INFRASTRUCTURE SERVICES COMMITTEE

Thursday, February 21, 2019
SCRD Boardroom, 1975 Field Road, Sechelt, B.C.

AGENDA

CALL TO ORDER 9:30 a.m.

AGENDA

1. Adoption of Agenda

PRESENTATIONS AND DELEGATIONS

2.	General Manager, Infrastructure Services Regarding Universal Water Metering	Presentation
3.	AJ MacDonald, Vice-President Operations, Integrated Sustainability Consultants Regarding Raw Water Reservoir(s) Feasibility Study	Presentation

REPORTS

4.	General Manager, Infrastructure Services Raw Water Reservoir(s) Feasibility Study Results **(Voting – A, B, D, E, F, Sechelt)**	Annex A pp 1 - 109
5.	General Manager, Infrastructure Services Raw Water Reservoir(s) Feasibility Study Phase 3 **(Voting – A, B, D, E, F, Sechelt)**	Annex B pp 110 - 112
6.	General Manager, Infrastructure Services Town of Gibsons Groundwater Investigation Phase 2 Results **(Voting – A, B, D, E, F, Sechelt)**	Annex C pp 113 - 116
7.	General Manager, Infrastructure Services 2018 Rainwater Harvesting Rebate Program **(Voting – A, B, D, E, F, Sechelt)**	Annex D pp 117 - 120
8.	General Manager, Infrastructure Services Water Treatment and Distribution Services – Regional Water **(Voting – A, B, D, E, F, Sechelt)**	Annex E pp 121 - 126
9.	General Manager, Infrastructure Services ITT 18 368 Chapman Creek Bridge Watermain Replacement **(Voting – A, B, D, E, F, Sechelt)**	Annex F pp 127 - 129

10. General Manager, Infrastructure Services — Annex G
RFQ 18 363 Supply and Delivery of Brass Water Service Fittings — pp 130 - 131
(Voting – A, B, D, E, F, Sechelt)

11. Chief Administrative Officer — Annex H
Air Quality Monitoring Station Request for Support — pp 132 - 136
(Voting – All)

12. General Manager, Planning and Community Development — Annex I
Arena Floor Surface Scheduling — pp 137 - 208
(Voting – A, B, D, E, F, Sechelt, Gibsons, SIGD)

COMMUNICATIONS

13. Honourable Minister George Heyman, Ministry of Environment and Climate Change Strategy dated February 7, 2019 — Annex J
Regarding Tetrahedron Provincial Park Boundary — pp 209
(Voting – All)

14. Fred McIntosh received February 8, 2019 — Annex K
Regarding Mahan Road and Dusty Road Well Sites — pp 210
(Voting – All)

NEW BUSINESS

IN CAMERA

ADJOURNMENT

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee Meeting – February 21, 2019

AUTHOR: Remko Rosenboom, General Manager, Infrastructure Services

SUBJECT: **RAW WATER RESERVOIR (S) FEASIBILITY STUDY RESULTS**

RECOMMENDATION(S)

THAT the report titled Raw Water Reservoir(s) Feasibility Study Results be received.

BACKGROUND

The Comprehensive Regional Water Plan as approved in June 2013 identified several projects to increase the water supply for the Chapman Creek water supply system. One of those projects is the raw water reservoir(s) project which explores the potential development of one or multiple raw water reservoir(s) as an additional water supply source.

At the April 26, 2018 Board meeting, the following recommendation was approved:

139/18 **Recommendation No. 3** *Raw Water Reservoir – Feasibility Study Outline*

THAT the report titled Raw Water Reservoir – Feasibility Study Outline be received for information.

In May 2018 the Board approved the Water Sourcing Policy – Framework and updated the policy objective for the water supply of the Chapman Creek System:

> *The SCRD intends to supply sufficient water at Stage 2 levels throughout the year to communities dependent on water from the Chapman Creek System.*
>
> *Emergency circumstances could result in increased Stage levels.*
>
> *If, due to emergency circumstances, the water supply for Chapman Creek is completely unavailable, the SCRD strives to have adequate alternative water supply sources available to address all essential community water demands for at least one week.*

At the December 13, 2018 Planning and Community Development Committee meeting, the report titled 2018 Water Demand Analysis was received. This report presented an outlook of the annual shortfall in the amount of water to satisfy the water supply objective as outlined in the Water Sourcing Policy – Framework. This shortfall is called the Water Supply Deficit.

The table presented below is taken from that report and presents the Water Supply Deficit (in Million cubic metres) for three levels of effectiveness of water conservation initiatives and a 2% average annual population growth within the area supplied by the Chapman Creek System.

Effectiveness of water conservation initiatives (per capita, compared to 2010)	**Water supply deficit (Million m^3)**		
	2025	**2035**	**2050**
Service Area Population	26,000	32,000	43,000
10% reduction	2.01	2.83	4.35
20% reduction	1.65	2.39	3.76
33% reduction	1.22	1.82	2.98

The January 31, 2019 Report Groundwater Investigation Phase 2 Results concludes that the development of a Church Road Area well field could reduce the water supply deficit for 2035, with 20% reduction from conservation, (2.39 Million m^3) with between 29 and 35%.

The development of a raw water reservoir is the only additional water supply source considered by the SCRD that meets the objectives of the Water Sourcing Policy – Framework.

The purpose of this report is to present the results of the raw water reservoir Phase 1 and Phase 2 and continue the work to address the water supply deficit with the development of one or more raw water reservoir(s).

DISCUSSION

Raw Water Reservoir(s) Conceptual Options

Three conceptual options for the connections between a reservoir and Chapman Creek and a reservoir and the Chapman Creek Water Treatment Plant have been defined as:

Concept A: Low elevation raw water reservoir

This conceptual option includes the construction of a reservoir downstream of the current intake location.

Concept A would use the current intake and require the construction of a piping system to supply the water from the current intake to the reservoir and from the reservoir to the treatment plant.

Concept B: High elevation raw water reservoir

This conceptual option includes the construction of a reservoir upstream of the current intake location.

Concept B requires the construction of a new intake and a piping system to supply the water from the new intake to the reservoir and from the reservoir to the treatment plant.

Concept C: Enlarging existing sub-alpine lake

This conceptual option would enlarge the storage volume of an existing sub-alpine lake through the construction of a dam at its outlet.

Conveyance to the treatment plant would occur through Chapman Creek, similar to the current method with flows released from Edwards Lake and Chapman Lake.

The construction of a dam across Chapman Creek to create an instream reservoir was assessed and it was determined that there are no locations in the Chapman Creek watershed where such a reservoir would have a storage capacity large enough to significantly reduce the Water Supply Deficit.

Assessment of the Conceptual Options

A desktop analysis of the Chapman Creek watershed resulted in several potential sites for the construction of a raw water reservoir for each of the conceptual options.

