

## VIA EMAIL: Bill.Corsan@nanaimo.ca

File: 26250-20/24079 Site ID: 24079

June 29, 2023

Bill Corsan City of Nanaimo 455 Wallace Street Nanaimo, BC V9R 5J6

Dear Bill Corsan:

## Re: Water Use Determination Nanaimo Downtown Corridor, Nanaimo, BC

The Ministry of Environment and Climate Change Strategy (ENV) has reviewed the following reports prepared by SNC-Lavalin Inc. (SNC-Lavalin) in support of your Contaminated Sites Services Application received November 9, 2020 for a Director's decision of no drinking water use for an area of the downtown core of Nanaimo, B.C. referred to as the Nanaimo Downtown Corridor (the "Study Area"):

- Request for Director's Determination of Water Use for the Nanaimo Downtown Corridor, Nanaimo, BC, dated September 16, 2020; and
- Addendum to Request for Director's Determination of Water Use for the Nanaimo Downtown Corridor, Nanaimo, BC, dated February 21, 2023.

The Study Area comprises an area of approximately 27 hectares and is located in the downtown core of Nanaimo, B.C. The location of the Study Area is shown on the figure included in Appendix A. Legal descriptions for the parcels included in the Study Area and a metes and bounds description of the Study Area boundary are provided in Appendix B.

Section 12(5) of the Contaminated Sites Regulation specifies the water uses that may apply at sites in B.C., including aquatic life, drinking, irrigation, and livestock watering water uses, as well as the factors a Director must consider in determining current and reasonable potential future water uses at a site. Protocol 21 provides criteria for determining current and reasonable potential potential future water uses at specific sites.

Where drinking water use has been determined to apply at a site under Protocol 21 and site circumstances indicate that it is unlikely or unreasonable to anticipate that water would be used for drinking, a site-specific water use decision may be sought from the Director. Protocol 21, Appendix 1 "*Director's Decision Framework for Site-Specific Decisions of Water Use*" outlines a multiple-lines-of-evidence approach for seeking a director's decision of no drinking water use at a specific site.

SNC-Lavalin presented the following rationale to support their assertion that drinking water use should not apply to the Study Area (also referred to below as the "Site" by SNC-Lavalin).

Within some portions of the Study Area, future drinking water use does not apply according to Protocol 21. These areas include the following:

- Approximately 8.5 ha of the Study Area is located within the filled former marine and estuarine foreshores (i.e., former Commercial Inlet). This portion of the Study Area is considered exempt from drinking water use under Protocol 21;
- Properties within the Study Area that have already been determined, through past site investigation/remediation and issuance of CoCs, that drinking water use does not apply;
- Portions of the Study Area with shallow groundwater in poor quality fill materials that is considered to have unsuitable water quality for domestic water supply; and
- Portions of the Study Area with reported low hydraulic conductivity values (and yield testing) in the native unconsolidated material (sandy silt and silt till in north and southeast portion of Study Area) would not be considered suitable drinking water aquifers (i.e., hydraulic conductivity values less than 10<sup>-6</sup> m/s).

For remaining portions of the Study Area, a lines of evidence approach was presented as follows:

- The entire Study Area and City of Nanaimo is serviced by the municipal water supply and does not rely on groundwater as a source;
- There are no mapped aquifers underlying the Site and as such the area is not classified according to the Ministry of Environment's Aquifer Classification System;
- The site is not located in an area of known limited water resources (i.e., not within an area at risk due to too little water). In fact, Nanaimo has been identified as an area with one of the best water supplies in Canada;
- Groundwater at the Site is not restricted for drinking water use under a Local Government Water Management Plan;
- The future use of the Site and surrounding Nanaimo downtown core area is to remain commercial/industrial;
- The Study Area being located in an area with a long industrial and commercial use history with multiple landowners;
- The presence of significant historic mine workings in bedrock within the Study Area represents a continual preferential pathway for groundwater contamination (either contaminant migration or sea water infiltration and migration). This has been noted in various reports documenting historical flooding during rain events, drainage to adits and airway holes, tension cracks as well as the documented presence of voids (often water

filled). The presence of these voids and preferential pathways present a significant risk to the quality of water within the bedrock in the Study Area. While several zones of mine workings are documented within the Study Area, there is also a high potential for many more undocumented workings to be present throughout the Study Area. Depth of historic mine workings have been documented as deep as 30 m into the bedrock, likely impacting both shallow and deep bedrock groundwater;

