ADDENDUM #3

Date: June 8, 2020

PACIFIC REGION
PORT HARDY LOGISTICS DEPOT
PORT HARDY, B.C.
Project No: 8H500

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1.0 SPECIFICATIONS

1.1 Section 09 65 16 Resilient Sheet Flooring
Delete:
2.1.3.1.9 Recycled Content: 51% pre-consumer.

1.2 Section 09 68 13 Tile Carpeting
Delete:
2.3.5 Face Fiber Content: eco solution nylon.
Add:
2.3.5 Face Fiber Content: nylon.

1.3 Section 26 42 00 Cathodic Protection
Delete:
2.1.3.1 Mooring Piles - Cable Anode
.1 100mm x 100mm x 1270mm anode.
.2 9.5mm stainless steel cable, 8m long cast into anode.
.3 2 cable clamps per anode.
.4 100mm x 150mm steel plate for welding to pile, drilled to accommodate 2 cable clamps for each plate to secure anode cables.
Add:
2.1.3.1 Mooring Piles - Cable Anode
.1 As shown on Drawing No. 203.
.2 Anode attachment plate fabricated from steel plate 10 mm x 100 mm x 200 mm.
.3 Structural channel fabricated from steel channel C130x13x150 mm LG. The structural channel will consist of a bolt through the channel with a head welded to the inside of the channel as shown on the Drawings. Material construction of fasteners shall be to ASTM A307 or approved equivalent.

2.0 STRUCTURAL ADDENDUM

2.1 Refer to Structural Addendum #2 (3 pages)

3.0 QUESTIONS

Q.1 I am writing you with regard to the floor covering specification for the above project and respectfully request your consideration of my enquiries:
Under Section 09 65 16 Resilient Sheet Flooring, 2.1.1 Linoleum sheet flooring. There are three manufacturers of linoleum in the world and only one of them, Forbo, offers a product which 'comes with texture of stone' for LINO 1 and what I would assume is a wood visual for LINO 2. Would this preclude me from submitting a price with a linoleum having a more generic visual and texture.
Under Section 09 65 16 Resilient Sheet Flooring, 2.1.3 Solid Vinyl Tile., 2.1.3.1.9 Recycled Content: 51% is an unusually high percentage to which I am unfamiliar with any product that

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would meet that content level; therefore, I respectfully request that the recycled content be deleted.

A.1 Please bid linoleum style per specifications and Appendix H.
Recycled content percentage can be any amount.

Q.2 Can and will the Ministry separate this tenure into two parts, 1st-Demolition of old facility & Civil Construction of new building, 2nd-Construction & installation of marine infrastructure? The tenure as it stands involves two distinct different disciplines. Separating this tenure will open the door to many more competent contractors and likely saving the Ministry money.

A.2 PSPC has decided to tender this project as a single bid.

Q.3 I would like to ask for clarification on this tender regarding section 09 68 13 Tile Carpeting. Would another brand type of nylon fibre be accepted?
Section 09 68 13 2.3.5 lists eco solution nylon which is a branded nylon.

A.3 Any brand of nylon fibre meeting the specified requirements is acceptable. 'Eco solution nylon' is not required.

Q.4 1. The lumber species was not found in review of the structural plans. For the design of the continuous rod system the following was assumed: SPF for sill/sole plates and SPF for studs. Please confirm.
2. TUD10 was used to minimize deflection at top storey, but it slightly surpassed the 0.2mm limit requested.
3. The rod system details on sheet S104 provides specifications for the anchorage of the lateral restraint rod system into the concrete however the specific plate size is not provided & required embedment depth is not given. Can you verify if the Simpson pre-assembled anchor bolt (PAB) matching the size & material of the ATS rod at the first level which includes the plate washer below is an acceptable anchor solution? If PAB anchors are acceptable can you provide the required embedment depth?

A.4 1. SPF lumber is acceptable for rough framing members.
2. Bid project as specified.
3. Pre-assembled anchor bolts are acceptable with 600mm minimum embedment.

Q.5 Appendix 1 – Combined Price Form -Item 3.6 – Supply and Install Rock Revetment indicates that the unit of measurement is 1m3. Is that to indicate that the rock will be paid by in place measured volume based on the cubic meter rate submitted.

A.5 See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020

Q.6 As per spec section 06 10 00, 06 13 13 & 06 13 23 can you please confirm if Douglas Fir #1 or better is acceptable or is Douglas Fir Select Structural – Appearance grade required.

A.6 Either Douglas Fir #1 or Douglas Fir Select Structural is acceptable for heavy timber construction. Rough framing shall be as specified.

Q.7 Can the DFO permit for the project be provided for review.

A.7 CCG has completed a full marine biophysical assessment of the proposed work. An application for DFO Review has been submitted and approval is pending. All Best management Practices for the proposed work are to be followed by the contractor. Further confirmation of requirements will come after approval from DFO.

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Q.8	Appendix 1 Combined Price Form stipulates in Item 2.2 that the estimated quantity of 1067 diameter x 25 thick pile is 179m inclusive of 1m tolerance in the length of each pile. However, when the lengths of pipe given in the Float Pile Schedule on Drawing 103 are totaled, the total supply length is 196.1m inclusive of 1m tolerance in the length of each pile.
A.8	See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020
Q.9	Appendix 1 Combined Price Form stipulates in Item 3.1 that the estimated quantity of 508 diameter x 17.5 thick pile is 34m inclusive of 1m tolerance in the length of each pile. However, when the lengths of pipe given in the Abutment Pile Schedule on Drawing 102 are totaled, the total supply length is 37.2m inclusive of 1m tolerance in the length of each pile.
A.9	See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020
Q.10	Please provide more information on the rock ramp demolition scope including size of existing rock, pile size, and pile installation method.
A.10	The rock ramp demolition should be removed from the scope as this will mostly be covered by the infill and revetment. See updated Drawings A-02. There are no drawings available for the existing wharf and piles.
Q.11	Please provide specification for the 700 mm thick filter rock layer, and the 1600 mm thick armour rock layer.
A.11	See Specification 35 31 19 Revetment Material and 35 31 20 Revetment Construction.
Q.12	Please will you provide architectural/structural framing details of the gable end overhang on gridlines 4 & 7?
A.12	See detail provided with this addendum.
Q.13	Appendix 1 - Combined Price Form, Unit Price Table - Should Item 3.6 - Supply and install rock revetment be L.S. and not m3 as shown?
A.13	See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020 with the estimated rock quantities in m3.
Q.14	Appendix 1 - Combined Price Form, Unit price table - Please confirm which line item should include the demolition of the existing wharf & piles?
A.14	All demolition should be included in the project lump sum price.
Q.15	Appendix H - Acceptable Products - We would just like to confirm if the products listed in the appendix are required or preferred? The Specification sections do not mention any specific products, performance specs only, and do not direct us to Appendix H so we would like clarification on what products we are to include.
A.15	Products of any manufacturer meeting the given specifications are acceptable. Items in Appendix H are provided as reference only.
Q.16	Drawing A-17 Window & Door Schedule - Please confirm material for interior window type IW2 is it HM or Alum. Anod.?
A.16	Material type for IW2 shall be anodized aluminum.
Q.17	Are door operators required for Doors 101 & 102? The door schedule implies that they do but operators are not called up in the door hardware schedule (Section 08 71 00)

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A.17	Door operators are required for doors 101 and 102. See specification section 08 71 00 2.2.5 and sheet E-04.
Q.18	We assume that the specification for exterior wood siding is as per Item 2.1.3; Section 06 20 00 Finish Carpentry but please can you confirm requirements for paint finish as it is not included in the exterior paint specification.
A.18	Exterior Cedar cladding shall not be painted or finished.
Q.19	Please will you provide details of vanity units to washrooms - They are not shown on the millwork drawing.
A.19	Casework and millwork shall conform to requirements shown on sheets A-19 and A-20. Contractor shall submit shop drawings for approval by Departmental Representative prior to installation.
Q.20	*(not used)*
A.20	
Q.21	*(not used)*
A.21	
Q.22	Interior painting - Are we to include painting of the exposed plywood soffit and pre-eng. trusses in the boat maintenance + rack storage rooms required?
A.22	Plywood surfaces in rooms 116 and 123 shall receive minimum one coat of clear preservative as per finish schedule on sheet A-22. Trusses shall not be painted. We are not aware of an exposed plywood soffit condition.
Q.23	Please will you confirm the floor/ceiling assembly to Rooms 118, 119, 120, 121, 122 & 124 which do not form the accessible mezzanine floor area.
A.23	These areas will have the same ceiling/floor above construction as room 117.
Q.24	*(not used)*
A.24	
Q.25	*(not used)*
A.25	
Q.26	*(not used)*
A.26	
Q.27	*(not used)*
A.27	
Q.28	*(not used)*
A.28	
Q.29	Conflicting details for the soffit material. One side calling for perforated vinyl soffit and other calling for perforated metal soffit. Please confirm.
A.29	Bid as all aluminum soffits.
Q.30	No Spec for Cedar Siding.

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A.30	Siding sample shall be submitted to Departmental Representative for approval.
Q.31	The Estimated Quantities for items 2.2 & 3.2 do not match the neat line quantity for pipe installed as an integral part of the work. How will this be administered?
A.31	See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020
Q.32	The Estimated Quantity for item 3.6 Supply and Install Rock Revetment is 1 m3. How will this be administered?
A.32	See APPENDIX 1 – COMBINED PRICE FORM Revised June 10, 2020
Q.33	Please provide the as-built drawings for the existing wharf to be removed.
A.33	No as-built drawings are available for the existing wharf.
Q.34	Where should the removal of the existing wharf be priced?
A.34	All demolition should be included in the project lump sum price.
Q.35	Are the steel piles off the existing wharf to be removed in this contract?
A.35	Yes, all the existing marine infrastructure is required to be removed, including these piles.
Q.36	Please provide a plan showing where these steel piles are located.
A.36	See attached photographs showing the wharf and the piles. Also see the site bathymetry drawing that shows the location of the three large diameter piles.
Q.37	Please provide installation details for the steel pilings to be removed (if in scope).
A.37	No as-built drawings or installation details are available for these piles.
Q.38	Will the steel ramp come complete with lifting lugs?
A.38	See A.2 of Addendum #2
Q.39	Will the successful proponent be afforded the opportunity to review and accept the lifting lug requirements to be installed by Others?
A.39	See A.2 of Addendum #2
Q.40	Amendment 003, Addendum #1, A.9 says the ramp is 40 ft long hinge to hinge. This appears incorrect as Dwg 002 in the Marine set shows the abutment to float gap to be 36550. What is the length of the ramp? What is the weight of the ramp in pounds?
A.40	See A.2 of Addendum #2
Q.41	Please provide drawings for the steel ramp.
A.41	See A.2 of Addendum #2
Q.42	Can the rock from the rock ramp be re-used?
A.42	The rock ramp is not required to be totally removed as it will be mostly covered with the fill and rock revetment. Some of the material may have to be removed to allow construction of the revetment. The rock in the ramp and other rock on the site can be reused as fill or on the revetment if it falls within the specified gradations.
Q.43	Is any contaminated materials in the revetment excavation?
A.43	No tests have been conducted for contaminated materials in the revetment excavation.
Q.44	Is there a DFO Authorization or Letter of Advice for the project?

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A.44	The DFO permitting process is currently ongoing and any updated requirements will be provided to the Contractor at a later date. For now, the Contractor must comply with Best Management Practices and the requirements outlined in the Contract Documents.
Q.45	The Best Management Practices for Pile Driving and Related Operations does not address rock placement on the foreshore. Is a silt curtain required for this work?
A.45	Yes, a silt curtain will be required around the works during rock placement on the foreshore.
Q.46	The Best Management Practices for Pile Driving and Related Operations does not address drilling operations and the water generated during drilling, nor is there a Construction Environmental Management Plan to provide guidance on environmental restrictions. Does the project permitting require all water to be treated before being returned to the marine environment?
A.46	Environmental requirements will be set by the DFO permit, which will not be available until after tender closing.
Q.47	Will passive dewatering of the drill barge be allowed?
A.47	Passive dewatering is allowed within the confines of a silt curtain to prevent sediment from entering the marine environment. Further guidance will be provided following conclusion of the DFO Permitting process.
Q.48	The Cathodic Protection specification Section 2.1.3.1 details do not match anode details on Drawing sheet 103 (Detail 'E'). Please confirm which document/detail should be followed.
A.48	Anodes should as per Drawing 103. See updated Cathodic Protection Specification.
Q.49	Could you please provide spec section 07 27 00 Air Barriers
A.49	See section 07 13 00.
Q.50	Detail 7/A14 calls for stainless steel hand rail. Please confirm if all hand rails are stainless steel or if this is just for the wall mounted handrails. Or is this the only location for stainless steel?
A.50	All handrails and guardrails are to be stainless steel.
Q.51	Please can you provide more structural details for the elevator shaft wall construction there is very little shown on the structural drawings apart from the elevator pit details.
A.51	Elevator shaft walls shall conform to the requirements specified by the elevator manufacturer.
Q.52	Is there a preferred product for the Hazardous Materials Shed as per Spec. Section. 10 80 00 - Other Specialities?
A.52	No.
Q.53	I've been working on the roof trusses for the project. I had a look at the proposed 4ply ridge girder and don't see any way to get that girder truss to work. It won't even work as (2) 4ply girders with each one only carrying one side of the roof. This will most likely have to a steel beam designed by the structural engineer to support the trusses. I also had a look at the proposed 3ply 84' span girder truss on flat that's being used as a brace frame at the end of the building. That truss won't work either due to design issues and high deflection. The structural engineer will most likely have to come up with an alternative means of bracing the ends walls.
A.53	See updated truss description.

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Q.54	Can you tell what kind of materials are being stored in the in the hazardous material shed, fuel, flammable liquids, or other products that give off vapours. Is the heating in the shed required to stop materials from freezing, as according to the shed manufacturer different products that are flammable give off vapours that can ignite at different temperatures?
A.54	The hazardous material shed will be used to store engine lube oils (new and waste), hydraulic oils, gasoline, and diesel. These will be stored in appropriate/approved containers. No heating will be required.
Q.55	Is this building to be sprinklered in the future as per note on electrical drawing E-09, currently NOT part of this project scope.
A.55	The building will not be sprinklered in the future.
Q.56	Furniture and rack storage shown on drawing A-21. This is for reference only, these items are being supplied and installed by others.
A.56	Furniture and racks will be supplied by owner.
Q.57	Marine works Drawing 102 Section D/101 shows a 20m 1000lg dowel at 300 from the precast slab into the CIP abutment however the Abutment needs to be poured first to support the slabs and there is a neoprene gasket between abutment and precast. Are these dowels required?
A.57	These dowels are required to connect the slab to the abutment. The slab shown is intended to be a cast-in-place slab but a precast alternative can be proposed by the contractor after award for review by the Engineer.
Q.58	Will there be an extension?
A.58	See current tender deadline on tender webpage.
Q.59	Cathodic protection is noted to be the scope of the marine contractor per spec 35 05 51 number 7 however it is also specified under electrical section 26 42 00. Is the electrical contractor expected to provide this scope of work to the marine contractor?
A.59	No.
Q.60	Spec section 26 32 13 “Power Generation Diesel” appears to be missing. Please issue.
A.60	See Addendum #2.
Q.61	Who is supplying the 20ft ISO containers marked on the drawings ? Owner or General Contractor ?
A.61	Owner
Q.62	Who is supplying the Hazmat shed ? Owner or General Contractor ? If the GC please provide more details than provided in the specifications
A.62	Contractor shall provide hazmat shed per specifications noted in 10 80 00 2.1.3 and as per shop drawings approved by Departmental Representative.
Q.63	Who is supplying the oil stores New & Waste ? The Owner or the General Contractor ?
A.63	Owner will supply this item noted on C01.
Q.64	Who is supplying the 40 ft x 20 ft Temp Storage ? The Owner or the General Contractor
A.64	Owner will supply this item noted on C01.

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Q.65	Who is supplying and installing the communications tower ? Owner or the General Contractor ?
A.65	Future tower noted on sheet C02 will be provided by others.
Q.66	Who is supplying the 2 x 30ft hard Shell barges Owner or General Contractor ?
A.66	Owner will supply this item noted on C01.
Q.67	Is a silt curtain required for drilling operations?
A.67	Yes, a silt curtain will be required around the drilling operations to contain the sediment and prevent it from entering the marine environment. Further guidance will be provided following conclusion of the DFO Permitting process
Q.68	Reference Marine Drawing 103 Detail 1 – are the 4-19dia threaded rod anchor rods for each C250x30x500 bracket to come embedded in the float concrete?
A.68	This is correct. The contractor should inspect and confirm the location of these anchor bolts before fabricating the brackets.
Q.69	To install an HDPE protection sleeve on the float bullrail, the HDPE sleeve would need to be split. Is this acceptable? Does it need to be strapped afterwards? Any specification requirements on the HDPE?
A.69	The sleeve is intended to be installed on the chain around the bullrail support and not the support itself. This is intended to protect the chain from damaging the support and concrete. This should be a flexible hdpe or nylon sleeve and it should not be cut.
Q.70	Electrical, Drg. E-09 – Schedules - All ceilings are Gypsum but in the luminaire schedule a 2x2 fixture description is grid mount (L3)? This should be changed to a “flush” mount if it is not T-Bar. Please will you confirm alternate specification.
A.70	Type L3 is surface mounted to ceiling through additional surface mount kit.
Q.71	There are existing steel piles off to side that are not shown on the drawings. Are these to remain or be removed? Do they need to be fully removed or can they be cut off?
A.71	All existing piles on site shall be completely removed.
Q.72	In the Specification Package section 01 78 00 Close Out Submittals references an Interactive Operating and Maintenance Manual System. Can you provide a list of recommended or qualified engineers to complete the Interactive Operating and Maintenance Manual System?
A.72	No specific company or engineering firm is pre-authorized to complete the manuals.
Q.73	IFT drawing S201 Foundation Plan references a Foundation Schedule, however, a minimum footing depth is not provided for SF1. Can you provide a minimum footing depth for SF1.
A.73	600mm
Q.74	For water distribution on the barge, if we use a steel system, are we able to use black iron, galvanized or stainless? Can the steel system be threaded?
A.74	Pottable water is requested, so Stainless steel pipe is the only steel pipe acceptable. Fittings are to be as per Specification 22 11 00 Float Water Distribution.
Q.75	*(not used)*
A.75	

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Q.76	*(not used)*
A.76	
Q.77	Please provide section 07 27 00 Air Barriers
A.77	See 07 13 00 Sheet Waterproofing.
Q.78	Drawing A-23 refers to the Antenna Armature. Please provide a list of approved manufacturers or suppliers.
A.78	Armature shall be by design/build. Contractor shall provide shop drawings to Departmental Representative for approval.
Q.79	Where in the drawings are the Layout for the roof anchors, I don't see any callouts on the roof plans indicating locations of installation.
A.79	Roof anchor system shall be by design/build. Contractor shall provide shop drawings to Departmental Representative for approval.
Q.80	On the sloped roofing side of the large parapet that separates the flat roof & sloped roof along GL 4 between "C"-"A" & "G"-"F". the detail calls for upturning the panels and indicates a flashing on the wall but doesn't give any detail or wall type are we to cross break panels or included for cladding?
A.80	See details: 17/A-10, 9/A-12, 5/A-12
Q.81	Please confirm that the parapet doesn't continue past GL "G"?
A.81	Yes, the parapet terminates at the stair bulkhead.
Q.82	Please confirm that the stair 2 roof building does terminate at the parapet @ GL "4-G" and will require cladding on the stair 2 roof building along the sloped roof side (R2) as indicated on A-10 (12).
A.82	Confirmed.
Q.83	Please confirm that the Elevator Roof is to match the height of the parapet @ GL "4" between "B"- "C" and clarify if it is to be a metal sloped roof or Torch on roof as indicated on A-09 (5) as the slope on the roof drawings (A-05) indicate 2% slope away from the wall but on the elevations it shows the roofing sloping back to GL 4.
A.83	Elevator roof is to be as shown in detail 9/A-12.
Q.84	Please confirm the detail showing the wall/Roof connection on the Elevator shaft roof @ GL 4 is the detail A-12 (9) because A-08 (1) shows the roofing sloping back towards the sloped roof and If the finish decking is not going to be flush or higher than the top of the parapet it would be better suited for a dead valley detail with a cricket and two through wall scuppers.
A.84	Elevator roof is to be as shown in detail 9/A-12.
Q.85	*(not used)*
A.85	
Q.86	On page A-12 (2) it shows the drain detail along GL "A" this detail will be problematic at the least. can we confirm this is how they want it detailed, it would seem better suited to taper the insulation right at the outer edge of the exterior wall add some roofing board & run the membrane up the roof approx.' 36" and continue the torch on membrane up and over the

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	"wooden box" right down to the eave monolithically covering the uninsulated portion of the roof overhang.
A.85	Please bid the project as shown. Design modifications may be considered after contract is awarded.
Q.85	On page A-12 (4) the stair 2 @ roof -entrance the high edge detail shows an area where the cladding meets the sloped roofing and is completely unsupported can we get clarification on this detail on how they plan to attach the perimeter flashings.
A.85	Cladding is attached to z-girts.
Q.86	On page A-12 (8) are we to be including blocking or "C" channel at the rakes and perimeters as none is indicated in the detail therefore the attachment of the flashing would solely be depending on the crimp were it folds onto the upturned panel w/ fasteners into the facia along GL 7, the insulation would also be unsupported at the rake edges in this case.
A.86	Design modification may be considered after contract is awarded.
Q.87	Metal Siding - Wall types E2,E3 & E3A indicate 25mm corrugated cladding. Can we confirm this is the correct size ? as the commonly used 7/8ths cladding is 22.225 mm. Specs do not indicate acceptable product just a component could we get clarification on the panel type?
A.87	22.225mm cladding is acceptable in lieu of 25mm cladding if it meets all other design criteria.
Q.88	Soffits - Please confirm the soffits are to be vinyl along GL "H" also that soffits are to be Perforated metal along GL "A" If so what metal type? Steel or aluminum"
A.88	All soffits are to be aluminum.
Q.89	We would like to request our NRSM SS 150 panel be added to the list of acceptable roofing panels if possible. Product information is attached for your review.
A.89	Contractors may use any material that meets the specified requirements.
Q.90	Please confirm if fence requires bottom rail or bottom wire? Specifications mention both.
A.90	Fencing requires bottom rail.
Q.91	Please if driveway gate is ground rolling or double swing? Drawing C03 shows double swing, specifications mention rolling.
A.91	Gate shall be double swing.
Q.92	*(not used)*
A.92	
Q.93	Confirmation if fence requires barb wire? If so, detail needed due to welded top rail.
A.93	Fence does not require barbed wire.
Q.94	Is insulation required for the cold water pipe located outdoors in the ramp and concrete float shown on P-04?
A.94	No, The water pipe to and at the float is not to be insulated.
Q.95	If pipe insulation is required, is weather-proof jacket required for the insulation?
A.95	The water pipe to and at the float is not to be insulated.