A Multi-Criteria Analysis (MCA) was conducted on these sites and configurations for each of these conceptual options were outlined (Attachment A). These sites were selected using mapping information. Each potential site was scored on criteria related to technical feasibility, economics, environmental impacts and regulatory requirements of the development of a raw water reservoir at that specific location.

The MCA concluded that there are several primary differentiating criteria between all the sites:

- The site-specific characteristics will ultimately determine the estimated storage capacity of a reservoir, not the conceptual option;
- Concept A sites could be the cheapest to operate;
- Concept B sites could be the most expensive to construct;
- Concept A and B sites would be accessible using current roads, where Concept C sites would only be accessible by air or after the construction of a significant number of new roads;
- Staff are familiar with the operations and maintenance of Concept C type reservoirs;
- Concept B sites would require the most amount of infrastructure to be constructed, while Concept C sites would require the least;
- Due to the elevation difference between a reservoir and the treatment plant, Concept B sites have potential to allow for hydropower production.

Selection and Analysis of Potential Sites

Based on the MCA several guiding principles for the development of a raw water reservoir were selected, including:

- A raw water reservoir would, in combination with the Church Road Area well field, provide enough additional supply to eliminate the Water Supply Deficit in 2025 with a 20% conservation initiatives effectiveness (1.65 Million m^3). This resulted in a target volume of between 900,000 m^3 to 1,300,000 m^3
- It would be favorable if a raw water reservoir could be enlarged at some point in the future
- Any embankment of a reservoir would be 15 m high at a maximum. Higher embankments would trigger international requirements with more stringent standards.
- All water distribution into and out of the reservoir would be gravity fed.

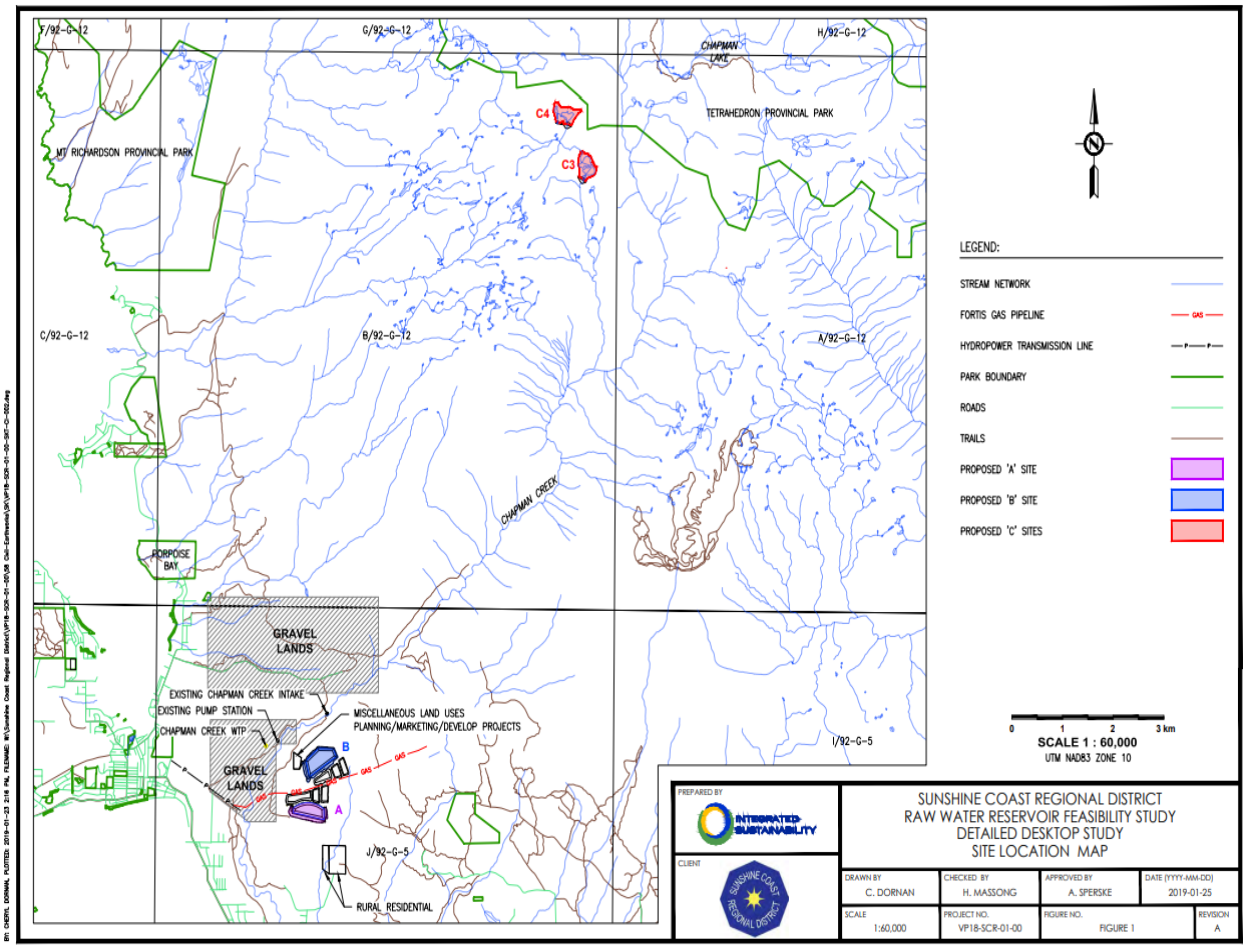
- A raw water reservoir and any associated works should be located on land owned by the SCRD or be on Crown Land for which the SCRD could obtain Land Tenure and should not overlap with any existing land tenures for other utilities (water, gas, electricity).

A more detailed desktop analysis of the Chapman Creek watershed resulted in the selection of five sites that could meet these guiding principles.

The feasibility for the development of a raw water reservoir on one of these five sites was assessed in more detail in a Detailed Desktop Feasibility Study (Attachment B): Site A, Site B and three Concept C sites (C1, C3 and C4).

Upon further analysis it was determined that Site C1 was located on a fault line and the seismic risk is therefore too high for the development of a raw water reservoir. This site was therefore not further assessed.

The map below provides an indication of the locations of the selected sites.



While independently they do not meet the minimum target volume of 900,000m3, cites C3 and C4 are included in the assessment as they are situated in the same sub-watershed and therefore, if both constructed, could function as one large raw water reservoir.

Conceptual designs for raw water reservoirs at these sites are included in Attachment C.

Results for several key characteristics of these sites are presented in the table below.