- The Study Area has undergone widespread historical infilling largely with coal waste fill material and debris, mainly to fill former marine and estuarine foreshore areas including Commercial Inlet but also adjoining low-lying areas and areas adjacent to the Nanaimo Harbour. This includes the Area Wide Determination identified by ENV (Zone D) as an area of "historical area wide coal waste contaminated fill". Groundwater encountered within the area wide coal waste contaminated fill and underlying till (if present) and/or bedrock within this area is considered to have unsuitable water quality for domestic water supply (due to preferential pathways and risk of its vulnerability to contamination from overlying fill material);
- Based on previous environment reports, portions of the Study Area contain naturally occurring chloride, sodium and TDS concentrations exceeding drinking water standards within saturated fill (based on select testing areas north of the Study Area, in the northern portion of the Study Area, central portions of the Study Area, and the south portion of the Study Area). This suggests that residual saltwater potentially remains within a large portion of the Study Area that was historically exposed to saltwater;
- The entire Study Area is located within 200 m of the former Commercial Inlet. It is likely that groundwater pumping within the Study Area for potential future drinking water purposes would produce drawdown and induce flow from the adjacent infilled areas and mine workings, thereby drawing in water that would be considered to have unsuitable quality for domestic water supply. In addition, with the entire Study Area being located within 350 m of the marine receiving environment, and in some cases adjacent to the marine environment, there is a high potential that active groundwater pumping for potential future drinking water could result in seawater intrusion. This would affect the quality of groundwater in both shallow and deep bedrock;
- Shallow groundwater is located primarily within the unconsolidated heterogeneous fill and/or underlying native soils. Averaged hydraulic conductivity values varied from greater than 1x10<sup>-4</sup> m/s (i.e., representative of sand and gravel with coal fill) and lower than 5x10<sup>-7</sup> m/s (i.e., representative of silty sand or silt till material);
- The average thickness of the shallow groundwater zone is approximately 3 m, and is expected to increase in areas of the former shoreline, and with tidally influenced water table fluctuation with temporary reversals closer to the Nanaimo Harbour;
- Shallow groundwater in the native till unit would not be considered able to produce enough water to supply a single-family dwelling for domestic use based on the average hydraulic conductivity (5x10<sup>-7</sup> m/s) noted above. This assertion is also supported by yield testing results on native soils in the North portion of the Site at 11 Terminal Avenue;
- In general, the average hydraulic conductivity for the varied fill material (1x10<sup>-4</sup> m/s) could be considered able to produce enough water to supply a single-family dwelling for

domestic use. However, this groundwater is not considered a sustainable source for domestic water supply due to its vulnerability to contamination from the fill material (per Protocol 21), including the area recognized by an Area Wide Determination as having coal waste fill. In addition, areas near the current Nanaimo Harbour foreshore are susceptible to sea water intrusion;

- The bedrock within the Study Area was characterized by average hydraulic conductivities ranging between 9.2x10<sup>-7</sup> m/s and 1.1x10<sup>-6</sup> m/s at the south-eastern portion of the Site and considered not a sustainable source of domestic water supply;
- Yield testing in a single location at the north end of the Study Area could not sustain the 1.3 L/min requirement;
- Flow within the bedrock along the southeastern portion of the Site is limited laterally due to reduced lateral hydraulic connectivity of fractures. It experiences tidal influence through vertical fractures connecting it hydraulically to the overlying unconsolidated aquifer comprising mostly fill materials, rather than direct lateral hydraulic connection to the ocean;
- Productivity of groundwater in bedrock in the Study Area is likely variable. In the vicinity of the current Nanaimo Harbour, water wells could potentially produce enough water to supply a single-family dwelling for domestic use based on the yield reported in geotechnical wells. However, this is not considered a sustainable source of domestic water supply due to influence of sea water intrusion. Similarly, groundwater in bedrock within the vicinity of infilled former Commercial Inlet (roughly equivalent to the Area Wide Determination Zone D area) is susceptible to contamination from historic overland filling with waste material; and
- The presence of former mine working shafts and voids in bedrock throughout the Study Area (some mapped, but many not mapped workings) also leads to uncertainty regarding bedrock groundwater productivity due to the ongoing likelihood that preferential pathways are present in the bedrock resulting in poor quality groundwater migration and contamination (from coal fill or sea water).