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Q.96	Is pipe and duct insulation located above rooms 118, 119, 120, 121, and 122 going to be considered as exposed or concealed insulation?
A.96	All water pipe is per Section 22 05 00 paragraph 2.4. All ductwork is per Section 23 07 13 paragraph 3.3 and are considered “exposed” as they are no in a wall or chase.
Q.97	Is insulation required for supply air ducts that are exposed in spaces that they aren't serving? Examples - supply air ducts on M-02 from RTU-1 and RTU-2 are exposed on the upper floor but aren't serving any spaces on the upper floor.
A.97	Insulation on all ductwork (supply and return) that is exposed in Storage Rm 210, Mezzanine Storage Rm 214 and Boat Maintenance Rm 216 are to be insulated. Insulation is not required on the ductwork in Hallway 4 Rm H201, or Gym Rm. 203.
Q.98	Regarding the structural framing components for Port Hardy Coast Guard. Are the Douglas Fir Posts to be FOHC (free of heart centre) and/or kiln dried?
A.98	Posts are not required to be FOHC but must be dried (air or kiln) to industry standards prior to installation.
Q.99	With regard to the entrance canopy does it have to be constructed in Cedar? The cost is higher and Cedar typically requires more maintenance as it rots easier also it is a softer wood so tends to get damaged easier. From a builders perspective we can use a smaller diameter log that is stronger if we use Douglas Fir. Please advise?
A.99	The entrance canopy is to be constructed of un-faceted Cedar.
Q.100	*(request for approval of alternates)*
A.100	Any products meeting the specified requirements may be used.

HARDY BAY

REM BLOCK C
DISTRICT LOT 2263
PLAN VIP45720

LOT 1
PLAN VIP51510

LOT A
PLAN
VIP70568

BLOCK B
DISTRICT LOT 2263
PLAN VIP45720

LOT 22
PLAN
VIP45348

LOT 23
PLAN
VIP45348

LOT 24
PLAN
VIP45348

LOT 20
PLAN
VIP45348

LOT 21
PLAN
VIP45348

Steel Piling

Steel Piling

Steel Piling

Location of Existing Wharf

Rock Ramp

Rocky Beach

Rocky Beach

Rock Ramp

Rocky Beach

Treed

Treed

Gravel

Gravel

Gravel

Gravel

Gravel

Gravel

Gravel

Ditch

Concrete Pad

Overhang

2 Storey Building

Lockblock Wall (Partially Buried)

Rivers standing out of ground

Bush

Wharehouse

Shared Gravel Drive way

Gravel Road

NATURAL BOUNDARY AS PER PLAN VIP45438

NATURAL BOUNDARY AS PER PLAN VIP45347

UNCONSTRUCTED ROAD

JENSEN COVE ROAD

JENSEN COVE ROAD

SHORE LINE

100 UTM ZONE 9
N: 5619490.839
E: 607503.316
Elev.: 13.427

N

W E

S

Scale 1:500

10 0 10 20 30 40

Stick Graph of Vertical Datums
(Not to Scale)

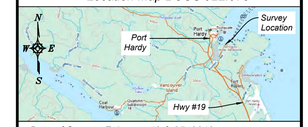
Chart Datum
Height = 2.76m
above CGVD2013(CGG2013a)

Geodetic CGVD2013(CGG2013a)
Height = 0.00m

Geodetic CGVD28(HTv2.0)2010
Height = 0.16m
below CGVD2013(CGG2013a)

Public Services and Procurement Canada / Services publics et Approvisionnement Canada
Geomatics Services
219–800 Burrard St., Vancouver, B.C. V6Z 0B9
604–775–7079

Location Map BCGS 92L.073



Date of Survey: February 13 & 25, 2019

drawing

Canadian Coast Guard
Proposed Jensen Cove Site
Topographic Survey Over
Lots 22 & 23, Plan VIP45348
Port Hardy, BC

drawn	S. M. Kavanagh 2019-02-23
approved	I. R. Robertson 2019-02-24
project number	R.104870.001
drawing no.	SK # 5686.00
GCDocs no.	185424091
survey file no.	SF # 3573.01, Fb#65, Pg 52-60
REVISIONS:	Feb 25, 2019 - Add Wharf & Ramp gone Jun 05, 2019 - Add Vertical Datum stick chart and Hydrographic sounding data

NOTES:

Control Point Datum: NAD83 (CSRS) (2002)
Control Point Vertical Datum: Chart Datum
Control Point Project: UTM Zone 9

Hydrographic:
Vessel: Pacific Echo
Sounder: Reson 7125 Multibeam
Positioning: POSMV - Post Processed GPS
Scanner: ILRIS
Date of Survey: May 13 & 14, 2019

Spot elevations and contours are shown above or below Chart Datum as per Monument 98C9101.

Contour Interval = 2m
All Coordinates have been Scaled to Ground

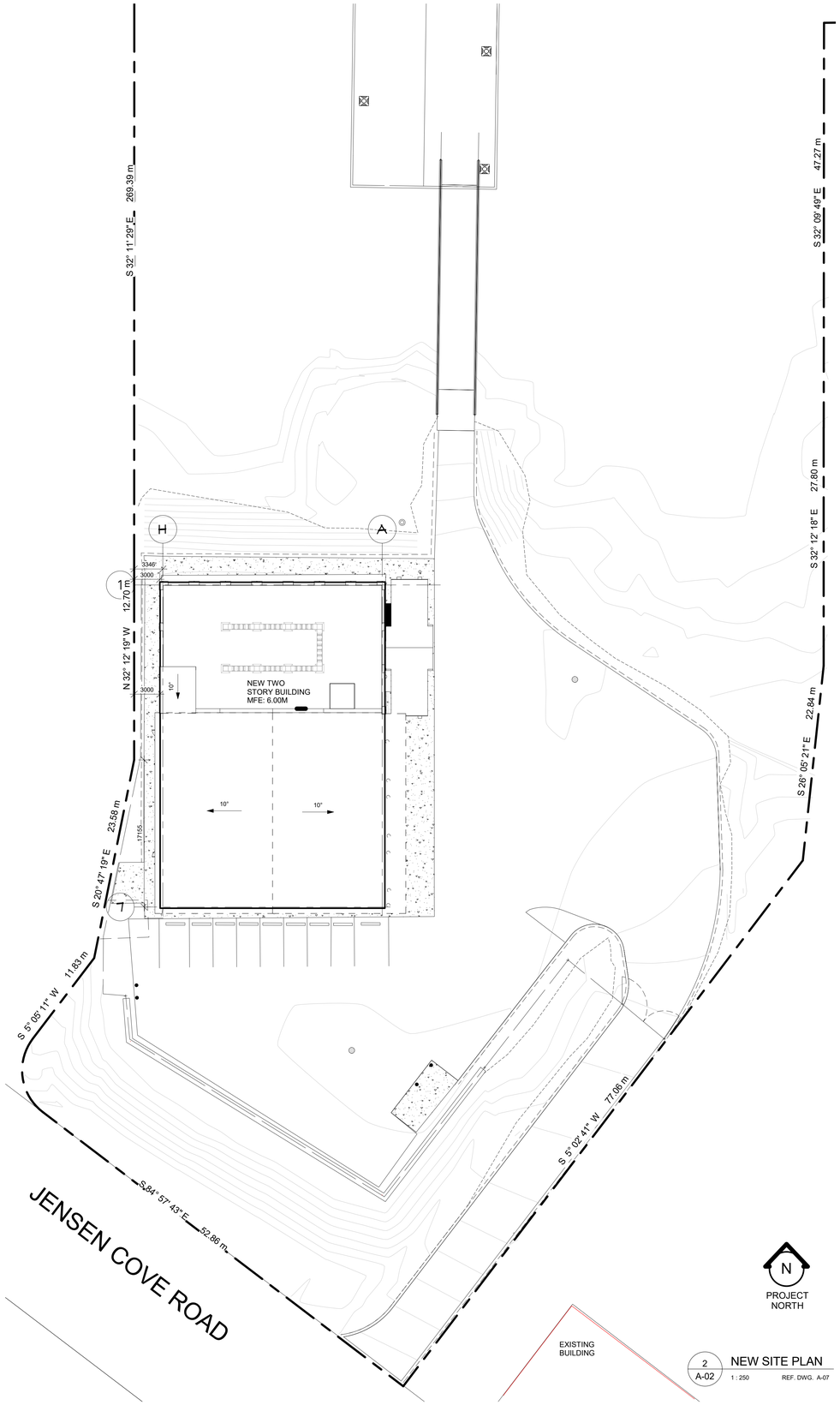
This plan lies within the Mount Waddington Regional District

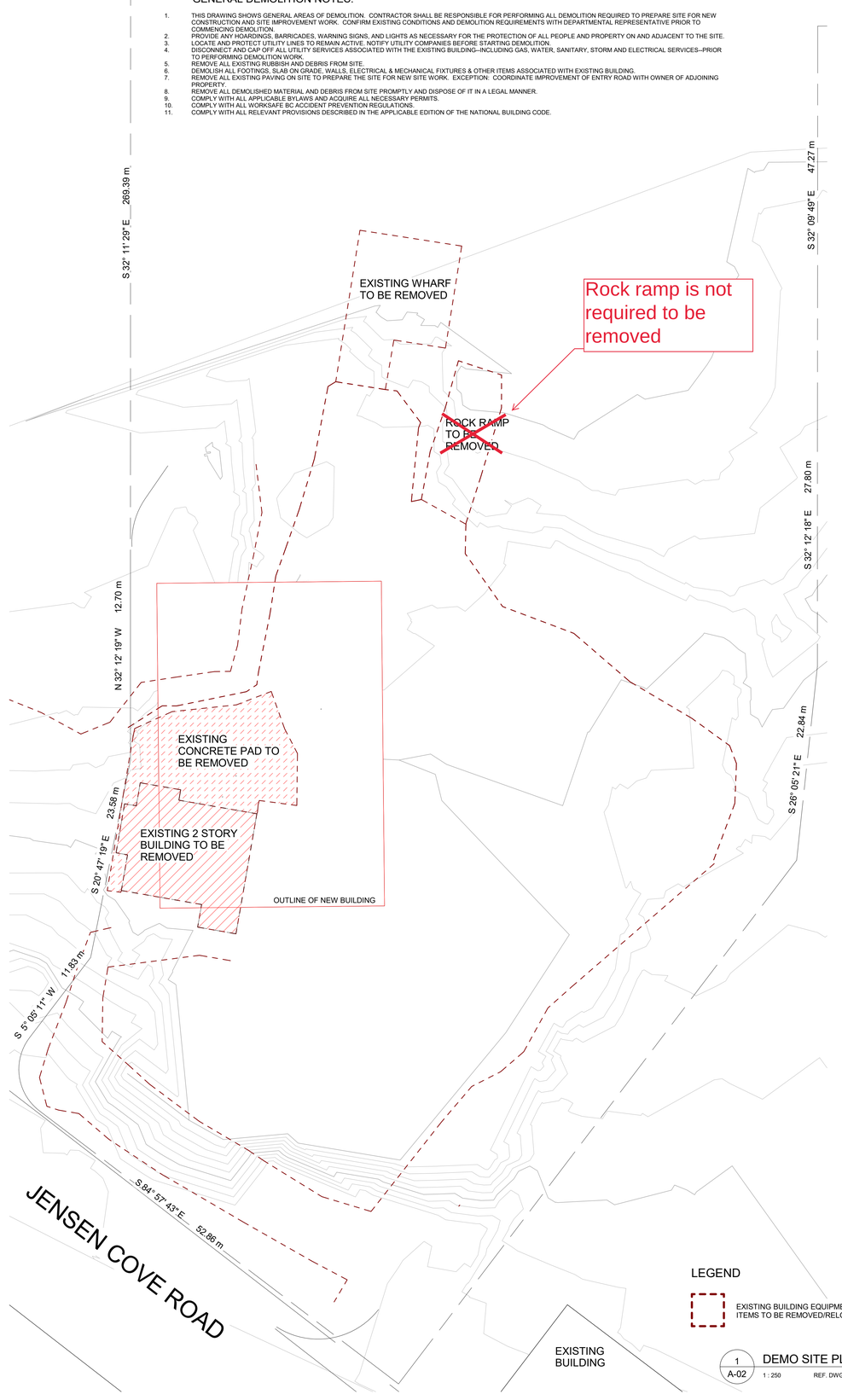
Legend:

- DENOTES IRON PIN FOUND
- DENOTES CONTROL SPIKE
- DENOTES CAPPED POST
- DENOTES POWER POLE
- DENOTES GUY WIRE
- DENOTES CONCRETE
- DENOTES WATER VALVE
- DENOTES FIRE HYDRANT
- DENOTES TREE/BUSH LINE
- DENOTES OVERHEAD POWER LINE
- DENOTES MAJOR CONTOUR 10M
- DENOTES MINOR CONTOUR 2M
- DENOTES BUILDING
- DENOTES RAMP MADE OF ROCK
- DENOTES SMALL DITCH
- DENOTES GRAVEL ROAD
- DENOTES SUMP
- DENOTES STEEL PILING
- DENOTES AREA COVERED BY WATER
- +0.00 DENOTES SPOT ELEVATION REFERRING TO CHART DATUM
- 0.00 DENOTES CONTOUR ELEVATION REFERRING TO CHART DATUM

GENERAL DEMOLITION NOTES:

1. THIS DRAWING SHOWS GENERAL AREAS OF DEMOLITION. CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING ALL DEMOLITION REQUIRED TO PREPARE SITE FOR NEW CONSTRUCTION AND SITE IMPROVEMENT WORK. CONFIRM EXISTING CONDITIONS AND DEMOLITION REQUIREMENTS WITH DEPARTMENTAL REPRESENTATIVE PRIOR TO COMMENCING DEMOLITION.
2. PROVIDE ANY HOARDINGS, BARRICADES, WARNING SIGNS, AND LIGHTS AS NECESSARY FOR THE PROTECTION OF ALL PEOPLE AND PROPERTY ON AND ADJACENT TO THE SITE.
3. LOCATE AND PROTECT UTILITY LINES TO REMAIN ACTIVE. NOTIFY UTILITY COMPANIES BEFORE STARTING DEMOLITION.
4. DISCONNECT AND CAP OFF ALL UTILITY SERVICES ASSOCIATED WITH THE EXISTING BUILDING--INCLUDING GAS, WATER, SANITARY, STORM AND ELECTRICAL SERVICES--PRIOR TO PERFORMING DEMOLITION WORK.
5. REMOVE ALL EXISTING RUBBISH AND DEBRIS FROM SITE.
6. DEMOLISH ALL FOOTINGS, SLAB ON GRADE, WALLS, ELECTRICAL & MECHANICAL FIXTURES & OTHER ITEMS ASSOCIATED WITH EXISTING BUILDING.
7. REMOVE ALL EXISTING PAVING ON SITE TO PREPARE THE SITE FOR NEW SITE WORK. EXCEPTION: COORDINATE IMPROVEMENT OF ENTRY ROAD WITH OWNER OF ADJOINING PROPERTY.
8. REMOVE ALL DEMOLISHED MATERIAL AND DEBRIS FROM SITE PROMPTLY AND DISPOSE OF IT IN A LEGAL MANNER.
9. COMPLY WITH ALL APPLICABLE BYLAWS AND ACQUIRE ALL NECESSARY PERMITS.
10. COMPLY WITH ALL WORKSAFE BC ACCIDENT PREVENTION REGULATIONS.
11. COMPLY WITH ALL RELEVANT PROVISIONS DESCRIBED IN THE APPLICABLE EDITION OF THE NATIONAL BUILDING CODE.





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REAL PROPERTY SERVICES
Pacific Region
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Region de Pacifique

CHERNOFF THOMPSON ARCHITECTS

REGISTERED ARCHITECT NAOMI K. CHERNOFF BRITISH COLUMBIA

Revision/ Revision	Description/Description	Date/Date
0	Issued for Tender	2020-01-20

Client/client

FISHERIES AND OCEANS CANADA - CANADIAN COAST GUARD

Project title/Titre du projet

6270 Jensen Cove Rd
Port Hardy, BC
V0N 2P0

PORT HARDY LOGISTICS DEPOT

Consultant Signature Box Only
-

Designed by/Concept par
N.G

Drawn by/Dessine par
A.A

PWGSC Project Manager/Administrateur de Projets TPSGC
Don Storry

PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC
-

Drawing title/Titre du dessin

DEMO SITE PLAN & NEW SITE PLAN

1 : 250

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
8H500 DATE 02/04/16	**A-02**	**0**

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PWGSC — 8.1 — 1000X707
0 10 20 30 40 50 60 70 80 90 100mm

HEROLD ENGINEERING

Addendum

DATE: June 8, 2020 **PROJECT No.:** 1691-017

PROJECT NAME:
New Operations Centre
Coast Guard Project - Port Hardy

Attn: Eric Douglas
Chernoff Thompson Architects
1075 W Georgia St.
Vancouver, BC
V6E 3C9

From: Jimmy Valliere

Pages Following

SAD-2

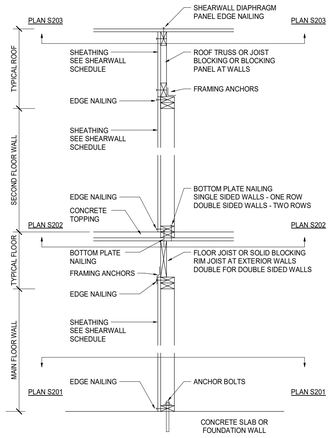
1. *This Addendum shall be read in conjunction with and considered as an integral part of the Contract Documents; revisions supersede the information contained in the original drawings, specifications or previously issued Addendum.*
2. *Tender Price submitted shall include all items of this Addendum.*
3. *No consideration will be allowed for any extras due to any bidder not being familiar with the contents of this Addendum.*

Addendum Information

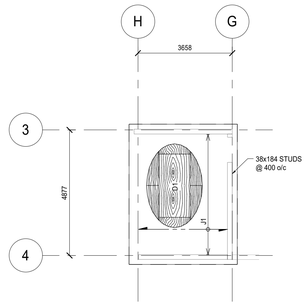
- Changed the depth of girder truss on GL D+.
- Added detail for achieving overhang on GL 7.
- Added embedment depths to hold-down/tie-down schedules.