	Site A	Site B	Site C3	Site C4
Maximum Storage Volume (m^3)	1,118,000	1,291,500	781,9000	856,000
Area (hectares) required for reservoir and stockpiles	45	45	41	35
Main infrastructure to be constructed	Reservoir, Pipes	Reservoir, Pipes, Intake	Dams, Access Roads	Dams, Access Roads
Development costs estimate (Class D)	$ 23,764,000	$ 23,575,000	$9,411,000	$8,698,000
Anticipated Dam Safety Classification	Very high-extreme	High-very high	High	High
Seismic impact susceptibility	Low	Low	Low	Low
Geological suitability	TBD	TBD	TBD	TBD
Presence of species of concern in or in proximity	Yes	Yes	Yes	Yes
Complexity of regulatory process	Moderate	Moderate	Moderate	Moderate
Publically known archeological, cultural or historic sites	No	No	No	No
Suitability as emergency supply	Good	Good	Moderate	Moderate
Operational benefits	Allow for closure of intake and therefore reduction in treatment cost during high turbidity events	Allow for closure of intake and therefore reduction in treatment cost during high turbidity events	N/A	N/A

Note: more details on the development cost estimates are included in Attachment D.

None of the desktop assessments completed to date have resulted in technical issues that cannot be addressed during the development process.

Due to the winter conditions at the sites, the project team has not been able to visit the sites to confirm some of these assessments based on a desktop study, including the geological suitability. The project team anticipate completion of these assessments by May 2019.

Next steps

As part of the current feasibility study, the project team will visit the four selected sites as soon as they are free of snow in the spring of 2019 to do a field reconnaissance and ground suitability.

The work would include several field-based assessments to provide more detailed information on the four selected sites. These assessments would focus on aspects such as:

- Suitability of the ground conditions (type and landslide risk)
- Presence and mitigation options for ecological values
- Hydrological impacts
- Confirmation of preliminary Dam Safety Classification
- Detailed assessments of the operations benefits and,

- Refinement of conceptual designs and cost estimates

The ground assessment results from the four sites will be further examined by applying the Multi Criteria Analyses. The outcomes of these assessments and Multi Criteria Analyses would be the subject of a further report targeted for no later than Q4 2019. This would allow the Board to provide further direction to staff to apply for the required authorizations for one or more raw water reservoirs.

Communication Strategy

Information on this project will be shared broadly through paid advertising, corporate newsletters, social media and the SCRD website.

Staff will reach out to the *shíshálh* Nation to share the findings of this feasibility study.

STRATEGIC PLAN AND RELATED POLICIES

The raw water reservoir Project is intended to supplement the existing water supply and ensure the SCRD can continue to meet its mission of providing quality services to our community through effective and responsive government.

CONCLUSION

The feasibility for the development of a raw water reservoir on one of these five sites was assessed in more detail in a Detailed Desktop Feasibility Study (Attachment B): Site A, Site B and three Concept C sites (C1, C3 and C4).

Field assessments are required to confirm the technical feasibility, operational benefits and the design and costs for the development of a reservoir on each of these sites.

The development of a raw water reservoir is the only additional water supply source considered by the SCRD that meets the objectives of the Water Sourcing Policy – Framework.

The purpose of this report is to present the results of the raw water reservoir Phase 1 and Phase 2 and continue the work to address the water supply deficit with the development of one or more raw water reservoir(s).

Staff recommend receipt of this report and attachments.

Attachments

Attachment A: Conceptual Options
Attachment B: Detailed Desktop Feasibility Study
Attachment C: Conceptual Designs
Attachment D: Development Cost Estimates (Class D)

Reviewed by:			
Manager		Finance	
GM		Legislative	
CAO	X – J. Loveys	GM	

Raw Water Reservoir Feasibility Study

Desktop Assessment & Multi-Criteria Analysis Report

Prepared for

Sunshine Coast Regional District

Integrated Sustainability

18 January 2019

Report Submission To:	Remko Rosenboom
Legal Company Name:	Sunshine Coast Regional District
Company Address:	1975 Field Road, Sechelt, BC, V0N 3A1
Contact Phone Number:	+1 (604) 885-6810
Contact Fax Number:	+1 (604) 885-7909
Contact Email Address:	Remko.Rosenboom@scrd.ca

Submitted By:	AJ MacDonald
Legal Company Name:	Integrated Sustainability
Company Address:	620, 1050 West Pender Street Vancouver, B.C. V6C 3S7
Contact Phone Number:	+1 (778) 886-5714
Contact Fax Number:	+1 (587) 331-7919
Contact Email Address:	AJ.MacDonald@integratedsustainability.ca

Document Number:	VP18-SCR-01-00-RPT-CI-Reservoir_MCA_RevA
Document Path:	P:\SCR\VP18-SCR-01-00\5.0_Tech_Exec\5.7_Civil\MCA Report\VP18-SCR-01-00-RPT-CI-Reservoir_MCA_Rev0.docx
Document Revision Number:	0

WATER | WASTE | ENERGY

CONSULTING & ENGINEERING

Disclaimer

The information presented in this document was compiled and interpreted exclusively for the purposes stated in Section 1.1 of the document. Integrated Sustainability provided this document for the Sunshine Coast Regional District solely for the purpose noted above.

Integrated Sustainability has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this document, but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this document is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Integrated Sustainability does not accept any responsibility for the use of this document for any purpose other than that stated in Section 1.1 and does not accept responsibility to any third party for the use in whole or in part of the contents of this document. Any alternative use, including that by a third party, or any reliance on, or decisions based on this document, is the responsibility of the alternative user or third party.

Any questions concerning the information or its interpretation should be directed to AJ MacDonald.

Document Revision History

Rev No.	Rev Description	Author	Reviewer	Approver	Rev Date
A	Issued for Review	Heather Kalf	Alexa Sperske	AJ MacDonald	10-Dec-2018
0	Issued as Final	Heather Kalf	Alexa Sperske	AJ MacDonald	18-Jan-2019

INTEGRATED SUSTAINABILITY

Table of Contents

Tables within Text

Figures within Text

Tables

Figures

1 INTRODUCTION

Integrated Sustainability has been retained by the Sunshine Coast Regional District (the SCRD) to complete a feasibility study to support development of a raw water reservoir to supplement supply to the existing Chapman Water System (the Project). The Chapman Water System is located along a narrow, coastal portion of the Sunshine Coast region within southwestern British Columbia (BC).

Integrated Sustainability's scope of work for the Project includes two phases:

1) Phase 1 includes a water demand analyses, desktop siting assessments for potential reservoir locations, engagement with the SCRD preliminary environmental and regulatory review, and a preliminary Multi-Criteria Analysis (MCA) of identified sites.
2) Phase 2 includes field assessment of reservoir sites, regulatory and First Nations engagement, conceptual design and cost estimates of sites that meet project objectives, and Phase 2 MCA of selected sites.

1.1 Purpose and Scope

As part of the Phase 1 scope of work for the Project, Integrated Sustainability completed a siting assessment and multi-criteria analysis (MCA) to identify and evaluate potential locations for the raw water reservoir (the Reservoir) within the target study area at a desktop level. This MCA marks the final step in Phase 1 of the Project and combines information collected in the water demand analysis, workshops with the SCRD, preliminary regulatory review, and compares and assesses each of the potential reservoir locations based on the technical, environmental, economic, and regulatory benefits and risks.