Based on the arguments and supporting information provided by SNC-Lavalin, I concur with the conclusion that potential future use of groundwater for drinking water is unlikely in the Study Area for the following reasons:

- No current use of groundwater for drinking water use within 500 metres of the Study Area. City of Nanaimo is serviced by a municipal drinking water system that does not rely on groundwater;
- Part of the Study Area is located within filled former marine foreshore and is considered to have unsuitable water quality for domestic water supply;
- There are no mapped aquifers beneath the Study Area;
- The bedrock aquifer does not qualify as a viable drinking water aquifer based on yield less than 1.3 L/min measured at the north end of the Study Area and average hydraulic conductivities ranging between 9.2x10<sup>-7</sup> m/s and 1.1x10<sup>-6</sup> m/s measured at the south-eastern portion of the Study Area;

- The native till unit does not qualify as a viable drinking water aquifer based on yield less than 1.3 L/min measured in the North portion of the Study Area;
- The fill layer does not qualify as a viable drinking water aquifer;
- Sodium and chloride concentrations are elevated at several locations across the Study Area. If groundwater pumping was to occur, concentrations of sodium and chloride would likely increase due to salt water intrusion;
- The Study Area is not located in an area of known limited water resources; and
- Groundwater is not restricted for drinking water use under a Local Government Water Management Plan.

Therefore, I hereby determine that drinking water use does not apply in the Study Area. I also confirm that aquatic life water use does apply.

This decision is based on the most recent information available to the ministry regarding the Site. The ministry, however, makes no representation or warranty as to the accuracy or completeness of this information.

Please contact Annette Mortensen at <u>Annette.Mortensen@gov.bc.ca</u> if you require clarification regarding this letter.

Sincerely,

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Annette Mortensen For Director, *Environmental Management Act* 

Attachments: Appendix A: Site Plan Appendix B: Study Area Legal Descriptions and Metes and Bounds Description

cc: Meredith Guest, SNC-Lavalin Inc., <u>Meredith.Guest@snclavalin.com</u> Janet Barrett, Senior Contaminated Sites Officer, ENV, <u>Janet.Barrett@gov.bc.ca</u> Client Information Officer, ENV, <u>csp\_cio@Victoria1.gov.bc.ca</u> Page 6

## APPENDIX A Site Plan Nanaimo Downtown Corridor



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APPENDIX B	
Site Legal Descriptions and Metes and Bounds Description	ption

Address	PID
10 Wallace Street	008-819-696
11 Terminal Avenue	Lot 13: 008-813-264
	Lot 12: 008-813-256
	Lot A: 005-183-235
17 Terminal Avenue	Lot 1: 004-575-709
	Lot 6: 001-302-809
	Lot 8: 005-137-705
	Lot 10: 005-138-019
	Lot 5: 005-833-221
	Lot 11: 005-833-345
	Lot 3: 005-833-566
	Lot 4: 005-833-779
96 Wallace Street	027-124-495
51 Terminal Avenue	000-213-551
100 Wallace Street	Lot 6: 008-788-731
	Lot 7: 008-788-863
125 Campbell Street	025-649-485
111 Terminal Avenue	025-649-493
123 Terminal Avenue	008-789-118
140 Wallace Street	Lot 4: 000-021-423
	Lot 5: 006-499-040
150 Wallace Street	008-788-596
170 Wallace Street	000-857-394
190 Wallace Street	008-788-545
199 Fraser Street	001-524-348
175 Fraser Street	008-789-011
165 Fraser Street	008-789-053
151 Terminal Avenue	002-774-330
145 Terminal Avenue	008-487-308
208 Wallace Street	008-780-625
220 Wallace Street	004-488-369
256 Wallace Street	002-498-600
280 Wallace Street	000-683-850
245 Fraser Street	000-296-228
233 Fraser Street	002-331-519
231 Fraser Street	002-331-454
211 Terminal Avenue	Lot 1: 005-262-801
	Lot 16: 005-263-344
221 Terminal Avenue	Lot 2: 001-638-645
	Lot 3: 001-638-661
	Lot 13: 001-638-670
	Lot 14: 001-638-696
	Lot 15: 001-638-718
250 Fraser Street	Lot 11: 005-263-425
	Lot 12: 005-263-433
260 Fraser Street	005-263-417

