildlife salvage, site clearing and grubbing for access areas, sediment and erosion control measures, and Contractor set up of laydown areas and utility clearance. Select Stage 2 activities such as mobilization, clearing and grubbing may be completed prior to in-water works but could continue as the Project progresses, depending on overall Project sequencing.

Stage 3– Creek Bypass and Pond Dewatering: isolation and diversion of input flows to the pond. Channel isolation and fish salvage will be conducted within the general reduced risk timing windows for instream works on Vancouver Island (June 15th to September 15th). Stage 2 is anticipated to begin following contract award in late spring 2020 and will be completed prior to Stage 3.

Stage 4 – Site Remediation: removal of contaminated material from within the pond area and transportation to a permitted facility for disposal. Sediments may be temporarily stockpiled in order to facilitate additional dewatering and/or characterization prior to transport. Activities within the natural boundary of the pond must be completed within the general reduced risk timing window for instream works on Vancouver Island (June 15th to September 15th).

Stage 5 – Site Restoration: includes reinstatement of the pond area following removal of contaminated materials. Pond water depths will be increased as a result which will provide benefit to aquatic habitat. Placement of backfill in select areas may also be conducted as required according to geotechnical recommendations. Disturbed upland areas will be replanted to re-establish vegetation and support fish and wildlife habitat. In-stream habitat features will also be incorporated in select locations. Instream restoration activities will commence immediately following completion of remedial activities (i.e., within the reduced risk timing window for instream works). Upland restoration and vegetation planting will be completed in fall 2020 during periods of suitable weather conditions.

Stage 6 – Re-Flooding of Pond: following completion of remedial excavation and restoration work, the pond will be slowly filled with creek water by staged deconstruction of the upstream diversion. The contractor will be responsible to control sedimentation and erosion during the reintroduction of water to the pond and eventually to the downstream areas below the dam. Once the pond is filled and functioning, the water diversion infrastructure can be removed from site.

Stage 7 – Long-Term Monitoring: includes assessment of riparian plantings and restoration areas in accordance with warranty periods (typically for a period of one year). Long-term monitoring may also include qualitative monitoring of riparian area establishment, fish habitat enhancement features, water flow and water quality monitoring. Additional monitoring based on conditions set out by approval and permitting agencies may also be included. Stage 7 is anticipated to be conducted for up to two years post-construction but may depend on specific conditions set out in approvals stipulated by the relevant permitting agencies.