The study area for the siting assessment is generally located immediately east of Sechelt, BC and extends north to the boundary of Tetrahedron Provincial Park. A location map indicating the general area of interest is shown in Figure A and is split into three areas, defined as follows:

- Area A: Lower reservoir sites at approximately elevation (El.) 174 m.
- Area B: Middle reservoir sites ranging from approximately El. 217 m to El. 229 m.
- Area C: Upper reservoir sites, known as sub-alpine, and ranging from approximately El. 935 m to El. 1085 m.

Area A reservoirs would need water supply and return pipes connected to the existing raw water pipeline and pump station. Area A reservoirs have the fixed constraint of a top water level of El. 174 m, which is the nominal limit that can be supplied from the existing diversion weir at El. 175 m.

In comparison, all Area B reservoirs require addition of a new weir on Chapman Creek at a higher elevation. However, the Area B reservoirs can bypass the existing pump station and connect to the existing raw water pipeline upstream of the Water Treatment Plant.

For Area C, the reservoirs would be operated using watershed drainage into Chapman creek during periods when needed, so would likely not require additional infrastructure outside of the constructed dam for the reservoirs.

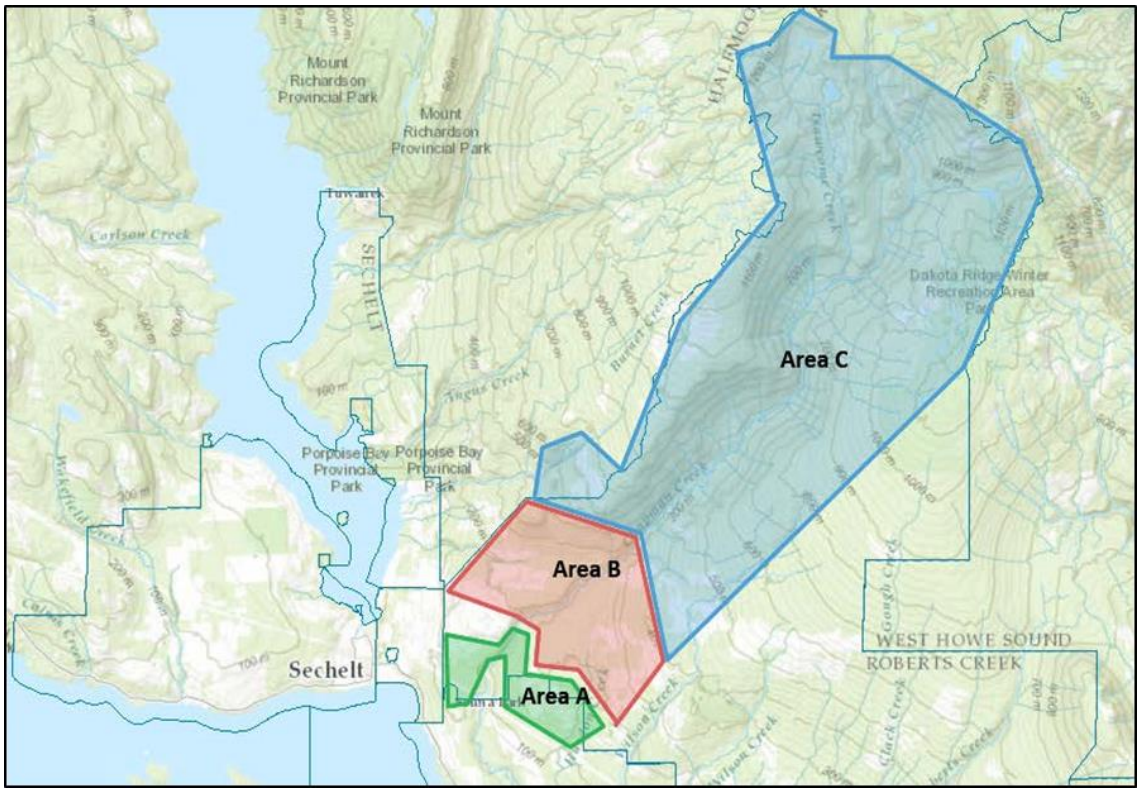


Figure A. Location Map of the Study Area

1.2 Background

The SCRD supplies water to residents and businesses along the sunshine coast within three water service areas, including the Regional Water Service Area (RWSA), North Pender Harbour Water Service Area, and South Pender Harbour Water Service Area (Opus DaytonKnight 2013). Together, the three water services areas extend approximately 85 km along the coast between Egmont, BC and Landale, BC. The Chapman Water System is the primary water system in the RWSA, but also includes Langdale, Soames Point, Granthams Landing, Eastbourne, Cove Cay and Egmont water systems, which are not covered within the Project.

Chapman Creek is the primary water source for the Chapman Water System and conveys water from Chapman Lake and Edwards Lake to the Chapman Creek Water Treatment Plant (WTP). Chaster Well is an additional water source for the Chapman Water System. The SCRD holds waterworks and water storage licenses on Chapman Creek. Water is currently conveyed from Chapman Creek to the WTP via a creek intake and a pipeline. In 2017, a specified minimum environmental streamflow was implemented for Chapman

Creek, which stipulates that a minimum flow of 200 L/s (17,280 m^3/day) downstream of the intake must be maintained (FLNRO 2017).

In 2013, a Comprehensive Regional Water Plan (CRWP) was prepared to provide direction for the SCRD to meet regional sustainability goals, guidance for water conservation, and recommendations for system expansion and improvement measures to accommodate growth projections identified to the year 2036 (Opus DaytonKnight 2013). Included in the CRWP are recommendations for expansion of Chapman Lake, additional production wells, and a raw water reservoir to store water from Chapman Creek to supplement the potable water supply during periods with low precipitation. The storage volumes recommended in the CRWP for a water storage reservoir under the intensive demand management (IDM) and existing demand management (EDM) scenarios were 430,000 m^3 and 760,000 m^3, respectively. The recommendations were based on the existing water sources, current and projected water demands, and downstream flow for Chapman Creek.

In 2018, the SCRD developed a Framework for the Development of a Water Sourcing Policy (SCRD 2018b), which outlines policy considerations, water demand (based on the CRWP), existing and potential (additional) water sources, an outline for the current supply strategy, and a strategy for development of additional supply sources. The proposed additional supply sources include three projects, including the raw water reservoir.