Per: James Valliere
Jimmy Valliere

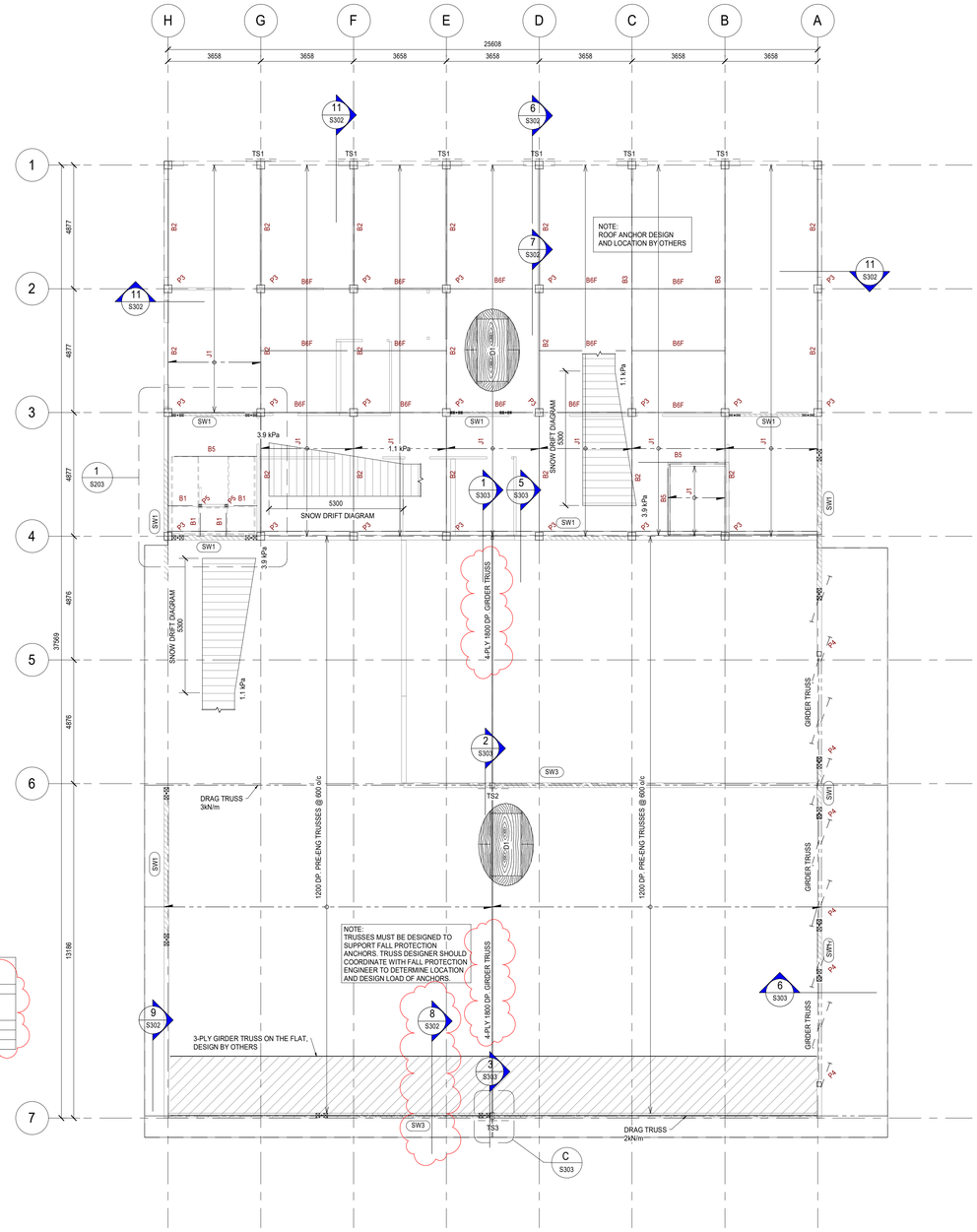
CC:



SHEARWALL / BEARING WALL KEY SECTION
NTS



1 S203 PENTHOUSE ROOF FRAMING PLAN
1 : 100



ROOF FRAMING PLAN
1 : 100

NOTE:
THESE PLANS HAVE BEEN PREPARED FROM ARCHITECTURAL BASE PLANS. ALL DIMENSIONS ARE TO BE CONFIRMED WITH CURRENT ARCHITECTURAL DRAWINGS AND DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION FOR EVALUATION.

FRAMING NOTES:
- ALL UNLABELED BEAMS TO BE 3-38x235 SPF No. 1/2
- ALL UNLABELLED POSTS TO BE 3-38x89, 3-38x184 OR 3-38x140
- ALL HOLD DOWNS TO HAVE MINIMUM FULL HEIGHT STUDS AS PER HOLD DOWN SCHEDULE
- DO NOT NOTCH OR CUT STAIR STRINGERS
- DO NOT DRILL, NOTCH OR CUT TJI's EXCEPT AS ALLOWED BY MANUFACTURER
- ALL SHEAR WALLS TO HAVE MINIMUM DOUBLE BOTTOM PLATES
- ALL DISCONTINUOUS WALLS ABOVE PARALLEL TO FRAMING TO HAVE MIN DOUBLE JOIST BELOW
- ALL DISCONTINUOUS WALLS ABOVE PERPENDICULAR TO FRAMING TO BE FULLY BLOCKED TIGHT BETWEEN JOISTS FOR ENTIRE LENGTH AND WIDTH OF WALL ABOVE

SHEARWALL SCHEDULE

MARK	PLYWOOD	EDGE NAILS	FRAMING ANCHORS	BOTTOM PLATE NAILING	BOTTOM PLATE ANCHOR BOLTS	REMARKS
SW1	13 PLY TWO SIDED	65 @75 O/C	400 O/C E/S	83 @ 65 O/C 2 ROWS	16Ø @ 600 O/C 200 LONG 125 EMBED	
SW2	13 PLY ONE SIDED	65 @150 O/C	300 O/C	83 @ 150 O/C 2 ROWS	16Ø @ 1200 O/C 200 LONG 125 EMBED	
SW3	13 PLY TWO SIDED	65 @150 O/C	400 O/C E/S	83 @ 75 O/C 2 ROWS	16Ø @ 1200 O/C 200 LONG 125 EMBED	

SHEARWALL SCHEDULE NOTES:
1. STUD SIZE AND SPACING AS NOTED ON PLAN

HOLD-DOWN PERFORMANCE SPECIFICATION SCHEDULE

MARK	FACTORED TENSILE RESISTANCE	MAX DEFLECTION OF HOLD-DOWN AT DESIGN LOAD	MIN. FULL-HEIGHT STUDS AT HOLD-DOWN	MIN. ROD EMBED
HD1	25kN	4.0mm	3-38x89	600

JOIST SCHEDULE

MARK	TYPE
J1	241 DP I-JOISTS @ 400 o/c

TIE-DOWN PERFORMANCE SPECIFICATION SCHEDULE

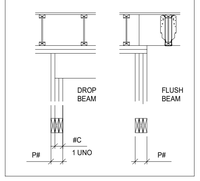
MARK	LEVEL 1		LEVEL 2				
	FACTORED TENSILE RESISTANCE	MAX DEFLECTION OF TAKE-UP DEVICE AT DESIGN LOAD	FACTORED TENSILE RESISTANCE	INCREMENTAL BEARING RESISTANCE	MAX DEFLECTION OF TAKE-UP DEVICE AT DESIGN LOAD	MIN. FULL-HEIGHT STUDS AT TIE-DOWN	MIN. ROD EMBED
HD2	80kN	0.5mm				4-38x184 E/S	600
HD3	100kN	0.5mm	55kN	45kN	0.2mm	5-38x89 E/S or 2-38x184 E/S	600

POST LEGEND

UNLABELLED POSTS: TO BE 3 PLY: 2 FULL HEIGHT STUD & 1 CRIPPLE FOR DROPPED BEAMS

LABELLED POSTS
- P# — SIZE OF POST (SEE SCHEDULE)
- #C — NUMBER OF CRIPPLES (MATCH POST SIZE)

ALL UNLABELLED CRIPPLES ARE 1 PLY



POST SCHEDULE

MARK	SIZE
P1	38x184
P2	38x140
P3	305x305 D.FIR No.1
P4	178x191 SCL
P5	3-38x89

BEAM SCHEDULE

MARK	TYPE
B1	2-38x235
B2	305x406 D.FIR No.1
B3	315x418 GLULAM DFir 20f-EX
B4	4-38x184 (ON THE FLAT)
B5	89x241 SCL
B6	133x241 SCL

STRAP SCHEDULE

MARK	TYPE	LOADING (ULS)
TS1	STRAP TIE	11kN SHORT TERM LOAD
TS2	STRAP TIE	36kN SHORT TERM LOAD
TS3	STRAP TIE	27kN SHORT TERM LOAD
CS1	CONTINUOUS COIL STRAP	11kN SHORT TERM LOAD

PLYWOOD DIAPHRAGM SCHEDULE

LEVEL	DESCRIPTION
D1	12 PLYWOOD SHEATHING (UNBLOCKED) NAILED TO FRAMING MEMBERS W/ 75 NAILS @ 150 O/C AT PANEL EDGES & 300 O/C OVER INTERMEDIATE FRAMING MEMBERS.
D2	38 CONCRETE TOPPING ON 16 PLYWOOD SHEATHING (UNBLOCKED) TO BE NAILED W/ 75 NAILS @ 150 O/C AT PANEL EDGES AND @ 300 O/C @ INTERMEDIATE FRAMING MEMBERS.
D3	38 CONCRETE TOPPING ON 16 PLYWOOD SHEATHING (FULLY BLOCKED) TO BE NAILED W/ 75 NAILS @ 100 O/C AT PANEL EDGES AND @ 300 O/C @ INTERMEDIATE FRAMING MEMBERS.

NOTES: ROOF DIAPHRAGM NAILING AT SHEARWALLS TO MATCH THAT INDICATED FOR EACH SHEARWALL IN THE "EDGE NAILS" SECTION OF THE SHEARWALL FRAMING SCHEDULE. PLYWOOD SHEATHING FACE GRAIN TO BE LAID PERPENDICULAR TO FRAMING MEMBERS.

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Travaux publics et Services gouvernementaux Canada

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CHERNOFF THOMPSON ARCHITECTS

HEROLD ENGINEERING
3701 Shenton Rd. Nanaimo, BC V9T 2H1
T: 250 751 8558 F: 250 751 8559
E: mail@heroldengineering.com

NORTH

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. S. VILLIERE #27410 ENGINEER
2020-06-08

Revision/ Revision	Description/Description	Date/Date
3	ISSUED FOR STRUCTURAL ADDENDUM 2	2020-06-08
2	ISSUED FOR STRUCTURAL ADDENDUM 1	2020-05-25
1	ISSUED FOR TENDER REV.1	2020-03-26
0	ISSUED FOR TENDER	2020-01-20

Client/client

FISHERIES AND OCEANS CANADA - CANADIAN COAST GUARD

Project title/Titre du projet

6270 Jensen Cove Rd
Port Hardy, BC
V0N 2P0

PORT HARDY LOGISTICS DEPOT

Consultant Signature Box Only
-

Designed by/Concept par
JV

Drawn by/Dessine par
LHo

PWGSC Project Manager/Administrateur de Projets TPSGC
-

PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC
-

Drawing title/Titre du dessin

ROOF FRAMING PLAN

1:100

Project No./No. du projet	Sheet/ Feuille	Revision no./ Lo Révision no.
1691-017 DATE 2020-01-20	**S203**	**3**

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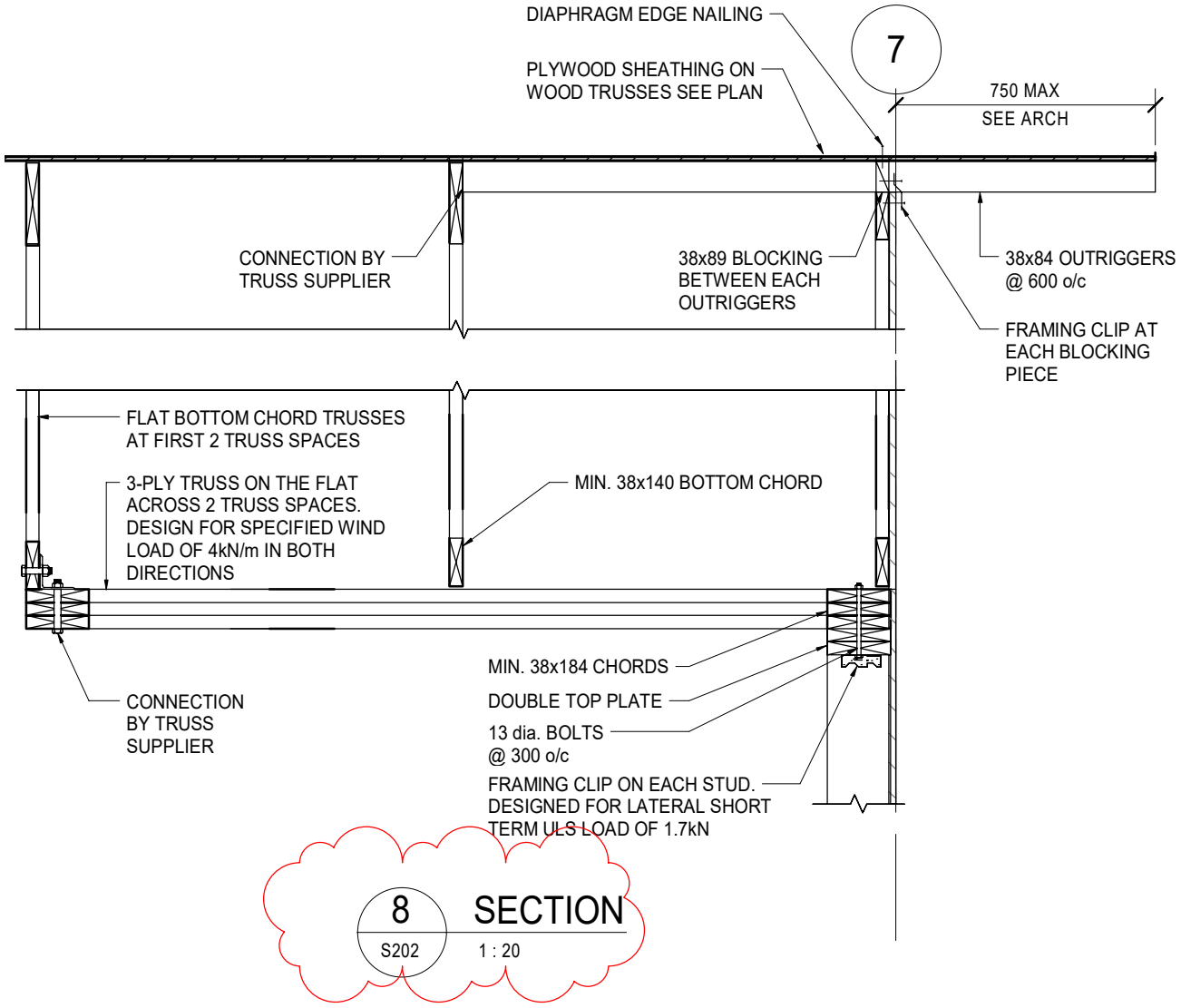

8 SECTION
S202 1 : 20

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. S. VALLIERE
#42410
2020-06-08

HEROLD ENGINEERING
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PORT HARDY LOGISTICS DEPOT
6270 JENSEN COVE ROAD, PORT HARDY, BC V0N 2P0
FISHERIES AND OCEANS CANADA - CANADIAN COAST GUARD

SECTION 8/302

3 - ISSUED FOR STRUCTURAL ADDENDUM 2

PROJECT No.	DESIGNED	DESIGN REVIEW	DRAFTED	DRAFTING REVIEW	SCALE	DRAWING No.	REV.
1691-017	Designer		Author		1 : 20	SSI#02	3

DESTROY ALL DRAWINGS SHOWING PREVIOUS REVISION

Fisheries and Oceans Canada | Pêches et Océans Canada

Modified Phase I Environmental Site Assessment
Jensen Cove Road Depot
Port Hardy, BC

SLR Consulting (Canada) Ltd.

205.03985.00000

Date Issued 09/17/2019

Report Version 2.0

Canada

EXECUTIVE SUMMARY

On behalf of Fisheries and Oceans Canada (DFO), SLR Consulting (Canada) Ltd. (SLR) conducted a Modified Phase I environmental site assessment (ESA) at the Jensen Cove Road Depot in Port Hardy, BC (the site). The Modified Phase I ESA was conducted for due diligence purposes prior to the potential purchase of the site. Soil and sediment samples were collected to establish a baseline assessment. The assessment was completed in conjunction with a geotechnical investigation conducted by Lewkowich Engineering Associates of Nanaimo, BC.

The site is located on Jensen Cove Road approximately 400 metres (m) east of Bear Cove Highway. The site is situated within Jensen Cove, on the east section of Hardy Bay and approximately 1.3 kilometer (km) across from the town center of Port Hardy, BC. The site includes two upland lots and one water lot. The upland area contains a two-storey permanent building structure located on the northwest corner and several vehicles and machinery including two excavators, a 53-foot trailer, a motorhome, two auxiliary trailers, and a shipping container. Three empty drums and a tidy tank were identified in the vicinity of the building. Several of the vehicles were dilapidated and appear to have been non-operational for some time. There was one barge ramp on the water lot. There was no indication of fuel, oil, lubricant or other chemical leaks or spills at the site.

Based on information from DFO, the site is currently used for light industrial purposes, including as a depot for loading of dried concrete and rocks onto barges. The surface of the upland lots was mostly imported geyserite fill underlain in some areas with inferred native sand and silt. Since the fill used at the site is from an unknown source and its quality has not been investigated, the general fill area across the upland lot was considered an area of potential environmental concern (i.e. APEC 1).

The result of the test pitting and stockpile sampling investigation indicated that the fill in APEC 1 had concentrations of arsenic, copper, and selenium greater than the Canadian Council of Ministers of the Environment (CCME) commercial (CL) and industrial (IL) land use guidelines. Based on the identified metal contamination in the fill, APEC 1 was carried forward as area of environmental concern (AEC) 1. The metal contamination in AEC 1 is likely from a non-point fill source and distributed randomly and heterogeneously across the site.

The results of the intertidal and subtidal sediment sampling investigation indicated that the sediment at the site is compliant with the Contaminated Site Regulation (CSR) sediment standards for marine typical use (SedMT). The sediment at the site is not considered and environmental liability.

The results of the Modified Phase I ESA are summarized in the following table.

Table ES-1: Area of Environmental Concern

AEC #	AEC Name	Potential Sources	COC(s) (CCME & CSR)	Potentially Impacted Media / Est Volume (m^3)	Potentially Impacted Properties / Lots	On-Site AEC(s) Moving Off-Site	Off-Site AEC(s) Moving On-Site
1	Upland Fill	Infilling with material from an unknown source and quality. Some related to the stockpiled geyersite fill which exceeds for arsenic, barium and selenium.	Arsenic, barium, chromium, copper, selenium	Soil: ~Site wide to competent bedrock	Site only	Extent of contamination estimated to be limited to the site	No

Notes:
AEC – area of environmental concern
COC – contaminant of concern

As indicated in the site redevelopment plans, the development activities would include excavation of soil and dredging of sediment for the construction of several structures including a building facility and associated utilities as well as a marine dock. SLR recommends contacting a Qualified Environmental Professional (QEP) for involvement and input during the development of the tender specification package and during redevelopment activities.