270 Fraser Street	008-780-455
290 Bastion Street	001-755-927
255 Terminal Avenue	Lot 1: 005-09-846
	Lot 8: 005-263-379
227 Terminal Avenue	000-187-208
225 Terminal Avenue	Lot 4: 001-328-492
	Lot 5: 001-328-522
165 Terminal Avenue	005-477-034
300 Wallace Street	010-540-113
303 Terminal Avenue	001-739-034
353 Terminal Avenue	Lot 4: 005-542-880
	Lot 5: 005-542-898
365 Terminal Avenue	005-542-863
375 Terminal Avenue	005-542-821
385 Terminal Avenue	005-542-766
395 Terminal Avenue	004-186-362
405 Terminal Avenue	004-186-699
450 Wallace Street	Lot 6: 004-164-156
	Lot 7: 004-164-172
	Lot 16: 004-164-211
	Lot 17: 004-164-237
458 Wallace Street	Lot 4: 006-241-212
	Lot 5: 006-241-263
	Lot 18: 006-241-298
1 Commercial Street	Lot 1: 006-240-992
	Lot 2: 006-241-034
	Lot 3: 006-241-042
14 Commercial Street	000-698-202
10 Commercial Street	000-698-148
6 Commercial Street	Lot 5: 000-698-067
	Lot 5A: 000-698-105
	Lot 27: 000-698-261
	Lot 28: 000-698-318
	Parcel A: 000-698-393
13 Victoria Crescent	015-982-840
30 Cavan Street	Strata Lots
33 Victoria Crescent	000-680-818
39 Victoria Crescent	005-019-401
45 Victoria Crescent	005-019-419
b3 Victoria Crescent	027-607-518
// Victoria Crescent	004-804-180
83 Victoria Crescent	000-318-396
40 Cavan Street	Lot A: 004-196-546
	LOT B: 004-196-562
14 Victoria Crescent	018-084-419
34 Victoria Crescent	Lot 8: 002-982-463
	Lot 8A: 002-982-226

	Lot 9: 002-982-293
	Lot J: 002-982-374
38 Victoria Crescent	005-420-024
50 Victoria Crescent	005-420-059
52 Victoria Crescent	005-420-067
60 Victoria Crescent	017-461-227
565 Terminal Avenue	008-850-682
575 Terminal Avenue	006-218-962
581 Terminal Avenue	006-218-920
589 Terminal Avenue	006-218-873
595 Terminal Avenue	Lot 19: 007-708-432
	Lot A: 006-218-661
	Lot B: 006-218-768
	Lot C: 006-218-822
9 Nicol Street	028-426-819
650 Terminal Avenue	028-426-801
125 Front Street	023-378-026
100 Cameron Road	005-496-497
100 Gordon Street	029-126-002
620 Terminal Avenue	005-596-688
125 Front Street	023-378-026
51 Gordon Street	023-760-010
115 Front Street	000-364-061
11 Bastion Street	000-364-568
174 Commercial Street	Lot 6: 008-771-197
	Lot 1: 008-771-154
	Lot 2: 008-771-171
150 Commercial Street	004-753-551
140 Commercial Street	017-926-866
120 Commercial Street	008-775-966
101 Gordon Street	026-458-942
121 Bastion Street	004-612-761
187 Commercial Street	001-587-226
163 Commercial Street	008-787-549
155 Commercial Street	004-338-472
123 Commercial Street	007-650-434
101 Commercial Street	Lot 3: 005-208-157
	Lot 1: 005-216-036
135 Bastion Street	001-510-151
235 Bastion Street	Lot 8: 005-649-871
	Lot 9: 005-649-919
300 Terminal Avenue	Lot 16: 008-824-291
	Lot 15: 008-824-312
324 Terminal Avenue	001-035-266
350 Terminal Avenue	Lot 9: 002-423-901
	Lot 10: 002-423-987