1.3 Key Project Drivers

The purpose of this Preliminary Site Assessment and Multi-Criteria Analysis is to complete an initial identification and screening for multiple reservoir locations. The following project drivers were identified by the SCRD and used as preliminary criteria for site identification and screening, and later for evaluation:

- The reservoir is to be located within land owned by the SCRD or Crown land.
- The reservoir is not to be located on privately owned land.
- The reservoir is not to be located within Tetrahedron Provincial Park, Gravel Lands as per shíshálh Nation Foundation Agreement, or Fortis BC right-of-way (ROW).
- Maximum embankment height of less than 15 m to avoid triggering additional dam safety requirements.
- Minimum storage volume considered for a reservoir is 900,000 m^3, due to the results of the water demand analysis, which were presented in the Water Demand Analysis Report (Integrated Sustainability 2018)
- For Phase 1, the target storage capacity of the reservoir is 2,300,000 m^3, which is based on the modelled supply deficit for the year 2035 and detailed in the Water Demand Analysis Report (Integrated Sustainability 2018). For Phase 2, the reservoir storage capacity will aim to achieve 900,000 m^3 to 1,300,000 m^3.

2 SITING ASSESSMENT AND POTENTIAL RESERVOIR LOCATIONS

2.1 Siting Assessment

The siting assessment for potential reservoir locations was based on consideration of the existing infrastructure described in Section 1.2 and project drivers detailed in Section 1.3. Based on a review of topography, eleven potential reservoir locations were originally identified in the target Areas.

The British Columbia Oil and Gas Commission (BC OGC) Application Analysis Tool (the Tool) was then used to investigate the eleven potential reservoir locations for additional environmental and regulatory constraints. The Tool provided a separate report for each location which queried select layers available in iMap BC. Some of the identified information included: environmentally sensitive areas, watershed reserves, private/crown land, Agricultural Land Reserve (ALR) land, and aquatic and terrestrial species.

This information was incorporated into the Phase I MCA Assessment of the potential reservoir locations described in the following section.

2.2 Potential Reservoir Locations

The following sections describe the eleven potential reservoir locations identified, grouped as per each of the Areas. The potential reservoir locations range in storage capacity between 900,000 m^3 (minimum) and 2,300,000 m^3 (target). A summary of the desktop siting assessment for each reservoir is provided in Table 1, and approximate footprint for each of the reservoirs are shown on Figures 1 through 3. Figure 1 and Figure 2 depicts the estimated locations for A1, A2, B1, B2, C1, C2, C3, and C4, based on initial desktop review. Figure 3 depicts the locations of A1-2-E, B1-E, and B1-2-E, which were modelled after the initial desktop review, using software to confirm approximate storage capacities for an engineered pond (E series).

2.2.1 Area A – Lower Reservoir Sites

Two approximate reservoir locations were identified in Area A, as shown on Figure 1. Based on this information, another reservoir was modelled (E series), as shown on Figure 3. A high-level summary of each reservoir location has been provided below:

1) Reservoir A1 (approximate volume: 980,000 m^3)
   - Estimated location, based on desktop review
   - A 3-sided dam on a flat area below the gas line
   - Located partially within the shíshálh Nation Gravel Lands; however, does not appear easily accessible by the shíshálh Nation
2) Reservoir A2 (approximate volume: 990,000 m^3)
   - Estimated location, based on desktop review
   - Located partially on crown land and partially in ALR

- Could be built as a 2-sided extension to Reservoir A1 (located to the west)

3) Reservoir A1-2-E (approximate volume: 2,300,000 m^3)
   - Refined location based on approximate software model
   - Located partially on crown land and partially in ALR
   - It represents a hybrid version of A1 and A2

2.2.2 Area B – Middle Reservoir Sites

Two potential reservoir locations were identified in Area B, as shown on Figure 1. Based on this information, two additional reservoirs were modelled (E series), as shown on Figure 3. A high-level summary of each reservoir location has been provided below:

1) Reservoir B1 (approximate volume: 1,800,000 m^3)
   - Estimated location, based on desktop review
   - A 2-sided dam above the gas line
   - This reservoir site has the potential to be expanded to increase storage volume by increasing the dam height to approximately 25 m to 35 m. The increased dam height would provide approximately up to 3,500,000 m^3 and 8,000,000 m^3 of storage, respectively. Extending the reservoir dam height to 35 m would likely impact private land; however, this may be feasible for future consideration.
2) Reservoir B2 (approximate volume: 1,000,000 m3)
   - Estimated location, based on desktop review
   - A 2-sided dam above the rifle range
   - Footprint extends into private land (quarry), so this option will likely require the SCRD to purchase the quarry land
3) Reservoir B1-E (approximate volume: 2,300,000 m^3)
   - Refined location based on approximate software model
   - Located partially on crown land and partially in ALR
4) Reservoir B1-2-E (approximate volume: 2,300,000 m^3)
   - Refined location based on approximate software model
   - It represents a hybrid version of B1 and B2
   - Footprint extends into private land (quarry), so this option likely requires SCRD to purchase the quarry land; however, due to the larger footprint, it is expected that the dam height may be reduced to approximately 11 m.

2.2.3 Area C – Upper Reservoir Sites

Four potential reservoir locations were identified in Area C, as shown on Figure 2. A high-level summary of each reservoir location has been provided below:

1) Reservoir C1 (approximate volume: 1,700,000 m^3)

- A long, 2-sided dam to raise multiple sub-alpine lakes
- Located on crown land within Dakota Ridge recreation site

2) Reservoir C2 (approximate volume: 900,000 m^3)
   - A 1-sided dam to raise a sub-alpine lake
   - Located on crown land within Dakota Ridge recreation site
3) Reservoir C3 (approximate volume: 1,200,000 m^3)
   - A 1-sided dam to raise a sub-alpine lake
   - Located on crown land
4) Reservoir C4 (approximate volume: 1,000,000 m^3)
   - A 1-sided dam to raise a sub-alpine lake
   - Located on crown land

3 MULTI-CRITERIA ANALYSIS (MCA) RESULTS

3.1 Methodology

The MCA provides an evaluation of technical, economic, environmental and regulatory considerations that may influence the future development of a water storage reservoir to supply the Chapman Water System. The MCA framework helps to compare options based on a set of pre-defined criteria. The criteria under each category are assigned a value from 1 (Significant Disadvantage) to 5 (Significant Advantage) based on the opportunity and risk impacts associated with an option when compared to the remaining options, as depicted below:

Significant Disadvantage	Moderate Disadvantage	Null	Moderate Advantage	Significant Advantage
1	2	3	4	5

The categories used to compare options included Technical Feasibility, Economics, Environmental Impacts, and Regulatory Requirements. Criteria within these categories were developed based on the SCRD's project drivers and constraints. Each criterion was then assigned a weighting value based on the level of importance of it in meeting the project goals and objectives.

3.2 Criteria and Summary of Results

To calculate an overall score for each option, the assigned value given to each criterion is multiplied by the criterion's weighting. The Phase 1 MCA evaluation criteria and weighting agreed upon after discussion with the SCRD are summarized in Table A. Based on the total of each weighted score, the options are ranked from most preferred (highest score) to least preferred (lowest score).