TABLE OF CONTENTS

LIST OF IN TEXT TABLES

TABLES FOLLOWING TEXT

LIST OF FIGURES

LIST OF APPENDICES

List of Acronyms

AEC ..... area of environmental concern
AIA ..... Archeological Impact Assessment
APEC ..... area of potential environmental concern
BV Labs ..... Bureau Veritas Laboratories
BFD ..... blind field duplicate
BTEX ..... benzene, toluene, ethylbenzene and xylene
CCME ..... Canadian Council of Ministers of the Environment
CL ..... commercial land use
cm ..... centimetre
COC ..... contaminant of concern
CSR ..... Contaminated Sites Regulations
CWS ..... Canada Wide Standard
DFO ..... Fisheries and Oceans Canada
DQO ..... data quality objectives
EMA ..... *Environmental Management Act*
ENV ..... BC Ministry of Environment & Climate Change Strategy
ESA ..... Environmental Site Assessment
FCSI ..... Federal Contaminated Sites Inventory
HASP ..... health and safety plan
HEPH ..... heavy extractable petroleum hydrocarbons
HSVL ..... head space vapour level
IL ..... industrial land use
ISQG ..... Interim Sediment Quality Guideline
km ..... kilometer
LEPH ..... light extractable petroleum hydrocarbons
Lewkowich ..... Lewkowich Engineering Associates
m ..... metres
mbg ..... metres below grade
µg/g ..... micrograms per kilogram
MDL ..... method detection limit
mL ..... millilitre
MTBE ..... methyl tert-butyl ether
Pacificus ..... Biological Services Ltd.
PAH ..... polycyclic aromatic hydrocarbons
PCOC ..... potential contaminant of concern
PHC F1-F4 ..... petroleum hydrocarbons fractions 1 to 4
ppm_V ..... part per million by volume
QA/QC ..... quality assurance/quality control

RPD.....relative percent difference
SARA .....Species at Risk Act
SedMT..... sediment standard, marine or estuarine typical use
SLR ..... SLR Consulting (Canada) Ltd.
Sources..... Sources Archaeological and Heritage Research Inc.
TOR.....Terms of Reference
VPH..... volatile petroleum hydrocarbons

STATEMENT OF QUALIFICATIONS & SIGNATURES

This report was prepared in accordance with the DFO Phase I Environmental Site Assessment Terms of Reference (TOR 2010), and the DFO Phase II Environmental Site Assessment TOR (TOR 2012). The authors and reviewers of this report, Roberto Prieto, M.Sc., P.Ag. and Phyllis Bruleigh, M.S., P.Geo., PMP, have over 25 years of combined experience in the assessment of similar sites.

The SLR project personnel listed here accept professional responsibility for the contents of this report, and can be contacted as follows:

- SLR Consulting (Canada) Ltd., #303-3960 Quadra Street, Victoria, BC V8X 4A3
- Tel: 250-475-9595
- Email: pbruleigh@slrconsulting.com

Prepared by:

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
2723
Roberto Prieto
2019-09-17
P.Ag.

Roberto Prieto, M.Sc., P.Ag.
Environmental Scientist

Reviewed by:

Phyllis Bruleigh, M.S., P.Geo, PMP
Senior Scientist

SECTION 1 • INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Fisheries and Oceans Canada (DFO) and their Ocean Protection Program to complete a Modified Phase I Environmental Site Assessment (ESA) at the Jensen Cove Road Depot in Port Hardy, BC (the site). The Modified Phase I ESA was conducted for due diligence purposes prior to the potential purchase of the site. Soil and sediment samples were collected to establish a baseline assessment. The Modified Phase I ESA was completed in general accordance with the 2010 DFO Phase I ESA TOR and included a soil and sediment sampling investigation conducted in general accordance with the 2012 DFO Phase II ESA TOR.

The site is located on Jensen Cove Road approximately 400 metres (m) east of Bear Cove Highway. The site is situated within Jensen Cove, on the east section of Hardy Bay and approximately 1.3 kilometer (km) across from the town center of Port Hardy, BC. The site is currently used for light industrial purposes, including as a depot for loading of dried concrete and rocks onto barges.

This report summarizes the findings of the Modified Phase I ESA. Photographs taken during the Modified Phase I ESA are included in Appendix A. Soil and sediment analytical results compared to federal guidelines and provincial standards are presented in Tables A to G. A site location map, site plan, and figures illustrating the locations and results of the assessment are included on Figures 1 to 6, following the tables.

1.1 OBJECTIVE

The assessment was conducted to identify actual or potential contamination at the site from past or present site uses and/or activities on adjacent sites. The assessment was completed in conjunction with a geotechnical investigation conducted by Lewkowich Engineering Associates (Lewkowich) of Nanaimo, BC, following an archaeological assessment by Sources Archaeological and Heritage Research Inc. (Sources)

1.2 REGULATORY FRAMEWORK

This Modified Phase I ESA has been completed in general accordance with the Canadian Standards Association Z768-01. In accordance with the applicable guidance, the scope of work for this Modified Phase I ESA included the following tasks:

- Completion of a desktop search of available records on site and within 300 m of the site;
- Confirmation of the proximity of the site to potential receiving surface waters; and
- Completion of a site visit to make visual observations of the following features, where they are relevant to the site:
    - geology, surface soils, hydrogeology, and topography;
    - containers (drums and storage tanks);
    - surface staining of soil and pavement;
    - strong or noxious odours;
    - visible areas of stressed vegetation;
    - sources of surface run-on or run-off; and
    - visible drainage pipes and drainage ditches.

SECTION 2 • MODIFIED PHASE I ESA

2.1 METHODS

2.1.1 Records Review

The following land title information was provided to SLR:

Land Lot:
Legal Description: Lots 22 and 23, Section 31, Township 6, Rupert District, Plan 45348
PIDs: 008-170-762 and 008-179-771

Aquatic Lot:
Legal Description: Lot 1 of District Lot 2263, Rupert District, Plan VIP 51510
PID: 016-857-674

On July 10, 2019, SLR conducted a search for current and historical records for the site on Provincial and Federal databases including iMapBC, BC Water Resource Atlas, BC Conservation Data Centre and the Federal Contaminated Sites Inventory (FCSI). Photographs of the site are included in Appendix A. A summary of the available records is provided in the following table and the search results are included in Appendix B.

Table 1: Records Review Summary

Information	Source or Contact
Topographic maps	iMapBC – Province of British Columbia, 2016.
Geological and soil maps	Surficial Materials of Canada; Fulton, R J. Geological Survey of Canada, "A" Series Map 1880A, 1995.
Water well records	BC Ministry of Environment & Climate Strategy (ENV) Water Resource Atlas.
Fire insurance plans	The site is remote – no fire insurance plans are available.
Previous environmental reports	waterlot agreement dated 2005
Species at Risk Act	BC Conservation Data Centre
Zoning	Schedule B Zoning Map Bylaw No. 1010-2013

2.1.2 Site Visit

SLR and DFO staff completed a site visit on June 25, 2019. SLR was able to access and observe the exterior condition of the site. Observations recorded during the site visit are summarized in the sections below.

2.1.3 Interviews

SLR was unable to obtain contract information for an interview someone with current and historical knowledge of the site. SLR understands that DFO has been in contact with the property owner during potential sale discussions and has the information they require.

SECTION 3 • FINDINGS

3.1 RECORDS REVIEW

3.1.1 Database Review

On July 10, 2019, SLR conducted an ENV records search of the site and surrounding 300 m. No listings were evident for the surrounding properties that might represent a potential offsite source of contamination. The results of the database searches are included in Appendix B.

The nearest property to the site identified in the BC Site Registry was numbered 10793. This property is located at 825 Glenview Road in Port Hardy, approximately 1.1 km west of the site and across Hardy Bay. Since this property has a very low potential to be hydraulically connected to the site, it was not considered a potential offsite source of contamination.

The nearest property to the site identified in the FCSI was numbered 19683. This is a DFO property known as Hardy Bay Inner located approximately 415 m west of the site and within Hardy Bay. The status of the property is shown as “historical review completed, no further action”. Since no further action is required for further assessment at this property, it was not considered a potential offsite source of contamination.

Based on the search of the BC Water Resource Atlas, Point of Diversion 31288 has reportedly been active for domestic purposes since February 2, 1976 at Clyde Creek. The Point of Diversion is located approximately 940 m south and cross gradient of the site. Water wells 114708 and 114709 were also identified by searching the BC Water Resource Atlas. Both wells are located approximately 1.1 km south and cross gradient of the site. Since the Point of Diversion and water wells are located cross gradient, these water resources are likely not hydraulically connected to the site.

SLR conducted a desktop review to identify the potential species-at-risk, Endangered, Threatened or Special Concern under the Species at Risk Act (SARA). Based on the search of the BC Conservation Data Centre database, there were 26 records in the region including six species considered at risk of being lost (extirpated, endangered or threatened). These red species are as follows:

- Northern Goshawk, laingi subspecies;
- Misty Lake "Lake" Stickleback;
- Misty Lake "Stream" Stickleback;
- Wolverine, vancouverensis subspecies;
- Northern Abalone; and
- Haida Gwaii Slug.

Only one record was found within the site; that is, the Keen's Myotis, which is considered a species of special concern.

3.1.2 Current and Historical Land Uses and Activities

According to information from DFO, the site was developed for light industrial purposes, including as a depot for loading of dried concrete and rocks onto barges.

DFO provided SLR with a water lot agreement dated March 21, 2005 between Pan Fish Canada Ltd (assignor) and 444498 BC Ltd (assignee), a copy is in Appendix B. This document stated that Port Hardy Processors Ltd. Inc No. 0426410 and the Province entered into a lease that was subsequently

assigned to the assignor on December 12, 2000. The document also contained the lease information from December 1993 between the Province (lessor) and Port Hardy Processors Ltd. Inc No. 0426410 (lessee). The site plan in 1993 indicated a processing plant in the location of the current permanent building structure. Other noted structures are an office, concrete pad, shed, loading dock, trailer and paved access to the wharf. This drawing also denoted the approximate top of fill line within the waterlot.

3.2 SITE DESCRIPTION

3.2.1 Overview

The site is located within the central section of the district of Port Hardy, BC with zoning M-3 (upland) and W-1 (waterlot): Marine Forest Industrial and Waterfront. The site includes two upland lots and one water lot. The approximate ground cover in the upland areas was comprised of 85% fill, 10% structures, and 5% vegetation next to the structures.

The site had minimal vegetation. The vegetation included small western hemlock and western red alder trees, shrubs, and grass found between the upland and water lot, as well as several larger western hemlock, sitka spruce, and western red alder trees found on the northeast corner of the site. There were no signs of stressed vegetation.

The surface of the upland lots was mostly imported fill (comprised of geyserite), and the surface of the water lot was native sand, gravel, and bedrock. Electricity to the building structure was supplied by an overhead power line. There was one stormwater discharge pipe running from the north side of the building to the water lot west of the barge ramp.

A site location map and site plan are presented on Figures 1 and 2, respectively, following the text.

3.2.2 Legal Description

A legal description of the site is provided in the following table.

Table 2: Property Summary

Common Name	Jensen Cove Road Depot
Civic address	N/A
Legal description	Upland Lots: Lots 22 and 23, Section 31, Township 6, Rupert District, Plan 45348 Water Lot: Lot 1 of District Lot 2263, Rupert District, Plan VIP 51510
PIDs	Upland Lots: 008-170-762 (Lot 22) and 008-179-771 (Lot 23) Water Lot: 016-857-674
Approximate Size	Upland Lots: 8,000 m^2. Water Lot:
Longitude and latitude (approximate)	-127.477405° W, 50.717598° N
UTM (approximate)	Zone 9U: 5619513.86m N, 607486.19m E
Zoning	M3: Marine Forest Industrial & W1: Waterfront

3.2.3 Built Environment

Observations and a summary of facilities and conditions noted during the site visit is provided in the following sections. A plan showing the main areas of the site is presented on Figure 2.

Building Units and Site Subareas

The site contains a two-storey permanent building structure that is located on the northwest corner of the upland lots as well as a barge ramp on the water lot. The building structure has an angled aluminum roof and wood siding. The surface of the area immediately surrounding the building is paved with asphalt. Based on information from DFO, the building is used as a residence and an office for operations of the site. The barge ramp appeared to be operational, but no barge was attached to the ramp at the time of the reconnaissance. Other non-permanent structures identified at the site include a 53-foot trailer, a motorhome, two auxiliary trailers, and a shipping container. The site reconnaissance did not include inspections of the permanent or non-permanent structures as the redevelopment plan includes demolishing and/or disposing these structures.

Heating and Cooling Systems

The site reconnaissance did not include an assessment of the heating or cooling systems at the site. However, it is expected that the building is likely heated with electric baseboards or a forced-air furnace.

Mechanical Equipment

Two excavators were identified at the site that were likely used for loading and/or offloading of barges. Several vehicles including trucks, cars and boats were also identified across the site. Most of the vehicles appeared dilapidated and non-operational. There was no indication of fuel, oil or lubricant spills or leaks from the vehicles and/or machinery.

Storage Tanks

Three empty drums were identified at the site. One of the drums was used for stabilizing the 53-foot trailer. There was no indication of leaks or spills from the drums. There was no evidence of rust, holes, dents or pitting in the drums.

One tidy tank was identified at the site. The tidy tank was situated on pallets that were on the asphalt surface by the building. There was no indication of leaks or spills from the tidy tank. There was no evidence of rust, holes, dents or pitting in the tidy tank.

Wastewater Management

The site reconnaissance did not include an assessment of wastewater management at the site. However, it was understood from DFO that the property is on a septic system and has a permit to discharge to the ocean.

Stormwater Management

There was one stormwater discharge pipe running from the north side of the building to the water lot west of the barge ramp. The site is mostly unpaved; stormwater management occurs through natural infiltration into subsurface soils.

Solid Waste and Recyclables

The site reconnaissance did not include an assessment of solid waste and recyclable management at the site. A pile of treated wood was identified near the barge ramp and several wooden pallets were found adjacent to the building. It is expected that the site is likely serviced by the municipal waste disposal system.

Fill

Most of the upland portion of the site has been infilled with imported geyserite fill, according to the locally based excavator operator contracted by Lewkowich. The operator said the geyserite is from Coal Harbour area and is typically rich in metals. Geyserite is a hard opaline siliceous deposit occurring around geysers and hot springs. A geyserite stockpile was identified in the south section of the site. At the request of DFO, samples from this stockpile were collected and analyzed for metals.

Since the fill used at the site is from an unknown source and its quality has not been investigated, the general fill area across the upland lot is considered an area of potential environmental concern (APEC 1).

3.2.4 Natural Environment

Topography and Surface Drainage

The site is situated on the central portion of Port Hardy and approximately at sea level. The terrain at the site has a moderate upward slope from the shoreline to the upland portion. The upland portion is relatively flat with some geyserite piles in the south section of the site. Surface drainage is inferred to follow the local topography being directed toward the Pacific Ocean located north of the site. Most of the site is unpaved and infilled with geyserite; therefore, surface drainage likely occurs via runoff and/or infiltration to groundwater.

Surface Water

The site is located adjacent to and within the Pacific Ocean. There was no freshwater observed at the site.

Soil Type

Based on the site reconnaissance, the upland section of the site has undergone significant infilling with geyserite. Shallow bedrock was observed in the foreshore area.

Based on the map *Surficial Materials of Canada* (R.J. Fulton, 1995), the surficial geology of the site is composed of Undivided (R): rock with minor Quaternary deposits.

Groundwater

The site is in an area with shallow bedrock and bedrock outcrops. Groundwater at the site is inferred to be found in a bedrock aquifer. Regional groundwater is inferred to follow the local topography and flow from the south of the site toward the south and into the Pacific Ocean at Hardy Bay.

3.2.5 Areas of Potential Environmental Concern

One onsite APEC was identified during the record review and/or site reconnaissance. The APEC and its associated potential contaminants of concern (PCOCs) are summarized in the following table and shown on Figure 2.

Table 3: Areas of Potential Environmental Concern

APEC #	APEC Name	Potential Sources	PCOC(s)	Potentially Impacted Media
1	Upland Fill	Infilling with material from an unknown source and quality	BTEX PHC (F1-F4) PAH Metals	Soil

Notes:
APEC – area of potential environmental concern
BTEX – benzene, toluene, ethylbenzene and xylene
PCOC – potential contaminant of concern
PAH – polycyclic aromatic hydrocarbons
PHC F1-F4 – petroleum hydrocarbons fraction 1 to 4

3.2.6 Potential Third Party Sources of Contamination

No third-party sources of contamination were identified.

SECTION 4 • PH II ESA-REGULATORY

There is no restricted access to the site, which is used for light industrial activities; therefore, the soil analytical results were compared to the Canadian Council of Ministers of the Environment (CCME) commercial land use (CL) and industrial land use (IL) guidelines. The BC Contaminated Sites Regulation (CSR) CL and IL soil standards are inferred to apply.

Sediment analytical results were compared to the CCME sediment quality guidelines and the CSR Schedule 3.4 sediment standards.

4.1 SITE-SPECIFIC FACTORS

SLR considered the following site-specific factors relevant to the selection of applicable environmental quality guidelines and standards for the samples collected within the site:

- The site is situated on provincial land, but the potential purchase of the site would make it federal land; therefore, both the provincial and federal regulatory criteria were applied. However, the figures showing analytical results were compared to federal guidelines in anticipation of this being federally owned;
- The site is currently used for light industrial purposes including for loading/unloading dried concrete and rock off barges;
- It is anticipated that the future use of the site would be for a commercial facility as an emergency response centre;
- The water lot section of the site is located below the high-water mark and within the marine environment;
- Most of the soils at the site were identified as coarse-grained; however, of those analyzed for grain size, one sample consisted of fine-grained soil; and
- Potential contaminants of concern may include benzene, toluene, ethylbenzene and xylene (BTEX); styrene; methyl tert-butyl ether (MTBE); volatile petroleum hydrocarbons (VPH); petroleum hydrocarbon fractions 1 to 4 (PHC F1-F4); light and heavy extractable petroleum hydrocarbons (LEPH/HEPH); polycyclic aromatic hydrocarbons (PAH), and metals.

4.2 APPLICABLE FEDERAL GUIDELINES

The following federal guidelines have been applied to soil at the site based on current land use:

- CCME Canadian Soil Quality Guidelines, CL and IL for metals;
- CCME Canadian Soil Quality Guidelines, CL and IL for PAH:
    - Environmental Health Guidelines – Soil Contact, Soil and Food Ingestion, Interim Soil Quality Criteria, Environmental Health.
    - Human Health Guidelines – Direct Contact.
- CCME Canadian Wide Standards (CWS) for petroleum hydrocarbons in soil, Tier 1 Levels for PHC F1-F4 for CL and IL, coarse- and fine-grained surface soil:
    - Management Limit, Eco Soil Contact, Human Health, Protection of Groundwater for Aquatic Life, Vapour Inhalation, and Direct Contact.

The following federal guidelines have been applied to sediment at the site based on current site conditions:

- CCME Sediment Quality Guidelines, Interim Sediment Quality Guideline (ISQG) for marine sediments. For Federal Contaminated Sites Action Plan Aquatic Sites Classification System ASCS scoring to help prioritize sites and determine funding eligibility, if necessary.

4.3 APPLICABLE PROVINCIAL STANDARDS

The CSR under the *Environmental Management Act* (EMA) is the principal regulatory document defining requirements for contaminated sites management in British Columbia. The CSR came into effect on April 1, 1997, and was amended most recently on October 31, 2017, enabling new standards and processes that came into effect November 1, 2017. The Hazardous Waste Regulation may also apply where contaminated media are transported and managed or disposed of offsite. Director's interim standards under section 63.1 of EMA and protocols under section 64 of EMA are also legally binding.

The EMA and CSR have provisions for incorporating both numerical and risk-based standards approaches to managing site contamination. The legislation outlines the procedures for site assessment, remediation and application for environmental closure for a property. Numerical standards are an essential component of the requirements in the CSR, as they define whether a site is contaminated or has been satisfactorily remediated when the numerical standards approach has been used.

Technical Guidance, Administrative Guidance, Procedure and Policy documents, and website Questions and Answers[1] issued by the BC Ministry of Environment & Climate Change Strategy (ENV) clarify the interpretation of regulatory standards and requirements and provide information regarding their application. Provisions in these documents are not legally binding but indicate the expectations of the ENV.

4.3.1 Soil Standards

Numerical standards for investigating and remediating soils are presented in CSR Schedule 3.1, which is divided into matrix standards and generic numerical standards as described in the following paragraphs.

Matrix Numerical Soil Standards are presented in Part 1 of Schedule 3.1 for a subset of inorganic and organic substances, where they are based on both land use and exposure pathways. Matrix standards are presented for eight classes of land use: Wildlands – Natural (WLn), Wildlands – Reverted, Agricultural, Urban Park, Residential – Low Density, Residential – High Density, Commercial, and Industrial. Several mandatory and potentially applicable site-specific factors are used to indicate potential exposure to contaminants and to define applicable standards. Mandatory site-specific factors under CSR section 12(8) include: human intake of contaminated soil; and, toxicity to soil invertebrates and plants. Commonly applicable site-specific factors include "groundwater used for drinking water", and "groundwater flow to surface water used by aquatic life (freshwater or marine)".