	Lot 11: 002-424-029
	Lot 12: 002-424-096
340 Terminal Avenue	008-814-783
65 Commercial Street	Lot 3: 008-823-227
	Lot 3: 008-822-611
	Lot 7: 008-823-286
51 Commercial Street	Parcel A: 008-821-691
	Lot 3: 008-787-581
	Lot 7: 008-826-765
37 Commercial Street	Lot 6: 008-814-694
	Lot 2: 005-972-345
	Lot 5: 008-821-771
	Lot 2: 008-821-801
35 Commercial Street	Lot 1: 005-972-329
	Lot 1: 008-787-573
29 Commercial Street	Lot 1: 000-529-842
	Lot 3: 000-529-851
19 Commercial Street	Lot 1: 000-097-110
	Lot A: 000-097-420
13 Commercial Street	Lot A: 006-317-391
	Lot B: 005-959-853
75 Commercial Street	004-979-141
83 Commercial Street	004-979-150
99 Commercial Street	000-503-622
275 Skinner Street	000-865-681
241 Skinner Street	000-009-261
236 Bastion Street	002-469-685
155 Skinner Street	001-830-554
222 Terminal Avenue	005-182-310
153 Skinner Street	004-122-941
151 Skinner Street	008-775-176
194 Cliff Street	030-185-688
180 Cliff Street	000-100-668
145 Skinner Street	000-410-110
160 Cliff Street	000-100-277
158 Cliff Street	000-741-906
150 Cliff Street	003-741-648
123 Skinner Street	003-741-541
111 Skinner Street	003-609-723
120 Cliff Street	003-607-828
140 Terminal Avenue	023-354-321
101 Skinner Street	008-775-010
85 Skinner Street	003-377-229
77 Skinner Street	003-377-300
67 Skinner Street	008-775-036
57 Skinner Street	000-383-465

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47 Skinner Street	008-775-044
60 Cliff Street	002-899-981
45 Chapel Street	008-775-061
38 Cliff Street	004-313-429
20 Cliff Street	002-896-061
41 Chapel Street	008-775-079
91 Comox Road	Parcel A: 008-775-125
	Lot 8: 008-775-133
	Lot 9: 008-775-141
	Lot 10: 008-775-168
10 Terminal Avenue	016-401-077
11 Cliff Street	Lot 4: 008-813-078
	Lot 5: 008-813-167
	Lot 10: 008-846-111
	Lot 5: 008-846-138
	Lot A: 016-557-522
36 Terminal Avenue	001-308-769
60 Terminal Avenue	006-701-523
85 Cliff Street	008-846-065
65 Cliff Street	000-342-106
33 Cliff Street	000-342-092
125 Comox Road	018-735-771
169 Comox Road	Lot 7: 000-672-491
	Lot 8: 000-499-153