Table A. Phase 1 MCA Criteria and Weighting

Criteria	Sub-Criteria	Weight Assigned
Technical Feasibility		**42**
Volume of Reservoir	Minimum: 900,000 m^3 Target: 2,300,000 m^3 (2035)	8
Distance to Chapman Creek Water Treatment Plant Connection Point	Approximate length of pipe to supply WTP (in meters)	4
Conveyance method of water to reservoir	Watershed drainage or pipe supply to reservoir	4
Conveyance method to WTP	Gravity feed or pump station	5
Addition of weir	Is a new weir required?	2
Development area (m^2) and classification of land	Location on crown land in watershed area, ALR, private land, Gravel Lands or development agreement applications	8
Scalability	Ability to expand for larger capacity (phased approach) by increasing area or dam height	2
Dam Consequence of Failure Rating	Population and infrastructure at risk below dam	5
Access	Road access or remote location (helicopter/hike in)	4
Economics		**28**
Capital cost of development	Qualitative capital cost comparison	12
Lifecycle cost	Qualitative asset management cost comparison	8
Operating cost	Qualitative operating cost comparison	6
Hydro development potential	Location allows for development of hydro-electric generation	2
Environmental Impacts		**15**
Impact on aquatic habitat		6
Impact on terrestrial habitat		7
Energy consumption, greenhouse gas emissions		2
Regulatory Requirements		**15**
Level of regulatory engagement required	Number of regulatory triggers and high-level regulatory timeline review	8
Major regulatory road blocks	Preliminary identification of regulatory or permit requirements that are challenging	7
Total		**100**

The results of the Phase 1 Preliminary Site Assessment MCA are provided in Table 2 attached. The results were presented to the SCRD in a workshop on 19 November 2018 and were modified based on the workshop discussion.

The following sections summarize the advantages and disadvantages associated with each option with respect to each of the four categories; Technical feasibility, Economics, Environmental Impacts, and Regulatory Requirements.

3.2.1 Technical Feasibility

This category considers all the technical criteria selected for the Preliminary Site Assessment. Each location may have different advantages and disadvantages with regards to the volume of water that can be stored, the site access, associated infrastructure needed, and possibility of future expansion.

The following summarizes the major advantages and disadvantages of the reservoirs within each area with regards to the technical feasibility criteria.

Area A

Advantages

- Volume: Of the three reservoirs described in Area A, the "Modelled" reservoir (A1-2-E) is sized to achieve the target water deficit volume of 2.3 Mm^3.
- Additional Weir: Reservoirs located in Area A do not require a new intake/weir, since they are located downstream of the existing intake.
- Development Area: Reservoir A1-2-E and A2 are located within ALR and Crown land.
- Site Access: All reservoirs located in Area A have road access to the sites.

Disadvantages

- Volume: Reservoir A1 is expected to be just above the minimum volume set for this preliminary evaluation.
- Distance to Chapman WTP: The Area A reservoirs are at least 1,200 m from the WTP and will require piping to transfer water to and from the system.
- Development Area: Reservoir A1 is partially within the Gravel Lands. Further assessment is required to determine if this is a feasible location for development.
- Scalability: Area A reservoirs cannot be expanded for larger capacity while still receiving all water from Chapman Creek. Potentially some additional storage could be provided to capture local surface runoff, but this is expected to be minimal.
- Dam Consequence of Failure: Area A reservoirs are the closest to residential, commercial, and industrial developed areas so would likely have the most significant impact in the event of a dam failure.

Area B

Advantages

- Volume: Of the four reservoirs described in Area B, the "Modelled" reservoirs (B1-E and B1-2-E) are sized to the 2.3 Mm^3, which is the target water deficit volume in 2035.
- Development Area: Reservoir B1 and B1-E are located partially within Agricultural Land Reserve, Crown Land, and Watershed reserve.
- Scalability: Reservoir B1 could be expanded to hold a volume of 2,500,000 m^3, by increasing the dam height to 25 m, or to 8,000,000 m^3, by increasing the dam height to 35 m. Reservoir B1-E, being in the same location, could also be expanded with increased dam height. These would then trigger additional regulatory scrutiny.
- Site Access: All 4 reservoirs located in Area B have road access to the sites.

Disadvantages

- Addition of weir: All Area B reservoirs require addition of a new weir on Chapman Creek at a higher elevation.
- Conveyance method to reservoir: All Area B reservoirs require installation of water supply piping from the weir to the reservoir (minimum of 1,600 m).
- Development Area: Reservoirs B1-2-E and B2 are partially located within private land (quarry).
- Scalability: Reservoirs B1-2-E and B2 cannot be expanded for larger capacity.

Area C

Advantages

- Volume: Out of the 4 sites evaluated in Area C, Reservoir C1 has the largest available storage volume of 1,700,000 m^3.
- Distance to Water Treatment Plant: Although the distance to the WTP is highest for these reservoirs, connecting infrastructure may not be required because the Area C options could potentially use the existing watershed drainage.
- Conveyance methods to and from the reservoir: Area C reservoirs utilize watershed drainage for collection of water and supply to the Chapman Creek water system.
- Development Area: Reservoirs C3 and C4 are located completely within Crown Land.
- Dam Consequence of Failure: The Area C reservoirs are located in the sub-alpine with very little development in the area. However, because it would feed into the existing watershed system, the consequence of failure would be based on the effects to the existing drainage paths.

Disadvantages

- Volume: Reservoir C2 only provides the minimum volume set for this preliminary evaluation.
- Scalability: None of the Area C reservoirs could be expanded for larger capacity
- Access: No existing site access to any of the Area C reservoirs, which would increase costs.

3.2.2 Economics

The cost of development and operation of each of the reservoirs was evaluated at a very high level for this Preliminary Site Assessment. In general, the smaller reservoirs have lower capital costs of development; however, there is an economy of scale that would be achieved with the larger volume reservoirs. This can be evaluated in the Phase 2 MCA when conceptual design drawings have been completed. The following summarizes the major advantages and disadvantages of the reservoirs within each area with regards to the economics criteria. Potential hydro-electrical power generation is possible with the Area A and B reservoirs; however, the economics of this have not been evaluated in Phase 1. This evaluation will be included in the Phase 2 assessment.

Area A

Advantages

- Operating Costs: Reservoirs in Area A would utilize existing pump station, so the only additional operating costs would be for maintenance of the reservoir and perimeter fence.

Disadvantages

- Life-Cycle Costs: The asset management costs would be high for the Area A reservoirs, due to the additional infrastructure assets (piping supply/return, fence, access road).

Area B

Advantages

- Hydro potential: Area B reservoirs have hydro-electric generation potential of up to 2MW.

Disadvantages

- Capital Costs: Reservoirs B1-2-E and B2 would likely have high capital costs due to the cost to acquire private land.
- Life-Cycle Costs: The asset management costs would be high for the Area B reservoirs, due to the additional infrastructure required (weir, piping supply, fence, access road).