Generic Numerical Soil Standards for a variety of inorganic and organic substances are presented in Parts 2 and 3 of Schedule 3.1, which are protective of human health and ecological health, respectively. As with the matrix standards, the generic numerical standards are listed under the same eight classes of land use.

[1] See the BC ENV website at: http://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources

Based on the current and reasonable potential future land use as outlined in Section 12 of the CSR, the IL and CL soil standards are considered to apply, including the following:

- Matrix Numerical Soil Standards for the mandatory site-specific factors: human intake of contaminated soil; and, toxicity to soil invertebrates and plants (CSR Schedule 3.1, Part 1);
- Matrix Numerical Soil Standards for the site-specific factors protection of groundwater used for drinking water (DW) and groundwater flow to surface water used by freshwater and marine aquatic life (AWm) (CSR Schedule 3.1 Part 1); and
- Generic Numerical Soil Standards (CSR Schedule 3.1) to protect human health (Part 2) and ecological health (Part 3).

4.3.2 Sediment Standards

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 and marine or estuarine sediments. These standards are abbreviated as SedFT and SedMT for typical freshwater and marine/estuarine sediments; SedFT and SedMT for typical freshwater and marine/estuarine sediments. According to the DFO Phase II Terms of Reference (2012), the CSR typical criteria should be used because of the marinas, docks, wharves and associated infrastructure located within their sites.

Provision exists in the CSR (section 11(3)) for considering background concentrations for sediments. Requirements for determining background sediment quality have not been specified in a Protocol, so using alternative numerical concentrations to those prescribed in Schedule 3.4 of the CSR is not currently possible.

For the purposes of this report, the CSR SedMS standards were applied.

4.3.3 Background Concentrations

Provision exists in Section 11(3) of the CSR for considering background concentration standards for soils. Requirements have been specified in ENV Protocol 4 for Contaminated Sites – *Determining Background Soil Quality* for using local and regional background soils concentrations as an alternative to the numerical standards prescribed in the CSR. The Protocol 4 concentrations for Region 1 apply at the site, which includes concentrations for chromium of 65 micrograms per kilogram (µg/g), cobalt of 30 µg/g, copper of 100 µg/g, selenium of 4 µg/g and vanadium of 200 µg/g.

SECTION 5 • PH II ESA-METHODS

5.1 PHASE II ESA PLANNING

5.1.1 Site Review – Boundaries, Investigation Areas

Test pit locations were selected based on geotechnical considerations, during which SLR collected opportunist soil samples for characterization of the fill while the test pits were open.

The intertidal locations were selected to get representative cover within the water lot and covering the upgradient property. The subtidal locations were focused around the wharf structure and resulted in some of the locations being just outside the waterlot property lines. Sample locations were selected in coordination with DFO to establish a baseline of soil and sediment quality at the site. The approximate locations of the test pit and sediment samples are shown on Figure 3.

5.1.2 Health & Safety

The Phase II ESA field work was conducted in conjunction with a geotechnical test pitting investigation directed by Lewkowich, who was prime contractor for that portion of the work. The sediment sampling investigation was directed by SLR.

The Phase II ESA field work was completed according to SLR's Health and Safety program. A site-specific health and safety plan (HASP) was prepared by SLR and reviewed prior to commencing the field work. The HASP included policies and procedures to protect workers from potential hazards posed by site activities, and for project personnel organization, personal protective equipment, site control, and decontamination procedures. The HASP also included a contingency plan that identified emergency contact names, numbers, procedures, and the location of the nearest emergency medical facilities.

In addition, SLR field supervisors and the project manager used behaviour-based health and safety tools including safety observations and last-minute risk assessment verifications to assess and monitor job safety.

5.2 FIELD INVESTIGATION

On June 19 and 20, 2019, an Archeological Impact Assessment (AIA) was completed by Sources of Vancouver, BC. The AIA was conducted with a BC Heritage Conservation Act Permit 2019-0132, awarded to Sources. The fieldwork was conducted with the full support and fieldwork participation of the Kwakiutl First Nation, whose territory the study area is located within. SLR was not present for the archaeological assessment. Sources will provide their report to DFO separately from this investigation. Sources findings allowed Lewkowich to conduct the test pitting investigation.

On June 25, 2019 SLR, Lewkowich and Pacificus Biological Services Ltd. (Pacificus) of Port Hardy, BC, accompanied by DFO completed the field investigation. Lewkowich subcontracted a private utility locater to determine locations of potential underground utility corridors. SLR was not present for the private utility locates.

The SLR scope of work was as follows:

- Collection 13 soil samples plus two blind field duplicates (BFDs) within the six test pits that were advanced by Lewkowich and their contracted operator. A seventh test pit encountered

bedrock and approximately 0.2 metres below grade (mbg), no soil sample was collected at this location (TP19-07); Samples were analyzed for BTEX, VPH, styrene, MTBE, LEPH/HEPH, PHC F1-F4, PAH, and metals;
- Collection of two stockpile samples of the geyserite for metals analysis;
- Collection of four intertidal and four subtidal sediment grab samples, plus one BFD, and submission for laboratory analysis of one or more of BTEX, VPH, styrene, MTBE, LEPH/HEPH, PHC F1-F4, PAH, and metals; and
- Completion of reporting requirements.

5.2.1 Test Pitting Investigation

Lewkowich guided the advancement of seven excavator-dug test pits advanced in APEC 1 until competent bedrock was exposed for a geotechnical assessment. SLR collected soil samples from select test pits based on field observations, soil stratigraphy, and DFO guidance. Each soil sample was monitored for head space vapour level (HSVL) using an RKI Eagle II gastechor.

Soil samples were classified according to soil unit, structure, colour, odour and staining, if present. A test pit log that includes sample depths and soil descriptions is presented in Appendix C.

Sample locations were backfilled and hoe-packed with the unused volume of soil after sample collection. Lewkowich collected GPS coordinates of each test pit location.

5.2.2 Stockpile Sampling

SLR collected two characterization samples from the geyserite stockpile located in APEC 1 on the south section of the site. The geyserite stockpile was in an area within the site that was unaffected by site activities and the samples were indicative of the composition of the fill that covers most of the site. Therefore, the stockpile samples were collected to determine the background quality of the geyserite prior to spreading onsite. Each stockpile sample was monitored for HSVL using an RKI Eagle II gastechor.

The stockpile samples were classified according to soil unit, structure, colour, odour and staining, if present. The stockpile sample descriptions are presented in Appendix C. Lewkowich collected GPS coordinates of each stockpile sample.

5.2.3 Sediment Sampling Investigation

SLR staff accompanied by DFO collected four hand-dug intertidal sediment grab samples at four location in the intertidal zone at the site. The subtidal locations were selected based on a grid and using visual reference points. At each location, SLR and DFO identified a location with suitable substrate for the collection of a sediment sample (i.e., an area of softer sediment and not bedrock or boulders). The sediment was collected using a decontaminated stainless-steel trowel and placed in a Ziploc® bag for transport back to the upland portion of the site. The sediment samples were placed in laboratory supplied jars. The HSVL for each sample was recorded from the Ziploc® bag prior to filling the sample jars.

Two Pacificus diving staff collected four subtidal sediment grab samples from four location within the water lot at the site. The field dive crew navigated to each pre-plotted subtidal location using a combination of GPS and visual reference points. Once at each location, the divers entered the water and descended to the seafloor, with one diver carrying in a mesh bag four 250 millilitre (mL) laboratory supplied sample jars. The lids of the jars were opened to prevent breakage from the pressure reduction upon descent. The second diver carried an underwater video camera and collected footage.

Once at the seabed, a suitable location for the collection of sediment samples was visually identified by the divers (i.e., an area of softer sediment and not bedrock). One diver proceeded to fill the four sample jars at each location by submerging the jar into the surface sediment layer to a depth of approximately 10 centimeters (cm) in a "scooping" motion. Once each the jar was full of sediment, the jar was capped closed. Concurrent with the sediment collection at each location, the second diver recorded on a slate the water depth, the primary substrate, and any other pertinent information such as significant macroalgal cover. The recording diver then documented each location by recording a short video clip of the general area and collecting underwater photos. Upon completion of these activities, divers returned to the surface and transferred the sample jars to SLR for processing. SLR decanted and homogenized the sediment in a stainless steel bowl. The sediment lithology was documented prior to filling 125 ml laboratory supplied samples jars. Approximately 300 mL of sediment was then placed in a Ziploc® bag and HSVL was monitored using an Eagle II gastechor.

The sediment sample descriptions are presented in Appendix C. Sample locations were backfilled with the unused volume of sediment after sample collection. Pacificus collected GPS coordinates of each sediment sample location.

5.2.4 Sample Analysis

Sediment and soil samples and completed chain-of-custody forms were submitted to Bureau Veritas Laboratories (BV Labs) of Burnaby, BC, for laboratory analysis of one or more of BTEX, VPH, styrene, MTBE, styrene, LEPH/HEPH, PHC F1-F4 and/or metals.

5.3 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

5.3.1 Field Procedures

QA/QC procedures used during soil and sediment sample collection, handling, identification and shipping included the following:

- Samples were placed directly in the laboratory supplied containers in the field; date and sample identifiers were placed on each jar;
- Samples were stored in an ice-chilled cooler in the field until delivery to the laboratory;
- Equipment and materials that contacted soil or sediment (e.g., trowels, shovels, glass jars) were decontaminated between sample collection to minimize the possibility for cross contamination;
- New nitrile glovers were used for collecting each sample to minimize the potential for cross-contamination;
- Chain-of-custody forms were completed to accompany samples shipped to the laboratory;
- Samples were submitted to and analyzed by the laboratory within the hold times specified by the laboratory to assure reliable results;
- The BFD samples were submitted, satisfying SLR's target ratio of one BFD for every 10 samples collected (1:10); and
- Sample notes are available to DFO upon request and are archived in our Victoria office.

Sampling procedures were conducted in general accordance with the following guidance documents:

- BC ENV Technical Guidance 1 on Contaminated Sites – *Site Characterization and Confirmation Testing* (January, 2009); and
- SLR Standard Field Procedures.

5.3.1.1 Relative Percent Difference

The BFD samples were collected to determine field sampling inconsistencies and to provide and independent check on internal laboratory QA/QC. For this purpose, the relative percent difference (RPD) of the sample and its BFD was calculated. The RPD is defined as the difference of the absolute value of the duplicate results divided by the average of the duplicate results, expressed as a percentage. The RPD values are compared to data quality objectives (DQOs) recommended by the BC Environmental Laboratory Quality Assurance Advisory Committee to the ENV and are presented in SLR's Technical Guidance for the Quality Review of Environmental Analytical Laboratory Data.

The RPD of duplicate analyses was used to evaluate the sample result variability. Analytical error increases near the method detection limit (MDL); therefore, the RPD calculation is not performed unless the concentrations of both samples are greater than five times the MDL. The RPD tables for the Phase II ESA are provided in the analytical tables.

5.3.2 Laboratory QA/QC Program

Samples were analyzed by BV Labs, a laboratory which is accredited by the Canadian Association for Laboratory Accreditation Inc. BV Labs uses methods recognized by the CCME and ENV. As conveyed by the laboratory, method blanks, control standards samples, certified reference material standards, method spikes, replicates, surrogates, and instrument blanks are routinely analyzed as part of their internal QA/QC programs.

The internal laboratory analysis indicated that the replicates were within the acceptable limits for samples analyzed at the site. The results of the laboratory internal quality control replicates can be found within the attached analytical reports included in Appendix D.

SECTION 6 • PHASE II ESA-FINDINGS AND RESULTS

The following sections detail the results of the soil and sediment sampling investigation conducted at the site on June 25, 2019. Analytical results compared to CCME guidelines and CSR standards are detailed in Tables A to H and CCME soil results are summarized on Figure 4A, CSR soil results are summarized on Figure 4B and the CSR sediment results are summarized on Figure 5.

6.1 FIELD OBSERVATIONS, CONDITIONS AND STRATIGRAPHY

6.1.1 Soil

Fifteen soil samples, plus two BFDs, were collected for laboratory analyses from seven test pits advanced in APEC 1 as well as from two samples from a geyserite stockpile located above the retaining wall along Jensen Cove Road in APEC 1. The test pits were advanced to competent bedrock which was encountered from approximately 0.2 to 2.6 mbg, with an average depth to weathered bedrock of 1.6 mbg. Samples were not collected from test pit TP19-07 since bedrock was encountered at 0.2 mbg. Two characterization samples were collected from a geyserite stockpile and analyzed for metals. The approximate volume of this stockpile is 23 cubic metres.

The stratigraphy at each test pit was relatively similar. A layer of weathered bedrock was encountered in most boreholes overlaying the competent bedrock. The weathered bedrock was overlain by brown sand and gravel fill with some boulders and trace silt. The sand was fine to coarse grained and the gravel was angular to subangular. The fill resembled rock rubble and was identified as geyserite. A layer of sand and silt and varying thickness was encountered overlaying the weathered bedrock in test pits TP19-04 and TP19-05. This layer was inferred to potentially represent the native soil at the site. An inferred abandoned septic line was encountered in test pit TP19-02 at approximately 1.4 mbg.

There was no visual or olfactory indication of impacts in the soil samples. The HSVL measured in the soil samples ranged from less than the detection limits to 90 part per million by volume (ppm_V).

Detailed stratigraphy is shown on the test pit logs, included in Appendix C.

6.1.2 Sediment

Four intertidal and four subtidal sediment grab samples, plus one BFD, were collected and submitted for laboratory analyses. The sediment grab samples were collected to a depth of approximately 0.1 mbg.

Intertidal sediment samples were uniformly comprised of grey medium to coarse grained sand with some angular to subangular gravel, shell debris and trace barnacles. Trace wood debris was encountered in intertidal sediment sample SED19-04. The subtidal sediment samples were comprised of dark grey medium to coarse grained sand with some silt, trace gravel, shell debris algae matter. Trace wood debris was encountered in subtidal sediment sample SED19-08.

There was no visual or olfactory indication of impacts in the sediment samples. The HSVL measured in the sediment samples ranged from less than the detection limits to 90 ppm_V.

Detailed stratigraphy is shown on the sediment sampling sheets, included in Appendix C.

6.2 ANALYTICAL RESULTS

The soil analytical results are presented in Tables A to D with comparison to the applicable CCME guidelines and CSR standards. The soil results compared to the CCME guidelines are summarized on Figure 4A and to CSR standards on Figure 4B.

The sediment analytical results are presented in Tables E to H with comparison to the applicable CCME guidelines and CSR standards. The soil results compared to the CSR SedMT standards are summarized on Figure 5.

6.2.1 Soil

Four soil samples collected from three test pits were submitted for analysis of CCME particle size. The results indicated that three samples collected from TP19-03 and TP19-04 (inferred geyserite fill) were considered coarse grained and one sample collected from TP19-05, the inferred native sand and silt was considered fine grained (Table A).

Thirteen soil samples, plus two BFDs, collected from six test pits advanced in APEC 1 were submitted for analyses of BTEX, VPH, styrene, MTBE, PHC, PAH and metals. The stockpile characterization samples were submitted for metals analysis only.

The results indicated that the 13 soil samples, and the two BFDs, had concentrations of BTEX, VPH, styrene, MTBE, PHC, and PAH that were less than the applicable CCME CL and IL guidelines as well as the CSR CL and IL standards.

Ten of the soil samples, and the two BFDs, exhibited pH values outside the CCME CL and IL guideline range of 6.0 – 8.0. Only samples from TP19-02 were within the CCME 6-8 pH range. The rest of the samples had a wide range of pH values from 3.45 to 9.18. Samples outside of the pH range were not flagged as an exceedance.

Every test pit with analyzed soil samples had one or more metal parameter (i.e. arsenic, copper and/or selenium) concentration greater than the CCME CL and IL guidelines except for the sand sample collected at 2.4-3.6 mbg from TP19-05.

In addition, arsenic, barium, chromium, and/or selenium, were greater than the CSR CL and IL standards in soil samples collected from TP19-03 and TP19-06.

The two geyserite stockpile characterization samples had concentrations of selenium that were greater than the CCME CL and IL guideline and the CSR CL and IL standards. These samples also had arsenic and/or barium concentrations greater than the CSR CL and IL standards but less than the CCME CL and IL guidelines.

Several samples collected from the test pits as well as from the stockpile had concentrations of one or more of chromium, cobalt, copper, selenium and/or vanadium that were greater than the CCME CL and IL guidelines and/or the CSR CL and IL standards but were less than the ENV Protocol 4 background estimates for Vancouver Island. These concentrations were not identified as exceedances.

6.2.2 Sediment

Four sediment samples were submitted for analysis of CCME particle size. The results indicated that the samples were considered coarse grained.

Eight grab samples, plus one BFD, were collected from the intertidal and subtidal sediment locations and submitted for analyses of BTEX, VPH, styrene, MTBE, PHC, PAH and metals.

The results indicated that the eight sediment samples, and the BFD, had concentrations of BTEX, VPH, styrene, MTBE and PHC less than the laboratory detection limit. There are no sediment CCME guidelines or CSR standards for these parameters.

The concentrations of PAH constituents in the intertidal sediment samples were less than the CSR SedMT standards and CCME ISQGs guidelines.

The concentrations of PAH constituents in the subtidal sediment samples were less than the CSR SedMT standards The concentrations of one or more of acenaphthylene, acenaphthene, benz(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene, and/or pyrene in the subtidal sediment samples were greater than the marine CCME ISQGs.

The concentrations of metals constituents in the intertidal and subtidal sediment samples were less than the CSR SedMT standards.

The concentrations of one or more of arsenic, cadmium, chromium, copper, and/or lead in the intertidal and subtidal sediment samples were greater than the marine CCME ISQGs.

6.3 QA/QC RESULTS

The results of the RPD calculations are shown in the analytical tables following the text.

6.3.1 Soil

Two soil BFD pairs were submitted to the laboratory for analysis. The results indicated that the RPD values for the soil BFDs were within the DQO.

6.3.2 Sediment

One sediment BFD pair was submitted to the laboratory for analysis. The results indicated that the RPD values for the sediment BFD were within the DQO.

6.3.3 Laboratory

As indicated in the laboratory reports included in Appendix D, the laboratory QA/QC program was met. The method detection limit for dibenz(a,h)anthracene in the sediment samples was (0.02µg/g) greater than the CCME ISQG but less than the CSR SedMT.

The average temperature in three of the four coolers was greater than 10°. The temperature increase is not expected to have impacted the results because the metals to not require samples to be chilled and the hydrocarbon results were generally less than the detection limit and not close to exceeding a guideline or standard.

SECTION 7 • CONCLUSIONS

7.1 ON-SITE CONDITIONS

The result of the test pitting indicated that the fill (including geyserite) in APEC 1 had concentrations of arsenic, copper, and selenium greater than the CCME CL and IL guidelines, based on soil samples from TP19-01, TP19-02, TP19-03, TP19-04 and TP19--06. When results were compared to the CSR CL and IL standards, the only exceedances were of arsenic, barium, chromium and selenium in soil samples from TP19-03 and TP19-06. There were no exceedances of petroleum hydrocarbons or PAHs.

Samples collected from a stockpile of geyserite indicated that the material had selenium concentrations greater than the CCME CL and IL guideline. This indicated that the geyserite fill may have naturally elevated selenium concentrations. The geyserite stockpile has CSR CL and IL exceedances of arsenic, barium and selenium.

Based on the identified metal contamination in the fill, APEC 1 was carried forward as area of environmental concern (AEC) 1 with contaminants of concern (COCs) including arsenic, barium, chromium, copper, and selenium. The metal contamination in AEC 1 is likely from a non-point source and distributed randomly and heterogeneously across the site.

The results of the intertidal and subtidal sediment sampling investigation indicated that the sediment at the site is compliant with the CSR SedMT standards.

The results are summarized in the following table.

Table 4: Area of Environmental Concern

AEC #	AEC Name	Potential Sources	COC(s) (CCME & CSR)	Potentially Impacted Media / Est Volume (m^3)	Potentially Impacted Properties / Lots	On-Site AEC(s) Moving Off-Site	Off-Site AEC(s) Moving On-Site
1	Upland Fill	Infilling with material from an unknown source and quality. Some related to the stockpiled geyersite fill which exceeds for arsenic, barium and selenium.	Arsenic, barium, chromium, copper, selenium	Soil: ~Site wide to competent bedrock	Site only	Extent of contamination estimated to be limited to the site	No

Notes:
AEC – area of environmental concern
COC – contaminant of concern

SECTION 8 • RECOMMENDATIONS

Based on the results of the Modified Phase I ESA, SLR identified one onsite AEC with metal contamination in fill. The metal contamination in AEC 1 is likely from a non-point source and distributed randomly and heterogeneously. Therefore, delineation of the metal contamination in AEC 1 is not recommended.