Metes and Bounds Description – Study Area

Commencing at a point with a northing of 5446809.4067 and an easting of 431562.1477. Thence, at a bearing of 150 degrees 47 minutes 43 seconds a distance of 3.90 m. Thence, at a bearing of 171 degrees 38 minutes 39 seconds a distance of 92.98 m. Thence, at a bearing of 179 degrees 35 minutes 20 seconds a distance of 7.05 m. Thence, at a bearing of 158 degrees 3 minutes 2 seconds a distance of 21.08 m. Thence, at a bearing of 228 degrees 23 minutes 49 seconds a distance of 9.65 m. Thence, at a bearing of 204 degrees 51 minutes 46 seconds a distance of 6.07 m. Thence, at a bearing of 175 degrees 57 minutes 58 seconds a distance of 3.07 m. Thence, at a bearing of 181 degrees 22 minutes 34 seconds a distance of 27.85 m. Thence, at a bearing of 172 degrees 19 minutes 5 seconds a distance of 166.06 m. Thence, at a bearing of 163 degrees 58 minutes 48 seconds a distance of 47.01 m. Thence, at a bearing of 165 degrees 8 minutes 16 seconds a distance of 44.68 m. Thence, at a bearing of 153 degrees 58 minutes 13 seconds a distance of 32.21 m. Thence, at a bearing of 61 degrees 13 minutes 26 seconds a distance of 162.22 m. Thence, at a bearing of 156 degrees 4 minutes 44 seconds a distance of 48.04 m. Thence, at a bearing of 141 degrees 35 minutes 29 seconds a distance of 89.55 m. Thence, at a bearing of 113 degrees 9 minutes 48 seconds a distance of 61.24 m. Thence, at a bearing of 99 degrees 26 minutes 55 seconds a distance of 6.47 m. Thence, at a bearing of 131 degrees 5 minutes 54 seconds a distance of 5.49 m. Thence, at a bearing of 358 degrees 47 minutes 49 seconds a distance of 2.93 m. Thence, at a bearing of 99 degrees 26 minutes 56 seconds a distance of 15.02 m. Thence, at a bearing of 78 degrees 19 minutes 20 seconds a distance of 15.79 m. Thence, at a bearing of 65 degrees 14 minutes 51 seconds a distance of 0.87 m. Thence, at a bearing of 2 degrees 37 minutes 11 seconds a distance of 2.15 m. Thence, at a bearing of 91 degrees 44 minutes 49 seconds a distance of 4.29 m. Thence, at a bearing of 65 degrees 14 minutes 42 seconds a distance of 19.85 m. Thence, at a bearing of 80 degrees 4 minutes 0 seconds a distance of 20.21 m. Thence, at a bearing of 101 degrees 10 minutes 15 seconds a distance of 23.85 m. Thence, at a bearing of 131 degrees 14 minutes 13 seconds a distance of 57.21 m. Thence, at a bearing of 134 degrees 5 minutes 20 seconds a distance of 49.45 m. Thence, at a bearing of 147 degrees 23 minutes 48 seconds a distance of 15.62 m. Thence, at a bearing of 150 degrees 21 minutes 27 seconds a distance of 8.70 m. Thence, at a bearing of 173 degrees 10 minutes 16 seconds a distance of 17.51 m. Thence, at a bearing of 188 degrees 54 minutes 36 seconds a distance of 11.30 m. Thence, at a bearing of 199 degrees 20 minutes 59 seconds a distance of 11.31 m. Thence, at a bearing of 214 degrees 29 minutes 26 seconds a distance of 41.84 m. Thence, at a bearing of 215 degrees 34 minutes 59 seconds a distance of 113.89 m. Thence, at a bearing of 220 degrees 55 minutes 21 seconds a distance of 35.21 m. Thence, at a bearing of 260 degrees 13 minutes 7 seconds a distance of 40.60 m. Thence, at a bearing of 256 degrees 16 minutes 4 seconds a distance of 22.23 m. Thence, at a bearing of 253 degrees 17 minutes 46 seconds a distance of 11.87 m. Thence, at a bearing of 246 degrees 31 minutes 38 seconds a distance of 10.77 m. Thence, at a bearing of 249 degrees 6 minutes 3 seconds a distance of 18.46 m. Thence, at a bearing of 268 degrees 38 minutes 35 seconds a distance of 36.54 m. Thence, at a bearing of 166 degrees 27 minutes 45 seconds a distance of 28.91 m. Thence, at a bearing of 175 degrees 48 minutes 26 seconds a distance of 20.79 m. Thence, at a bearing of 184 degrees 58 minutes 20 seconds a distance of 17.49 m. Thence, at a bearing of 294 degrees 36 minutes 50 seconds a distance of 195.25 m. Thence, at a bearing of 33 degrees 6 minutes 23 seconds a distance of 81.55 m. Thence, at a bearing of 310 degrees 4 minutes 51 seconds a distance of 73.71 m. Thence, at a bearing of 304 degrees 39 minutes 49 seconds a distance of 86.26 m. Thence, at a bearing of 318 degrees 26 minutes 59 seconds a distance of 190.81 m. Thence, at a bearing of 319 degrees 1 minute 47 seconds a distance of 161.67 m. Thence, at a bearing of 351 degrees 25 minutes 54 seconds a distance of 363.26 m. Thence, at a bearing of 95 degrees 10 minutes 50 seconds a distance of 32.54 m. Thence, at a bearing of 90 degrees 18 minutes 27 seconds a distance of 65.83 m. Thence, at a bearing of 85 degrees 14 minutes 32 seconds a distance of 76.69 m. Thence, at a bearing of 86 degrees 9 minutes 56 seconds a distance of 73.35 m to the point of commencement, and comprising an area of 269,814.58 m<sup>2</sup>.