Area C

Advantages

- Capital Costs: At a high-level cost evaluation, the construction of the smaller reservoirs in the sub-alpine (Area C) would likely have a medium capital cost (C2, C3, and C4), since only a one-sided dam wall is needed for each. There is no additional infrastructure (piping or fence) needed to utilize a storage reservoir in these locations.
- Life-Cycle Costs: The asset management costs would be low for the Area C reservoirs provided conveyance of water can utilize the existing watershed drainage paths. However, some upgrades to the existing Chapman Creek water conveyance piping may be required due to additional flow volume from the reservoir. Lifecycle costs will be evaluated in Phase 2.

Disadvantages

- Hydro potential: Area C reservoirs do not have hydro-electric generation potential.

3.2.3 Environmental Impacts

The environmental impacts were evaluated at a high level for Phase 1. Integrated Sustainability utilized the BC OGC Application Analysis Tool (the Tool) to investigate the proposed spatial location of each reservoir for environmental and regulatory constraints. The Tool provided a separate report for each location which queried select layers available in iMap BC. Some of the identified information included: environmentally sensitive areas, watershed reserves, private/crown land, ALR land, and aquatic and terrestrial species at risk. A more detailed evaluation of environmental impacts will be completed in the Phase 2 assessment, which will also include a visual field assessment.

The following summarizes the major advantages and disadvantages identified in this Preliminary Site Assessment of the reservoirs with regards to the environmental criteria.

Area A

Advantages

- Impact on terrestrial habitat: Reservoirs A1 and A2 are located within a logged area and there are no identified sensitive species noted at this stage of assessment.

Disadvantages

- Impact on terrestrial habitat: Reservoir A1-2-E is located within an environmentally sensitive area (BC red list: Sitka spruce/salmonberry). The configuration of this reservoir could be modified to avoid environmentally sensitive areas, but may reduce the storage capacity.

Area B

Advantages

- Impact on terrestrial habitat: Reservoirs B1-E, B2 and B1-2-E are located within a logged area and there are no identified sensitive species noted for this level of assessment.
- Energy Consumption: Area B reservoirs are at a high enough elevation such that the supply to the WTP can bypass the existing pump station.

Disadvantages

- Impact on aquatic habitat: Area B reservoirs all require addition of a new weir in Chapman Creek, which may affect aquatic habitat.
- Impact on terrestrial habitat: Reservoir B1 is located within an environmentally sensitive area (BC red list: Sitka spruce/salmonberry). The configuration of this reservoir could be modified to avoid environmentally sensitive areas, but may reduce the storage capacity.

Area C

Advantages

- Impact on aquatic habitat: The Area C reservoirs do not require building additional infrastructure within Chapman creek.

Disadvantages

- Impact on terrestrial habitat: Area C reservoirs are all located within mature forest regrowth areas
- Flooding forested areas creates greenhouse gas emissions

3.2.4 Regulatory Review Summary

For Phase 1, Integrated Sustainability completed a high-level review that consisted of looking at publicly available information and maps. Information evaluated consisted of the following:

- environmentally sensitive areas
- watershed reserves, private/crown land, and ALR land
- aquatic and terrestrial species

This information was incorporated into the Phase I MCA Table and supported in identifying potential regulatory roadblocks.

Based on the meeting with the SCRD Project Manager on 13 November 2018 to discuss First Nations or Regulatory communications completed to date, it was decided that the focus for Phase 1 of the project would be on identification of regulatory deliverables and

the First Nations engagement will begin once the regulatory deliverables have been identified. The SCRD Project Manager provided contact information for a representative at the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). A meeting was held on 21 November 2018 and it was identified that Land Tenure (if on Crown land) and a Water License will likely be required for any of the reservoir sites and a Section 11 notification would be required for changes in and about a stream for the options requiring a new weir.

In Phase 2, once specific reservoir information is available, the general regulatory timelines and requirements for licensing will be established and engagement with First Nations will begin.

The following summarizes the major advantages and disadvantages identified at a high level in the Preliminary Site Assessment of the reservoirs with regards to the regulatory criteria.

Area A

Advantages

- Level of Regulatory Engagement required: From a high-level review of regulatory requirements, reservoirs A1 and A2 require the lowest level of regulatory engagement

Disadvantages

- Regulatory roadblocks: The preliminary regulatory evaluation identified that reservoir A1-2-E is located within an environmentally sensitive area (BC red list: Sitka spruce/Salmonberry) and Section 16 Map Reserve (Treaty Area).
- Reservoir A1 extends partially within the shíshálh Nation Gravel Lands.

Area B

Advantages

- Regulatory roadblocks: The preliminary regulatory evaluation did not identify regulatory roadblocks for reservoirs B1-E, B2, or B1-2-E.

Disadvantages

- Level of regulatory engagement required: Area B reservoirs would require an additional permit for construction of weir in Chapman Creek (Section 11 Notification for Changes in and about a Stream).
- Regulatory roadblocks: The preliminary regulatory evaluation identified that reservoir B1 is located within an environmentally sensitive area (BC red list: Sitka spruce/Salmonberry)

Area C

Advantages

- Regulatory roadblocks: The preliminary regulatory evaluation did not identify any regulatory roadblocks for Area C reservoir sites.

Disadvantages

- Level of regulatory engagement required: Area C reservoirs may require additional regulatory involvement to evaluate the development impacts in this area. Further evaluation of Area C sites will be completed in Phase 2.

4 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Table B provides the overall ranking of the options resulting from the MCA analysis.

Table B. MCA Option Ranking Summary

Option	Unweighted Rank	Unweighted Score	Weighted Rank	Weighted Score
Option 1: Reservoir A1	3	57	5	310
Option 2: Reservoir A1-2-E	8	55	9	300
Option 3: Reservoir A2	2	59	3	326
Option 4: Reservoir B1	3	57	8	303
Option 5: Reservoir B1-E	1	63	1	330
Option 6: Reservoir B2	11	53	11	267
Option 7: Reservoir B1-2-E	6	56	10	291
Option 8: Reservoir C1	8	55	6	306
Option 9: Reservoir C2	10	54	6	306
Option 10: Reservoir C3	3	57	1	330
Option 11: Reservoir C4	6	56	4	322

Based on the results of the Preliminary Site Assessment, the following five reservoir options are deemed the most favourable:

- C3 (1,200,000 m^3)
- B1-E (2,300,000 m^3)
- A2 (990,000 m^3)
- C4 (1,000,000 m^3)
- A1 (980,000 m^3)

These reservoirs are the top five sites identified at this stage, however, the differences between these and the remaining sites in the top eight is not large, as can be seen in Table B above. It is clear from the table that the options extending into the private land

(B2 and B1-2-E) are the least favorable, both with weighted scores less than 300. Also, reservoir C2, with only 900,000 m^3 of storage available, is not deemed a favorable option when compared against the other Area C sites, even though C2 ranks sixth overall (tied with C1) with a weighted score of 306.