As indicated in the site redevelopment plans, activities would include excavation of soil and dredging of sediment for the construction of several structures including a building facility and associated utilities as well as a marine dock. SLR recommends contacting a Qualified Environmental Professional for involvement and input during the development of the tender specification package and during redevelopment activities.

SECTION 9 • STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Fisheries and Oceans Canada, hereafter referred to as the "Client". It is intended for the sole and exclusive use of the client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

This report has been prepared for specific application to this site and site conditions existing at the time work for the report was completed. Any conclusions or recommendations made in this report reflect SLR's professional opinion based on limited investigations including: visual observation of the site, surface and subsurface investigation at discrete locations and depths, and laboratory analysis of specific chemical parameters. The results cannot be extended to previous or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters and materials that were not addressed. Substances other than those addressed by the investigation may exist within the site; and substances addressed by the investigation may exist in areas of the site not investigated in concentrations that differ from those reported. SLR does not warranty information from third party sources used in the development of investigations and subsequent reporting.

Nothing in this report is intended to constitute or provide a legal opinion. SLR expresses no warranty to the accuracy of laboratory methodologies and analytical results. SLR makes no representation as to the requirements of compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

SECTION 10 • REFERENCES

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TABLES

TABLE A: SOIL ANALYTICAL RESULTS - PHYSICAL PARAMETERS

				Particle Size		Physical Parameters
				% >75um	% <75um	moisture
				%	%	%
EQL				0.2	0.2	0.6
Field ID	**Depth Range**	**Sampled Date**	**HSVL**			
GEYSER 1		2019-Jun-25	90	-	-	-
GEYSER 2		2019-Jun-25	80	-	-	-
TP19-01	0-1.5	2019-Jun-25	30	-	-	6.2
TP19-02	0-0.5	2019-Jun-25	5	-	-	7.9
	0.6-1	2019-Jun-25	LTDL	-	-	12
	1-1.4	2019-Jun-25	10	-	-	16
TP19-03	0-0.4	2019-Jun-25	LTDL	78.3	21.7	5.5
	0.4-1.4	2019-Jun-25	LTDL	86.8	13.2	6.6
TP19-04	0.9-1.7	2019-Jun-25	LTDL	76.1	23.9	11
			LTDL	-	-	10
	1.7-2.5	2019-Jun-25	LTDL	-	-	14
TP19-05	2.4-3.6	2019-Jun-25	LTDL	36.5	63.5	14
			LTDL	-	-	13
TP19-06	0-0.7	2019-Jun-25	LTDL	-	-	5.9
	0.7-1.9	2019-Jun-25	LTDL	-	-	15

HSVL - head space vapour level
LTDL - less than detection limit

TABLE B: SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

								Petroleum Hydrocarbons													
								benzene	toluene	ethylbenzene	xylene (o)	xylene (m & p)	total xylenes	styrene	methyl tert-butyl ether (MTBE)	VHs6-10	VPHs	EPH10-19	LEPHs	EPH19-32	HEPHs	F1 (C6-C10 less BTEX)	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)
								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
EQL								0.01	0.1	0.02	0.08	0.08	0.08	0.06	0.2	20	20	200	200	200	200	20	20	20	100	100
CCME SoilQG/CWS Tier 1 IL (Coarse Soil)								0.03[#1]	0.37[#1]	0.082[#1]			11[#1]	50								240	240	260	1700	3300
CCME SoilQG/CWS Tier 1 IL (Fine Soil)								0.0068[#2]	0.08[#2]	0.018[#2]			2.4[#2]	50								170	170	230	2500	3600
CCME SoilQG/CWS Tier 1 CL (Coarse Soil)								0.03[#1]	0.37[#1]	0.082[#1]			11[#1]	50								240	240	260	1700	3300
CCME SoilQG/CWS Tier 1 CL (Fine Soil)								0.0068[#2]	0.08[#2]	0.018[#2]			2.4[#2]	50								170	170	230	2500	3600
BC CSR IL h														**1000000**	**20000**		**200**	**2000[#3]**	**2000**	**5000[#3]**	**5000**					
BC CSR IL e														**50**			**200**	**2000[#3]**	**2000**	**5000[#3]**	**5000**					
BC CSR IL dw								**0.035**	**6**	**15**			**6.5**													
BC CSR IL fw								**2.5**	**0.5**	**200**			**20**													
BC CSR IL i								**6500**	**550000**	**700000**			**1000000**													
BC CSR IL m								**6.5**	**200**	**200**			**20**													
BC CSR IL t								**250**	**450**	**650**			**600**													
BC CSR CL h														**50000**	**20000**		**200**	**2000[#3]**	**2000**	**5000[#3]**	**5000**					
BC CSR CL e														**50**			**200**	**2000[#3]**	**2000**	**5000[#3]**	**5000**					
BC CSR CL dw								**0.035**	**6**	**15**			**6.5**													
BC CSR CL fw								**2.5**	**0.5**	**200**			**20**													
BC CSR CL i								**1000**	**20000**	**25000**			**50000**													
BC CSR CL m								**6.5**	**200**	**200**			**20**													
BC CSR CL t								**250**	**450**	**650**			**600**													
Location	**Field ID**	**Sample Depth Range**	**Sampled Date**	**HSVL**																						
TP19-01	TP19-01_0-1.5	0-1.5	2019-Jun-25	90	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	110	110	<10	<10	<10	140	86
TP19-02	TP19-02_0-0.5	0-0.5	2019-Jun-25	80	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	54	110
	TP19-02_0.6-1.0	0.6-1	2019-Jun-25	30	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	78	<50
	TP19-02_1.0-1.4	1-1.4	2019-Jun-25	5	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	63	51
TP19-03	TP19-03_0-0.4	0-0.4	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	TP19-03_0.4-1.4	0.4-1.4	2019-Jun-25	10	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	<50	<50
TP19-04	TP19-04_0.9-1.7	0.9-1.7	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	DUP1			LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	RPD (%)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-
	TP19-04_1.7-2.5	1.7-2.5	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	<50	<50
TP19-05	TP19-05_2.4-3.6	2.4-3.6	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	DUP2			LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	RPD (%)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-
TP19-06	TP19-06_0-0.7	0-0.7	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	110	110	<10	<10	<10	150	68
	TP19-06_0.7-1.9	0.7-1.9	2019-Jun-25	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	200	200	<10	<10	-	-	-

Standards / Guidelines Descriptions:
- CCME SoilQG/CWS Tier 1 IL, CL (Coarse or Fine Soil):CCME Tier 1 Soil Quality Guidelines or Canada-Wide Standards for Petroleum Hydrocarbons in soil for the Protection of Environment and Human Health, Indrustrial (IL) and Commercial (CL) (Coarse or Fine Soil)
- BC CSR IL, CL:BC Contaminated Sites Regulation, Schedule 3.1 Part 1 Numerical Soil Standards, Part 2 Generic Numerical Soil Standards to Protect Human Health, Part 3 Generic Numerical Soil Standards to Protect Ecological Health, Industrial (IL) and Commerical (CL), including:
  - e: Part 3 Generic Numerical Soil Standards to Protect Ecological Health
  - dw: Part 1 Numerical Soil Standards, Groundwater used for drinking water
  - fw:Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Freshwater)
  - i: Part 1 Numerical Soil Standards, Intake of Contaminated Soil
  - m: Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Marine)
  - t: Part 1 Numerical Soil Standards, Toxicity to soil invertebrates and plants

Standards / Guidelines Comments:
#1:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#2:Value for fine soil and ILCR of 1 in 100,000. Higher value for coarse soil.
#3:for screening purposes where PAH not analyzed

Notes:
m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
- formatting of cells indicates exceedances of like-formatted standards
- formatting indicates the least stringent standard/guideline exceeded
- samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
- laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures

BETX - benzene, ethylbenzene, toluene, xylenes
HSVL - headspace vapour level
MTBE - methyl tert-butyl ether
PAHs - polycyclic aromatic hydrocarbons
ppmv - parts per million by volume
EPHs10-19 - extractable petroleum hydrocarbon in soil (nC10-nC19)
LEPHs - Light Extractable Petroleum Hydrocarbons in soil: EPHs10-19 minus PAH compounds: naphthalene and phenanthrene
EPHs19-32 - heavy extractable petroleum hydrocarbons (nC19-nC32)
HEPHs - EPHs19-32 minus PAH compounds: benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene and pyrene
VHsC6-C10 - volatile petroleum hydrocarbons (nC6-nC10)
VPHs - VHC6-C10 minus BETX and styrene
- RPD - relative percent difference
- NC - not calculated
- HSVL - head space vapour level
- LTDL - less than detection limit

TABLE C: SOIL ANALYTICAL RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

				PAHs																										
				acenaphthylene	acenaphthene	acridine	anthracene	benz(a)anthracene	benzo(b)fluoranthene	benzo(b+j)fluoranthenes	benzo(g,h,i)perylene	benzo(j)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 1-	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	quinoline	light molecular weight PAHs	heavy molecular weight PAHs	PAHs (sum of total)	IACR (CCME Lab)	B(a)P TPE (BC CSR)
				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	µg/g	µg/g	µg/g	N/A	µg/g
EQL				0.01	0.01	0.1	0.008	0.04	0.04	0.04	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.1	0.04	0.02	0.02	0.04	0.1	0.1	0.1	0.1	0.2	0.02
CCME SoilQG Tier 1 IL (Coarse Soil)				320[#1]	0.28[#1]		32[#2]	10[#3]	10[#3]				10[#3]	72[#2]		10[#3]	180[#2]	0.25[#1]	10[#3]		0.1	0.04	0.013[#4]	0.046[#4]	100[#3]					1[#5]	
CCME SoilQG Tier 1 IL (Fine Soil)				320[#1]	0.28[#1]		32[#2]	10[#3]	10[#3]				10[#3]	72[#2]		10[#3]	180[#2]	0.25[#1]	10[#3]				0.013[#4]	0.046[#4]	100[#3]					1[#5]	
CCME SoilQG Tier 1 CL (Coarse Soil)				320[#1]	0.28[#1]		32[#2]	10[#3]	10[#3]				10[#3]	72[#2]		10[#3]	180[#2]	0.25[#1]	10[#3]				0.013[#4]	0.046[#4]	100[#3]					1[#5]	
CCME SoilQG Tier 1 CL (Fine Soil)				320[#1]	0.28[#1]		32[#2]	10[#3]	10[#3]				10[#3]	72[#2]		10[#3]	180[#2]	0.25[#1]	10[#3]				0.013[#4]	0.046[#4]	100[#3]					1[#5]	
BC CSR IL h					**15000**			**500**		**500**			**500**		**4500**	**50**		**9500**	**500**	**1000**	**950**			**300000**	**200000**	**10**					**50**
BC CSR IL e								**10**		**10**			**10**			**10**			**10**					**50**	**100**						
BC CSR IL dw																							**100**								
BC CSR IL fw																							**75**								
BC CSR IL i							**1000000**							**50**			**300000**						**150000**								
BC CSR IL m																							**75**								
BC CSR IL t							**30**							**70**			**200**						**20**								
BC CSR CL h					**15000**			**300**		**300**			**300**		**4500**	**30**		**9500**	**300**	**1000**	**950**			**10000**	**7500**	**10**					**30**
BC CSR CL e								**10**		**10**			**10**			**10**			**10**					**50**	**100**						
BC CSR CL dw																							**100**								
BC CSR CL fw																							**75**								
BC CSR CL i							**75000**							**30**			**10000**						**5000**								
BC CSR CL m																							**75**								
BC CSR CL t							**30**							**70**			**200**						**20**								
Location	**Field ID**	**Sample Depth Range**	**Sampled Date**																												
TP19-01	TP19-01_0-1.5	0-1.5	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
TP19-02	TP19-02_0-0.5	0-0.5	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	TP19-02_0.6-1.0	0.6-1	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	TP19-02_1.0-1.4	1-1.4	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
TP19-03	TP19-03_0-0.4	0-0.4	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	TP19-03_0.4-1.4	0.4-1.4	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
TP19-04	TP19-04_0.9-1.7	0.9-1.7	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	DUP1			<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	RPD (%)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	TP19-04_1.7-2.5	1.7-2.5	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
TP19-05	TP19-05_2.4-3.6	2.4-3.6	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	DUP2			<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	RPD (%)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TP19-06	TP19-06_0-0.7	0-0.7	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
	TP19-06_0.7-1.9	0.7-1.9	2019-Jun-25	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024

Standards / Guidelines Descriptions:

- CCME SoilQG Tier 1 IL, CL (Coarse or Fine Soil):CCME Tier 1 Soil Quality Guidelines for the Protection of Environment and Human Health, Indrustrial (IL) and Commercial (CL) (Coarse or Fine Soil)
- BC CSR IL, CL:BC Contaminated Sites Regulation, Schedule 3.1 Part 1 Numerical Soil Standards, Part 2 Generic Numerical Soil Standards to Protect Human Health, Part 3 Generic Numerical Soil Standards to Protect Ecological Health, Industrial (IL) and Commerical (CL), including:
  - e: Part 3 Generic Numerical Soil Standards to Protect Ecological Health
  - dw: Part 1 Numerical Soil Standards, Groundwater used for drinking water
  - fw:Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Freshwater)
  - i: Part 1 Numerical Soil Standards, Intake of Contaminated Soil
  - m: Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Marine)
  - t: Part 1 Numerical Soil Standards, Toxicity to soil invertebrates and plants

Standards / Guidelines Comments:

#1:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#2:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#3:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#4:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#5:For the protection of potable water.

Notes:

m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated

- formatting of cells indicates exceedances of like-formatted standards
- formatting indicates the least stringent standard/guideline exceeded
- samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
- laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures

PAHs - 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:
benz(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

- RPD - relative percent difference
- NC - not calculated

TABLE D: SOIL ANALYTICAL RESULTS - METALS

				pH	Metals																												Inorganics
				pH	aluminum	antimony	arsenic	barium	beryllium	bismuth	boron	cadmium	calcium	chromium (III+VI)	cobalt	copper	iron	lead	lithium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium	tin	tungsten	uranium	vanadium	zinc	zirconium	phosphorus
				pH_Units	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	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
EQL				0	200	0.2	1	0.2	0.4	0.2	2	0.1	200	2	0.6	1	200	0.2	10	0.4	0.1	0.2	1.6	200	1	0.1	200	0.2	0.1	0.2	1	0.1	4	2	1	20
CCME SoilQG Tier 1 IL (Coarse Soil)				6 - 8		40	12	2000	8			22		87	300	91		600			50	40	89		2.9	40			1	300		300	130	410		
CCME SoilQG Tier 1 IL (Fine Soil)				6 - 8		40	12	2000	8			22		87	300	91		600			50	40	89		2.9	40			1	300		300	130	410		
CCME SoilQG Tier 1 CL (Coarse Soil)				6 - 8		40	12	2000	8			22		87	300	91		260			24	40	89		2.9	40			1	300		33	130	410		
CCME SoilQG Tier 1 CL (Fine Soil)				6 - 8		40	12	2000	8			22		87	300	91		260			24	40	89		2.9	40			1	300		33	130	410		
BC CSR IL h					250000	40000					1000000						150000		450						35000		150000		1000000	200					
BC CSR IL e						40																			40			25	300						
BC CSR IL dw							10	350	1 - 2500 *			1 - 70 *		60	25	250 - 100000 *		120 - 8500 *		2000		15	70 - 500 *		1							30	100	200 - 5500 *		
BC CSR IL fw							10	3500	1 - 500 *			1 - 50 *		60	25	75 - 7500 *		200^{99} - 90000^{99} *				650	90 - 9500 *		1							150		150 - 3000 *		
BC CSR IL i							400	1000000	15000			3500		20000	2000	700000		4000		1000000	2000	35000	80000		35000							20000	35000	1000000		
BC CSR IL m							10	1500	85 - 350000 *			1 - 200 *		60	25	75 - 1500 *		120 - 15000 *				650	70 - 500 *		1							150		150 - 200 *		
BC CSR IL t							40	1500	350			75		250	200	300		1000		2000	75	150	250		2							2000	300	450		
BC CSR CL h					250000	1500					50000						150000		450						1500		150000		150000	200					
BC CSR CL e						40																			40			25	300						
BC CSR CL dw							10	350	1 - 2500 *			1 - 70 *		60	25	250 - 100000 *		120 - 8500 *		2000		15	70 - 500 *		1							30	100	200 - 5500 *		
BC CSR CL fw							10	3500	1 - 500 *			1 - 50 *		60	25	75 - 7500 *		200^{99} - 90000^{99} *				650	90 - 9500 *		1							150		150 - 3000 *		
BC CSR CL i							150	50000	500			150		750	75	25000		150		35000	75	1500	3000		1500							750	1500	75000		
BC CSR CL m							10	1500	85 - 350000 *			1 - 200 *		60	25	75 - 1500 *		120 - 15000 *				650	70 - 500 *		1							150		150 - 200 *		
BC CSR CL t							40	1500	350			75		250	200	300		1000		2000	75	150	250		2							2000	300	450		
BC P4 Background Soil - Region 1 Vancouver Island					55,000	4	4	250	0.7		1	0.95		65	30	100	70,000	40		5000	0.15	1	50		4	1		100		4			200	150		
Location	**Field ID**	**Sample Depth Range**	**Sampled Date**																																
GEYSER 1	GEYSER 1		2019-Jun-25	5.03	7400	1.18	9.09	**457**	<0.2	2.21	<1	<0.05	1050	7	2.43	36.8	18,600	48.4	<5	84	0.103	7.54	3.03	<100	**5.32**	<0.05	<100	31	0.118	2.44	<0.5	0.27	23	8.2	3.6	215
GEYSER 2	GEYSER 2		2019-Jun-25	4.56	8340	1.19	**10.5**	**532**	<0.2	2.39	<1	0.054	1310	7.5	2.9	41.2	20,400	54.3	<5	88.1	0.109	8.41	3.26	<100	**5.94**	0.064	<100	35.4	0.168	2.67	<0.5	0.311	25.2	7.5	4.11	272
TP19-01	TP19-01_0-1.5	0-1.5	2019-Jun-25	8.46	26,800	0.43	9.28	77.7	0.3	0.61	4.7	0.32	27,900	27.3	22.4	123	48,700	23.2	<5	802	0.05	1.44	31.8	228	*1 (1)*	0.12	233	42.3	<0.05	1	<0.5	0.275	*143 (1)*	88.6	21.6	433
TP19-02	TP19-02_0-0.5	0-0.5	2019-Jun-25	7.97	28,100	0.16	2.37	52.2	0.28	0.17	4.8	0.198	20,800	41.9	21.8	130	44,200	5.78	6	805	<0.05	0.76	40	336	<0.5	0.054	435	54.7	<0.05	1.02	<0.5	0.257	*136 (1)*	68.6	14	639
	TP19-02_0.6-1.0	0.6-1	2019-Jun-25	7.37	24,700	0.26	3.2	61.3	0.27	0.37	4.4	0.162	16,400	42.3	19.4	161	41,400	10.4	5.9	720	0.054	1.27	36.5	299	0.83	0.108	432	44	<0.05	1.75	<0.5	0.334	*131 (1)*	67.5	10.8	753
	TP19-02_1.0-1.4	1-1.4	2019-Jun-25	6.98	26,500	0.21	2.22	41.6	0.29	0.15	4.8	0.193	20,500	48.2	21.6	112	44,800	7.36	5.7	776	<0.05	0.7	38.5	267	<0.5	0.074	583	44.8	<0.05	1.42	<0.5	0.302	*139 (1)*	72.2	13.7	683
TP19-03	TP19-03_0-0.4	0-0.4	2019-Jun-25	3.45	7180	2.02	**16.6**	227	<0.2	2.34	<1	<0.05	1310	5.5	2.91	33.3	17,000	25	<5	67.6	0.236	4.77	3.52	<100	**6.69**	0.128	<100	23.9	0.359	2.18	<0.5	0.202	17.4	10.7	4.09	146
	TP19-03_0.4-1.4	0.4-1.4	2019-Jun-25	8.18	35,200	0.16	1.36	142	0.32	0.37	5.5	0.088	38,300	**66.6**	*28.4 (1)*	69.1	52,400	5.66	<5	1270	<0.05	0.87	54.5	463	0.64	0.118	216	79.5	<0.05	0.82	<0.5	0.152	*153 (1)*	67.1	15.3	359
TP19-04	TP19-04_0.9-1.7	0.9-1.7	2019-Jun-25	8.97	20,200	<0.1	2.64	32.7	0.21	<0.1	5	0.145	17,700	49.7	18.8	64.1	38,200	1.46	<5	609	<0.05	0.32	37	394	<0.5	<0.05	579	45.4	0.05	0.4	<0.5	0.19	*115 (1)*	46	10.5	422
	DUP1			9.01	19,300	<0.1	1.29	30.4	0.21	<0.1	4.9	0.065	15,800	47.5	18.3	66.6	36,900	1.26	<5	575	<0.05	0.22	35.2	352	<0.5	<0.05	526	46.2	<0.05	0.34	<0.5	0.175	*106 (1)*	44	8.9	406
	RPD (%)			0.1%	1%	NC	NC	2%	NC	NC	1%	19%	3%	1%	1%	1%	4%	4%	NC	1%	NC	9%	1%	3%	NC	NC	2%	0.4%	NC	4%	NC	2%	2%	1%	4%	1%
	TP19-04_1.7-2.5	1.7-2.5	2019-Jun-25	9.18	24,000	0.11	1.67	43.3	0.24	<0.1	6.1	0.078	23,000	*63.4 (1)*	21.9	130	42,900	1.92	<5	970	<0.05	0.29	42.3	449	<0.5	<0.05	580	46.5	<0.05	0.54	<0.5	0.228	*125 (1)*	57.2	9.05	341
TP19-05	TP19-05_2.4-3.6	2.4-3.6	2019-Jun-25	9.03	14,800	0.13	2.25	28.8	0.24	<0.1	5.2	0.064	15,800	24.5	9.92	38.4	26,500	1.77	5.1	349	<0.05	0.39	18.5	584	<0.5	<0.05	698	50.9	<0.05	0.37	<0.5	0.361	92	31.2	10.8	585
	DUP2			8.97	15,100	0.12	2.27	30	<0.2	<0.1	4.8	0.075	16,200	24.4	9.57	37.9	26,300	1.64	<5	339	<0.05	0.28	18.5	573	<0.5	<0.05	697	49.9	<0.05	0.33	<0.5	0.299	90.9	31.2	10.6	573
	RPD (%)			0.2%	1%	NC	NC	1%	NC	NC	2%	4%	1%	0.1%	1%	0.3%	0.2%	2%	NC	1%	NC	8%	0%	0.5%	NC	NC	0%	0.5%	NC	3%	NC	5%	0.3%	0%	0.5%	1%
TP19-06	TP19-06_0-0.7	0-0.7	2019-Jun-25	5.18	8890	1.28	**15.5**	**393**	<0.2	2.61	<1	0.05	1680	4.9	2.3	43.3	19,600	26.4	<5	68.7	0.135	6.28	3.27	<100	**6.73**	0.07	<100	30.9	0.125	2.45	<0.5	0.235	17.4	8.5	3.78	226
	TP19-06_0.7-1.9	0.7-1.9	2019-Jun-25	8.05	24,000	0.92	**13.1**	168	<0.2	1.3	3.5	0.172	20,700	40.7	17.4	*99.9 (1)*	36,000	16.7	<5	1040	0.128	3.17	33.5	346	*2.52 (1)*	0.098	213	54.9	0.084	1.34	<0.5	0.305	94.4	58.1	14.1	334

Standards / Guidelines Descriptions:

- CCME SoilQG Tier 1 IL, CL (Coarse or Fine Soil):CCME Tier 1 Soil Quality Guidelines for the Protection of Environment and Human Health, Indrustrial (IL) and Commercial (CL) (Coarse or Fine Soil)
- BC CSR IL, CL:BC Contaminated Sites Regulation, Schedule 3.1 Part 1 Numerical Soil Standards, Part 2 Generic Numerical Soil Standards to Protect Human Health, Part 3 Generic Numerical Soil Standards to Protect Ecological Health, Industrial (IL) and Commerical (CL), including:
  - e: Part 3 Generic Numerical Soil Standards to Protect Ecological Health
  - dw: Part 1 Numerical Soil Standards, Groundwater used for drinking water
  - fw:Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Freshwater)
  - i: Part 1 Numerical Soil Standards, Intake of Contaminated Soil
  - m: Part 1 Numerical Soil Standards, Groundwater flow to surface water used by aquatic life (Marine)
  - t: Part 1 Numerical Soil Standards, Toxicity to soil invertebrates and plants
- BC P4 Background Soil - Region 1 Vancouver Island:BC CSR Protocol 4 Table 1: Regional estimates for background concentrations in soil for inorganic substances (Region 1 Vancouver Island)

Notes:

(1) Concentrations less than the BC P4 Background Soil - Region 1 Vancouver Island (chromium = 65 µg/g, cobalt = 30 µg/g, copper = 100 µg/g, selenium = 4 µg/g, vanadium = 200 µg/g)

m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
- formatting of cells indicates exceedances of like-formatted standards
- formatting indicates the least stringent standard/guideline exceeded
- samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
- laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures

* - range of pH-dependent standards; value is compared to standard derived from pH of individual sample

- metals with pH-dependent standards:
  Be - beryllium, Cd - cadmium, Cu - copper, Pb - lead, Ni = nickel, Zn - zinc
- water uses:
  DW - drinking water, AWF - aquatic life (freshwater), AWM - aquatic life (marine)
- RPD - relative percent difference
- NC - not calculated

Be - DW	**Cd - DW**	**Cu - DW**	**Pb - DW**	**Ni - DW**	**Zn - DW**
1 @ pH < 5.5	1 @ pH < 7.0	250 @ pH < 5.0	120 @ pH < 5.5	70 @ pH < 7.5	200 @ pH < 5.0
1.5 @ pH 5.5<6.0	4.5 @ pH 7.0<7.5	500 @ pH 5.0<5.5	150 @ pH 5.5<6.0	250 @ pH 7.5<8.0	250 @ pH 5.0<5.5
4 @ pH 6.0<6.5	30 @ pH 7.5<8.0	2,000 @ pH 5.5<6.0	800 @ pH 6.0<6.5	500 @ pH ≥ 8.0	300 @ pH 5.5<6.0
20 @ pH 6.5<7.0	70 @ pH ≥ 8.0	10,000 @ pH 6.0<6.5	3,500 @ pH 6.5<7.0		450 @ pH 6.0<6.5
150 @ pH 7.0<7.5		50,000 @ pH 6.5<7.0	7,500 @ pH 7.0<7.5		600 @ pH 6.5<7.0
1,000 @ pH 7.5<8.0		100,000 @ pH ≥ 7.0	8,500 @ pH ≥ 7.5		1,000 @ pH 7.0<7.5
2,500 @ pH ≥ 8.0					3,000 @ pH 7.5<8.0
					5,500 @ pH ≥ 8.0

Be - AWF	**Cd - AWF**	**Cu - AWF**	**Pb - AWF**	**Ni - AWF**	**Zn - AWF**
1 @ pH < 6.5	1 @ pH < 7.0	75 @ pH < 5.5	200 @ pH < 5.0	90 @ pH < 5.0	150 @ pH < 6.0
4 @ pH 6.5<7.0	3 @ pH 7.0<7.5	100 @ pH 5.5<6.0	350 @ pH 5.0<5.5	100 @ pH 5.0<5.5	250 @ pH 6.0<6.5
30 @ pH 7.0<7.5	20 @ pH 7.5<8.0	700 @ pH 6.0<6.5	1,500 @ pH 5.5<6.0	150 @ pH 5.5<6.0	350 @ pH 6.5<7.0
250 @ pH 7.5<8.0	50 @ pH ≥ 8.0	3,000 @ pH 6.5<7.0	8,500 @ pH 6.0<6.5	200 @ pH 6.0<6.5	600 @ pH 7.0<7.5
500 @ pH ≥ 8.0		6,500 @ pH 7.0<7.5	35,000 @ pH 6.5<7.0	300 @ pH 6.5<7.0	1,500 @ pH 7.5<8.0
		7,500 @ pH ≥ 7.5	80,000 @ pH 7.0<7.5	900 @ pH 7.0<7.5	3,000 @ pH ≥ 8.0
			90,000 @ pH ≥ 7.5	5,000 @ pH 7.5<8.0	
				9,500 @ pH ≥ 8.0	

Be - AWM	**Cd - AWM**	**Cu - AWM**	**Pb - AWM**	**Ni - AWM**	**Zn - AWM**
85 @ pH < 5.0	1 @ pH < 5.5	75 @ pH < 6.0	120 @ pH < 5.5	70 @ pH < 7.5	150 @ pH < 8.0
100 @ pH 5.0<5.5	1.5 @ pH 5.5<6.0	150 @ pH 6.0<6.5	300 @ pH 5.5<6.0	250 @ pH 7.5<8.0	200 @ pH ≥ 8.0
200 @ pH 5.5<6.0	2 @ pH 6.0<6.5	650 @ pH 6.5<7.0	1,500 @ pH 6.0<6.5	500 @ pH ≥ 8.0	
550 @ pH 6.0<6.5	3.5 @ pH 6.5<7.0	1,500 @ pH ≥ 7.0	6,500 @ pH 6.5<7.0		
2,500 @ pH 6.5<7.0	15 @ pH 7.0<7.5		15,000 @ pH ≥ 7.0		
20,000 @ pH 7.0<7.5	95 @ pH 7.5<8.0				
150,000 @ pH 7.5<8.0	200 @ pH ≥ 8.0				
350,000 @ pH ≥ 8.0					

TABLE E: SEDMIENT ANALYTICAL RESULTS - PHYSICAL PARAMETERS

					Field	Particle Size		Physical Parameters
					pH (field)	% >75um	% <75um	moisture
					pH_Units	%	%	%
EQL					0	0.2	0.2	0.6
Location Code	Sample Depth Range	Sampled Date	Field ID	HSVL				
SED19-01	0.2	2019-Jun-25	SED19-01	65	7.91	90.7	9.35	25
SED19-02	0.1	2019-Jun-25	SED19-02	90	7.81	-	-	22
SED19-03	0.05	2019-Jun-25	SED19-03	-	8.88	-	-	16
SED19-04	0.05-0.1	2019-Jun-25	SED19-04	20	8.57	99.3	0.68	16
SED19-05	0.05-0.1	2019-Jun-25	SED19-05	LTDL	8.6	-	-	29
SED19-06	0.05-0.1	2019-Jun-25	SED19-06	25	8.45	96.5	3.55	20
SED19-07	0.2	2019-Jun-25	SED19-07	LTDL	8.49	-	-	30
			DUP3	LTDL	8.5	-	-	30
SED19-08	0.05	2019-Jun-25	SED19-08	LTDL	8.35	89	11	29

HSVL - head space vapour level
LTDL - less than detection limit

TABLE F: SEDMIENT ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

					Petroleum Hydrocarbons																		
					benzene	toluene	ethylbenzene	xylene (o)	xylene (m & p)	total xylenes	styrene	methyl tert-butyl ether [MTBE]	VH6-10	VPH	EPH10-19	LEPH	EPH19-32	HEPH	F1 (C6-C10 less BTEX)	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)
					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
EQL					0.01	0.1	0.02	0.08	0.08	0.08	0.06	0.2	20	20	200	200	200	200	20	20	20	100	100
CCME SedQG Marine (ISQG)																							
BC CSR SedMT																							
Location Code	**Sample Depth Range**	**Sampled Date**	**Field ID**	**HSVL**																			
SED19-01	0.2	2019-Jun-25	SED19-01	65	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
SED19-02	0.1	2019-Jun-25	SED19-02	90	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	62	<50
SED19-03	0.05	2019-Jun-25	SED19-03	-	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
SED19-04	0.05-0.1	2019-Jun-25	SED19-04	20	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
SED19-05	0.05-0.1	2019-Jun-25	SED19-05	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
SED19-06	0.05-0.1	2019-Jun-25	SED19-06	25	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	<50	<50
SED19-07	0.2	2019-Jun-25	SED19-07	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
			DUP3	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	-	-	-
	RPD (%)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-
SED19-08	0.05	2019-Jun-25	SED19-08	LTDL	<0.005	<0.05	<0.01	<0.04	<0.04	<0.04	<0.03	<0.1	<10	<10	<100	<100	<100	<100	<10	<10	<10	<50	<50

Standards / Guidelines Descriptions:
• CCME SedQG Marine (ISQG):CCME Sediment Quality Guidelines for the Protection of Aquatic Life, Marine (Interim sediment quality guidelines)
• BC CSR SedMT:BC Contaminated Sites Regulation, Schedule 3.4, Generic Numerical Sediment Standards, Marine Typical Use

Notes:
m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
• samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
• laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures
BETX - benzene, ethylbenzene, toluene, xylenes
HSVL - headspace vapour level
MTBE - methyl tert-butyl ether
PAHs - polycyclic aromatic hydrocarbons
ppmv - parts per million by volume
EPHs10-19 - extractable petroleum hydrocarbon in soil (nC10-nC19)
LEPHs - Light Extractable Petroleum Hydrocarbons in soil: EPHs10-19 minus PAH compounds: naphthalene and phenanthrene
EPHs19-32 - heavy extractable petroleum hydrocarbons (nC19-nC32)
HEPHs - EPHs19-32 minus PAH compounds: benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene and pyrene
VHsC6-C10 - volatile petroleum hydrocarbons (nC6-nC10)
VPHs - VHC6-C10 minus BETX and styrene
• RPD - relative percent difference
• NC - not calculated
• HSVL - head space vapour level
• LTDL - less than detection limit

TABLE G: SEDIMENT ANAYTICAL RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

				PAHs																									
				acenaphthylene	acenaphthene	acridine	anthracene	benz(a)anthracene	benzo(b)fluoranthene	benzo(b+j)fluoranthenes	benzo(g,h,i)perylene	benzo(j)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 1-	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	quinoline	light molecular weight PAHs	heavy molecular weight PAHs	PAHs (sum of total)	IACR (CCME Lab)	B(a)P TPE (BC CSR)
				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	µg/g	µg/g	µg/g	N/A	µg/g
EQL				0.01	0.01	0.1	0.008	0.04	0.04	0.04	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.1	0.04	0.02	0.02	0.04	0.1	0.1	0.1	0.1	0.2	0.02
CCME SedQG Marine (ISQG)				0.00587	0.00671		0.0469	0.0748						0.0888	0.108	0.00622	0.113	0.0212			0.0202	0.0346	0.0867	0.153						
BC CSR SedMT				**0.15**	**0.11**		**0.29**	**0.83**						**0.92**	**1**	**0.16**	**1.8**	**0.17**			**0.24**	**0.47**	**0.65**	**1.7**				**20**		
Location Code	**Sample Depth Range**	**Sampled Date**	**Field ID**																											
SED19-01	0.2	2019-Jun-25	SED19-01	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	0.049	*<0.02*	0.024	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	0.026	<0.05	<0.05	0.098	0.098	0.26	0.025
SED19-02	0.1	2019-Jun-25	SED19-02	<0.005	<0.005	<0.05	0.0062	0.022	<0.02	<0.02	<0.05	<0.02	<0.02	0.024	0.026	*<0.02*	0.053	<0.02	<0.02	<0.05	<0.02	<0.01	0.015	0.046	<0.05	<0.05	0.17	0.19	0.32	0.04
SED19-03	0.05	2019-Jun-25	SED19-03	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	*<0.02*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
SED19-04	0.05-0.1	2019-Jun-25	SED19-04	<0.005	<0.005	<0.05	<0.004	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	*<0.02*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.01	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	0.024
SED19-05	0.05-0.1	2019-Jun-25	SED19-05	0.0079	0.0083	<0.05	0.026	0.073	0.066	0.11	<0.05	0.04	0.036	0.08	0.075	*<0.02*	0.12	<0.02	0.042	<0.05	<0.02	<0.01	0.074	0.12	<0.05	0.12	0.66	0.77	1.4	0.12
SED19-06	0.05-0.1	2019-Jun-25	SED19-06	0.0058	0.011	<0.05	0.03	0.11	0.081	0.13	0.052	0.047	0.043	0.089	0.11	*<0.02*	0.27	<0.02	0.052	<0.05	<0.02	0.011	0.11	0.23	<0.05	0.16	1.1	1.3	1.8	0.13
SED19-07	0.2	2019-Jun-25	SED19-07	<0.005	0.0067	<0.05	0.028	0.08	0.067	0.11	<0.05	0.038	0.035	0.062	0.12	*<0.02*	0.21	<0.02	0.036	<0.05	<0.02	<0.01	0.088	0.15	<0.05	0.12	0.8	0.93	1.4	0.099
			DUP3	<0.005	<0.005	<0.05	0.0088	0.026	0.022	0.022	<0.05	<0.02	<0.02	0.024	0.033	*<0.02*	0.05	<0.02	<0.02	<0.05	<0.02	<0.01	0.026	0.051	<0.05	<0.05	0.21	0.24	0.41	0.041
	RPD (%)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SED19-08	0.05	2019-Jun-25	SED19-08	0.0068	<0.005	<0.05	0.011	0.033	0.031	0.031	<0.05	<0.02	<0.02	0.035	0.038	*<0.02*	0.064	<0.02	0.023	<0.05	<0.02	<0.01	0.04	0.054	<0.05	0.057	0.28	0.33	0.52	0.055

Standard/Guideline Descriptions
• CCME SedQG Marine (ISQG):CCME Sediment Quality Guidelines for the Protection of Aquatic Life, Marine (Interim sediment quality guidelines)
• BC CSR SedMT:BC Contaminated Sites Regulation, Schedule 3.4, Generic Numerical Sediment Standards, Marine Typical Use
Italics - Detection limits greater than ISQG

Notes:
m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
• formatting of cells indicates exceedances of like-formatted standards
• formatting indicates the least stringent standard/guideline exceeded
• samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
• laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures
PAHs - 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:
benz(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
• RPD - relative percent difference
• NC - not calculated

TABLE H: SEDIMENT ANALYTICAL RESULTS - METALS

				Metals																													Inorganics
				aluminum	antimony	arsenic	barium	beryllium	bismuth	boron	cadmium	calcium	chromium (III+VI)	cobalt	copper	iron	lead	lithium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium	tin	tungsten	uranium	vanadium	zinc	zirconium	phosphorus
				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	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
EQL				200	0.2	1	0.2	0.4	0.2	2	0.1	200	2	0.6	1	200	0.2	10	0.4	0.1	0.2	1.6	200	1	0.1	200	0.2	0.1	0.2	1	0.1	4	2	1	20
CCME SedQG Marine (ISQG)						7.24					0.7		52.3		18.7		30.2			0.13												124		
BC CSR SedMT						**50**					**5**		**190**		**130**		**130**			**0.84**												**330**		
Location Code	**Sample Depth Range**	**Sampled Date**	**Field ID**																															
SED19-01	0.2	2019-Jun-25	SED19-01	35,200	0.17	4.25	7.09	0.42	0.14	18.2	0.281	21,600	115	36.8	50.4	71,300	16.5	32.3	675	<0.05	2.09	71.5	1270	<0.5	<0.05	4900	34.6	0.118	16.6	<0.5	1.73	218	108	22.6	517
SED19-02	0.1	2019-Jun-25	SED19-02	39,400	0.29	7.67	10.4	0.42	<0.1	22.9	0.396	30,600	116	35	55.9	66,600	40.1	40.2	919	<0.05	2.36	70.2	957	<0.5	<0.05	4150	50.6	0.103	9.27	<0.5	3.13	228	120	31.9	749
SED19-03	0.05	2019-Jun-25	SED19-03	27,200	<0.1	1.64	5.59	0.3	<0.1	10.7	0.068	25,100	83.6	22.7	34.6	40,900	10	14.8	790	<0.05	0.29	49.8	492	<0.5	<0.05	1110	57.6	<0.05	2.02	<0.5	0.269	117	70.1	14.6	521
SED19-04	0.05-0.1	2019-Jun-25	SED19-04	27,800	0.43	3.37	11.4	0.32	<0.1	12	0.134	24,100	47.6	20.9	57.7	44,300	71	24.3	646	<0.05	0.67	44.6	357	<0.5	<0.05	717	36.4	<0.05	40.9	<0.5	0.488	150	90.7	15.2	512
SED19-05	0.05-0.1	2019-Jun-25	SED19-05	14,800	0.22	8.5	58.3	<0.2	0.18	23.9	0.834	160,000	31.3	10.5	43.2	22,600	10.4	10.2	276	0.055	1.78	22	773	0.67	<0.05	6830	1320	0.382	1.58	<0.5	1.26	87.2	55.5	8.16	800
SED19-06	0.05-0.1	2019-Jun-25	SED19-06	22,900	0.35	5.61	19.9	0.26	<0.1	21.8	0.396	52,900	45.2	18.4	62	38,600	101	29.2	475	<0.05	0.62	39	565	<0.5	<0.05	3590	347	0.107	57.7	<0.5	0.669	123	95	16.1	598
SED19-07	0.2	2019-Jun-25	SED19-07	11,500	0.26	4.87	33.7	<0.2	0.11	23	0.582	154,000	25.1	8.73	22.7	18,800	4.35	8.7	263	<0.05	1.31	18.2	869	0.67	<0.05	8100	1090	0.37	1.13	<0.5	0.878	66.9	42.7	7.03	528
			DUP3	11,500	0.19	4.46	35.7	<0.2	<0.1	20.6	0.551	151,000	25.7	8.91	20.6	18,800	3.98	9	260	<0.05	0.98	18.4	787	0.55	<0.05	6180	1110	0.397	0.89	<0.5	0.982	66.4	43.4	5.54	553
	RPD (%)			0%	NC	NC	6%	NC	NC	11%	5%	2%	2%	2%	10%	0%	9%	NC	1%	NC	NC	1%	NC	NC	NC	27%	2%	NC	NC	NC	11%	1%	2%	24%	5%
SED19-08	0.05	2019-Jun-25	SED19-08	18,400	0.2	5.03	16.7	0.28	<0.1	19.3	0.324	62,800	28.8	11.1	20.2	24,400	4.3	9.5	301	<0.05	0.52	20.8	799	<0.5	<0.05	3460	243	0.424	1.43	<0.5	0.503	103	42.6	15	584

Standard/Guideline Descriptions

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- BC CSR SedMT:BC Contaminated Sites Regulation, Schedule 3.4, Generic Numerical Sediment Standards, Marine Typical Use

Notes:

m - metres
µg/g - microgram per gram
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated

- formatting of cells indicates exceedances of like-formatted standards
- formatting indicates the least stringent standard/guideline exceeded
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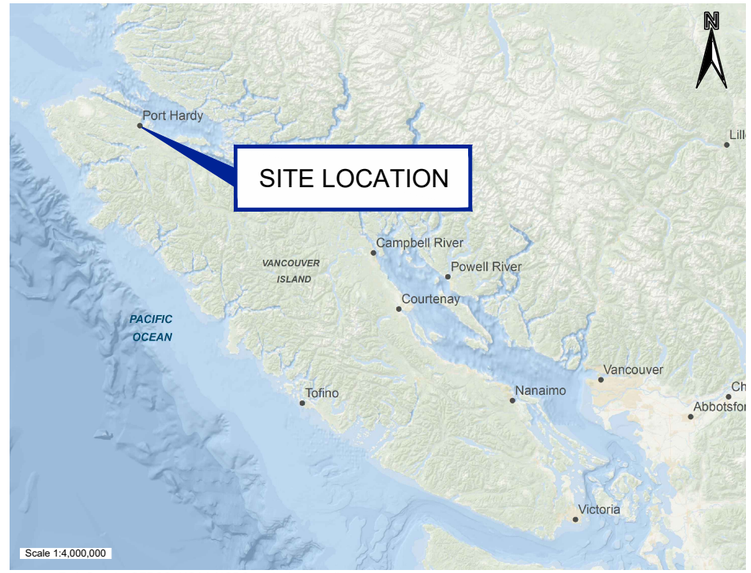
- laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures
- RPD - relative percent difference
- NC - not calculated

FIGURES



Source: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source: THE GOVERNMENT OF BRITISH COLUMBIA DATA CATALOGUE Copyright © 2019, Province of British Columbia

LEGEND

PROPERTY BOUNDARY

Title: SITE LOCATION

Project: MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client: FISHERIES AND OCEANS CANADA PACIFIC REGION REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

DRAWN BY:	CHECKED BY:	PLOT SIZE:
IO	RAP	11X17"

Date: SEPTEMBER 2019

FIGURE 1

SLR global environmental solutions

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Image date: 2014

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APEC #	APEC Name	Potential Sources (based on field observations)	PCOC(s)	Potentially Impacted Media
1	Upland Fill	Infilling with material from an unkown source and quality	BTEX PHC (F1-F4) PAH Metals	Soil

Notes:
APEC – area of potential environmental concern
BTEX – benzene, toluene, ethylbenzene and xylene
PCOC – potential contaminant of concern
PAH – polycyclic aromatic hydrocarbons
PHC (F1-F4) – petroleum hydrocarbons fraction 1 to 4

LEGEND

PROPERTY BOUNDARY

APPROXIMATE AREA OF POTENTIAL ENVIRONMENTAL CONCERN (APEC)

ABBREVIATIONS

CCME CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT

REFERENCES

ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

Bing aerial from ArcGIS: BING MAPS AERIAL - © 2019 MICROSOFT CORPORATION © 2019 DIGITALGLOBE © CNES (2019) DISTRIBUTION AIRBUS DS

Scale 1:1000

0 10 20 40 60 m
metres

Title:
SITE PLAN AND AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

Project:
MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client:
FISHERIES AND OCEANS CANADA PACIFIC REGION
REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

DRAWN BY:	CHECKED BY:	PLOT SIZE:
IO	RAP	11X17"

Date: SEPTEMBER 2019

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FIGURE 2

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LEGEND

- PROPERTY BOUNDARY
- X SEDIMENT SAMPLE
- TEST PIT
- STOCKPILE SAMPLE

ABBREVIATIONS

CCME	CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT

REFERENCES

ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

Bing aerial from ArcGIS: BING MAPS AERIAL - © 2019 MICROSOFT CORPORATION © 2019 DIGITALGLOBE © CNES (2019) DISTRIBUTION AIRBUS DS

Scale 1:1000

0 10 20 40 60 m
metres

Title:

SAMPLING LOCATIONS

Project:

MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client:

FISHERIES AND OCEANS CANADA PACIFIC REGION
REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

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IO	RAP	11X17"	SEPTEMBER 2019

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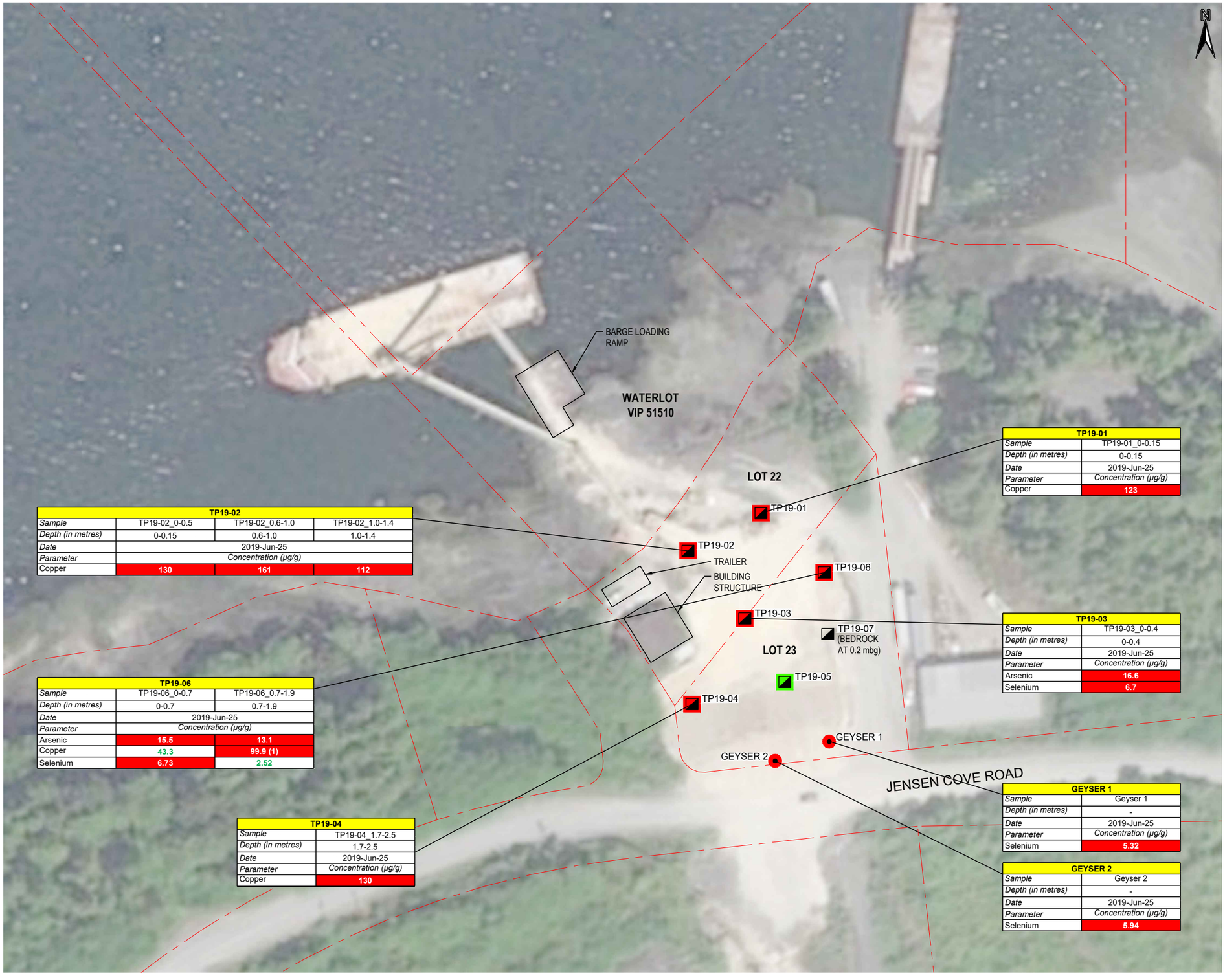
FIGURE 3

1855-1001/CAD/NR-SG/S_205-03985-00000-Master Figure.dwg



TP19-02			
Sample	TP19-02_0-0.5	TP19-02_0.6-1.0	TP19-02_1.0-1.4
Depth (in metres)	0-0.15	0.6-1.0	1.0-1.4
Date	2019-Jun-25		
Parameter	*Concentration (µg/g)*		
Copper	**130**	**161**	**112**

TP19-01	
Sample	TP19-01_0-0.15
Depth (in metres)	0-0.15
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Copper	**123**

TP19-03	
Sample	TP19-03_0-0.4
Depth (in metres)	0-0.4
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Arsenic	**16.6**
Selenium	**6.7**

TP19-06		
Sample	TP19-06_0-0.7	TP19-06_0.7-1.9
Depth (in metres)	0-0.7	0.7-1.9
Date	2019-Jun-25	
Parameter	*Concentration (µg/g)*	
Arsenic	**15.5**	**13.1**
Copper	**43.3**	**99.9 (1)**
Selenium	**6.73**	**2.52**

TP19-04	
Sample	TP19-04_1.7-2.5
Depth (in metres)	1.7-2.5
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Copper	**130**

GEYSER 1	
Sample	Geyser 1
Depth (in metres)	-
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Selenium	**5.32**

GEYSER 2	
Sample	Geyser 2
Depth (in metres)	-
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Selenium	**5.94**

LEGEND

- PROPERTY BOUNDARY
- TEST PIT
- STOCKPILE SAMPLE
- **SOIL LABORATORY ANALYSIS RESULTS**
  - CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE CCME SOIL GUIDELINES
  - CONCENTRATION(S) GREATER THAN APPLICABLE CCME SOIL GUIDELINE(S)
- mbg — METRES BELOW GROUND
- µg/g — MICROGRAMS PER GRAM

Applicable Guidelines		
Parameter	CCME Soil Quality Guidelines for Commercial (CL) and Industrial (IL) Land Uses	
	CL µg/g	IL µg/g
Arsenic	12	12
Copper	91	91
Selenium	2.9	2.9

NOTES

1) CONCENTRATIONS LESS THAN BC PROTOCOL 4 BACKGROUND SOIL - REGION 1 VANCOUVER ISLAND (COPPER = 100 µg/g)

ABBREVIATIONS

CCME CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT

REFERENCES

ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

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Scale 1:1000

0 10 20 40 60 m
metres

Title:

CCME SOIL ANALYTICAL RESULTS

Project:

MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client:

FISHERIES AND OCEANS CANADA PACIFIC REGION
REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

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FIGURE 4A

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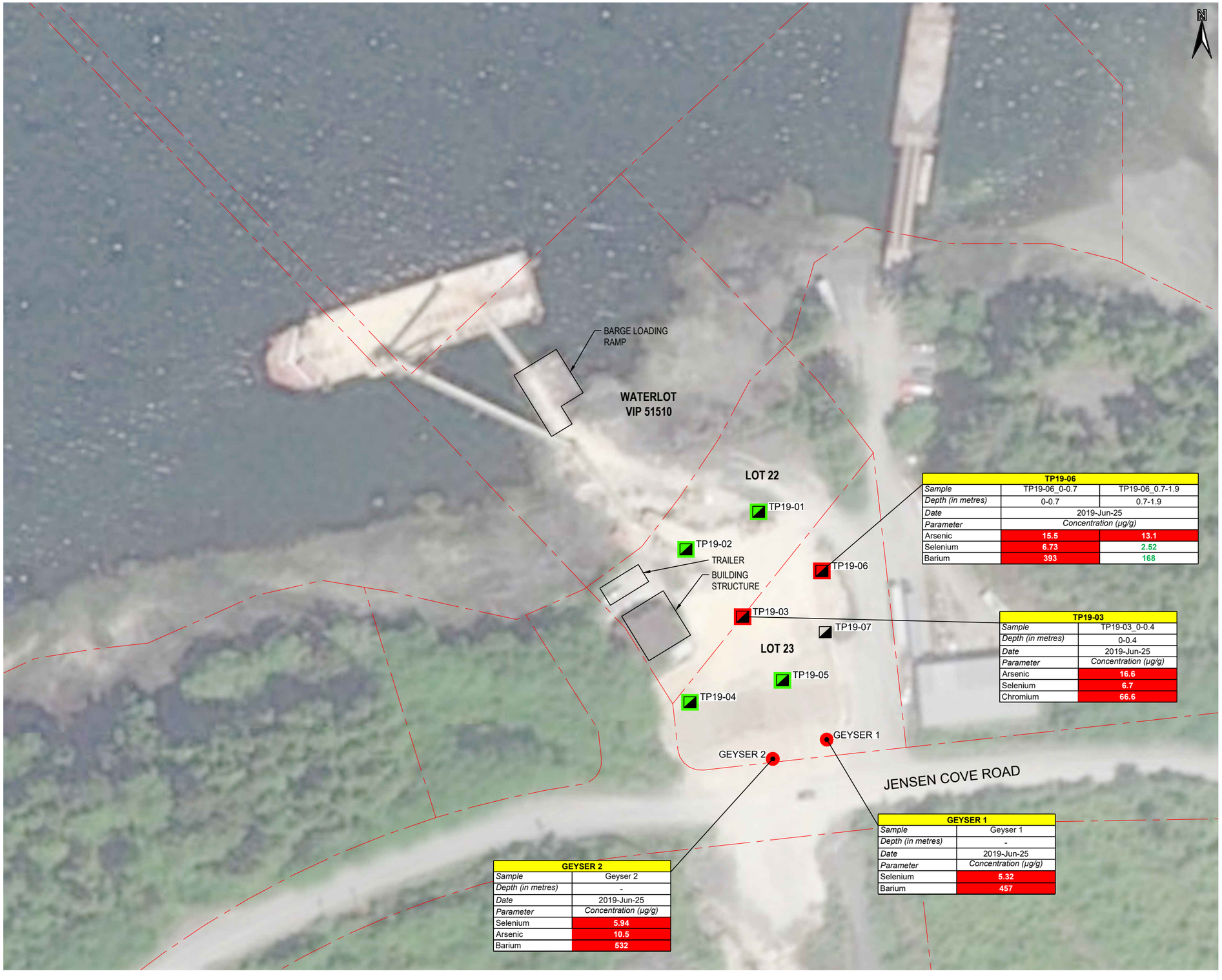

TP19-06		
Sample	TP19-06_0-0.7	TP19-06_0.7-1.9
Depth (in metres)	0-0.7	0.7-1.9
Date	2019-Jun-25	
Parameter	*Concentration (µg/g)*	
Arsenic	**15.5**	**13.1**
Selenium	**6.73**	**2.52**
Barium	**393**	**168**

TP19-03	
Sample	TP19-03_0-0.4
Depth (in metres)	0-0.4
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Arsenic	**16.6**
Selenium	**6.7**
Chromium	**66.6**

GEYSER 1	
Sample	Geyser 1
Depth (in metres)	-
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Selenium	**5.32**
Barium	**457**

GEYSER 2	
Sample	Geyser 2
Depth (in metres)	-
Date	2019-Jun-25
Parameter	*Concentration (µg/g)*
Selenium	**5.94**
Arsenic	**10.5**
Barium	**532**

LEGEND

- PROPERTY BOUNDARY
- TEST PIT
- STOCKPILE SAMPLE
- **SOIL LABORATORY ANALYSIS RESULTS**
  - CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE CSR SOIL GUIDELINES
  - CONCENTRATION(S) GREATER THAN APPLICABLE CSR SOIL GUIDELINE(S)
- mbg — METRES BELOW GROUND
- µg/g — MICROGRAMS PER GRAM

Applicable Guidelines		
Parameter	CSR Soil Quality Guidelines for Commercial (CL) and Industrial (IL) Land Uses	
	CL µg/g	IL µg/g
Arsenic	10	10
Selenium	4	4
Barium	350	350
Chromium	65	65

NOTES

1) CONCENTRATIONS LESS THAN BC PROTOCOL 4 BACKGROUND SOIL - REGION 1 VANCOUVER ISLAND (COPPER = 100 µg/g)

ABBREVIATIONS

CSR CONTAMINATED SITES REGULATION

REFERENCES

ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

Bing aerial from ArcGIS: BING MAPS AERIAL - © 2019 MICROSOFT CORPORATION © 2019 DIGITALGLOBE © CNES (2019) DISTRIBUTION AIRBUS DS

Scale 1:1000

0 10 20 40 60 m
metres

Title:

CSR SOIL ANALYTICAL RESULTS

Project:

MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client:

FISHERIES AND OCEANS CANADA PACIFIC REGION REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

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FIGURE 4B

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LEGEND

- PROPERTY BOUNDARY
- X SEDIMENT SAMPLE
- **LABORATORY ANALYSIS RESULTS**
  - CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE CSR SedMT
  - CONCENTRATION(S) GREATER THAN APPLICABLE CSR SedMT

ABBREVIATIONS

CSR	CONTAMINATED SITES REGULATION
SedMT	SEDIMENT STANDARD, MARINE TYPICAL USE

REFERENCES

ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

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Scale 1:1000

0 10 20 40 60 m
metres

Title:
CSR SEDIMENT ANALYTICAL RESULTS

Project:
MODIFIED PHASE I ENVIRONMENTAL SITE ASSESSMENT

Client:
FISHERIES AND OCEANS CANADA PACIFIC REGION
REAL PROPERTY AND TECHNICAL SUPPORT DIVISION

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FIGURE 5

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APPENDIX A

Photographs

Photo 1: View of the west section of the site including the building and geyserite stockpile.

Photo 2: View of the barge ramp located on the north section of the site and within the water lot.

Photo 3: View of the building structure located on the west section of the upland portion of the site.

Photo 4: View of one of the auxiliary trailers onsite.

Photo 5: View of the site from Hardy Bay.

Photo 6: View of the advancement of test pit TP19-03.

Photo 7: View of the weathered bedrock encountered at 1.7 mbg at test pit TP19-04.

Photo 8: View of the geyserite stockpile that was sampled during the field program.

Photo 9: View of the intertidal sediment grab sample SED19-01.

Photo 10: View of the dive team that collected the subtidal sediment samples.

APPENDIX B

Phase I ESA Database Search Results

ADDENDUM #3

Date: June 8, 2020

PACIFIC REGION
PORT HARDY LOGISTICS DEPOT
PORT HARDY, B.C.
Project No: 8H500

The following revisions supersede the information contained in the original drawings and specification issued for the above named project, and shall become part thereof. No consideration will be allowed for extras due to the contractor or any subcontractor not being familiar with this Addendum.

END ADDENDUM #3