Based on the Phase 1 assessment, four sites are excluded from further study in Phase 2, as follows:

- The site on gravel lands located next to the Chapman Creek Water Treatment Plant, which was originally contemplated in the CRWP, will be excluded as it lies completely within the shíshálh Nation gravel lands.
- Sites B1-2-E and B2 will be excluded because the current footprint extends partially into private land.
- Site C2 will be excluded because it can hold the minimum volume considered for this preliminary assessment (900,000 m^3), which makes it much less favorable when compared to the other Area C sites.

4.2 Recommendations for the Phase 2 Site Assessment

For Phase 2 of the study, typically the top five options from the Preliminary Site Assessment MCA would be evaluated in more detail. However, the reservoir options are not all clearly separated by site location, but instead in the case of the Area A and B sites, are varying configurations, and based on the preliminary review, not enough conclusions can be made to eliminate any of the areas. Factors such as topographical and geotechnical considerations, land category, supply and return pipeline lengths, aquatic and terrestrial habitat characteristics are all characteristics of the site, not the specific reservoir configurations. Therefore, for the Phase 2 field assessment of a site, the results can be extended to multiple configurations within the same area.

The following will be completed in the Phase 2 Assessment:

- Reservoir volumes to be considered will fall within the range of 900,000 m^3 to 1,300,000 m^3, as requested by SCRD project manager in 9 January 2019 Project Meeting.
- Complete the visual field assessments, environmental and regulatory evaluations.
- Conceptual designs will be developed for five reservoir configurations, assuming one layout per site area (Areas A, B, C1, C3, and C4). Conceptual layout options will be evaluated in a Phase 2 Multi-Criteria Analysis.

5 LIMITATIONS

Integrated Sustainability's services consist of professional opinions, conclusions, and recommendations that are made in accordance with generally accepted, local engineering principles and practices at the time our services were performed. This warranty is in lieu of all other warranties, either express or implied.

The recommendations contained in this report are based on the data obtained and discussions between Integrated Sustainability and the Sunshine Coast Regional District for the analysis conducted.

This report has been prepared for the exclusive use of the Sunshine Coast Regional District and their consultants for specific application of the water demand analysis for the Chapman Water System, for the Raw Water Reservoir Feasibility Study project, as described herein. In the event that there are any changes in the ownership, nature, design, or location of the proposed project, or if any future additions are planned, the conclusions and recommendations contained in this report should not be considered valid unless (1) the project changes are reviewed by Integrated Sustainability, and (2) the conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for un-consulted use of segregated portions of this report.

6 CLOSURE

Integrated Sustainability would like to thank the Sunshine Coast Regional District for the opportunity to support the Raw Water Reservoir Feasibility Study project. We trust that this MCA Summary Report meets the needs and expectations of the Sunshine Coast Regional District. If you have any questions, please contact the undersigned at any time.

Sincerely,

Integrated Sustainability

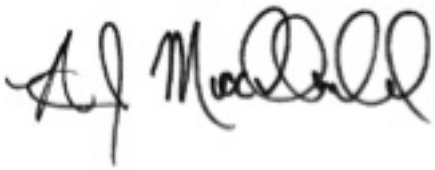
Heather Kalf, P.Eng.

Project Engineer

Reviewed by:

Alexa J. Sperske, P.Eng.

Senior Geotechnical Engineer



AJ MacDonald, M.A.Sc, P.Eng.

Project Manager

7 REFERENCES

Integrated Sustainability Ltd. 2018. *Water Demand Analysis Report.* 30 November 2018

Ministry of Forest, Land, Natural Resource Operations of British Columbia (FLNRO). 2017. *Letter re: Order for Regulation of Flow in Chapman Creek*. 19 July 2017

Opus DaytonKnight Consultants Ltd. (Opus DaytonKnight). 2013. *Sunshine Coast Regional District Comprehensive Regional Water Plan.* D-02820.00. June 2013.

Sunshine Coast Regional District (SCRD). 2018a. *e-mail from Remko Rosenboom, RWR information request.* 28 September 2018.

Sunshine Coast Regional District (SCRD). 2018b. *Framework for the Development of a Water Sourcing Policy.* 2018.

INTEGRATED SUSTAINABILITY

Tables

INTEGRATED SUSTAINABILITY

Table 1- Site Summary

Project Name: Raw Water Reservoir Feasibility Study
Client Name: Sunshine Coast Regional District
Project Manager: AJ MacDonald

Project Number: VP18-SCR-01-00
Date: 2019-Jan-15
Rev #: 0

Reservoir Site Description	A1[1]	A1-2-E	A2[1]	B1[1,3]	B1-E	B2[1]	B1-2-E	C1[1]	C2[1]	C3[1]	C4[1]
Catchment Area	Lower	Lower	Lower	Middle	Middle	Middle	Middle	Upper	Upper	Upper	Upper
Approximate Elevation (m)[1]	174	174	174	217	219	233	229	1085	935	1010	1060
Recharge from natural catchment	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Conveyance to WTP	Pipe via exist pump stn	Pipe via exist pump stn	Pipe via exist pump stn	Pipe direct to WTP	Pipe direct to WTP	Pipe direct to WTP	Pipe direct to WTP	Overland flow to Chapman Cr.	Overland flow to Chapman Cr.	Overland flow to Chapman Cr.	Overland flow to Chapman Cr.
New water diversion licence	N	N	N	Y	Y	Y	Y	N	N	N	N
Approximate Volume (M cu.m)	0.9	2.2	0.9	1.8	2.3	1.0	2.3	1.7	0.9	1.2	1.0
Approximate Reservoir Area (sq.m)	100,000	338,000	150,000	310,000	249,000	125,000	360,000	250,000	130,000	150,000	150,000
Maximum Dam Height (m)	15	15	15	15	15	15	11	15	15	15	15
Estimated Dam Consequence of Failure[2]	Medium to high	Medium to high	Medium to high	Low to medium	Low to medium	Low to medium	Low to medium	Low to medium	Low to medium	Low to medium	Low to medium
Gravel Land	Yes (Part)	No	No	No	No	No	No	No	No	No	No
Private Land	No	No	No	No	No	Yes (part)	Yes (part)	No	No	No	No
Crown Land	Yes	Yes	Yes	Yes	Yes	Yes (part)	Yes (part)	Yes	Yes	Yes	Yes
ALR	No	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Watershed Reserve	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Community Watershed	No	No	No	No	No	Yes[6]	Yes[6]	Yes[6]	Yes[6]	Yes[6]	Yes[6]
Environmentally Sensitive	Low	High[4]	Low	High[4]	Low	Medium	Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium
Crown Tenures	Yes	Yes[5]	Yes	Yes	Yes	Yes[7]	Yes	Yes[8]	Yes[8]	Yes[9]	Yes[9]
Potential Regulatory Roadblocks*	No	Yes[5]	No	Yes[4]	No	No	No	No	No	No	No
Land Condition	Logged	Logged	Logged	Logged, poor regrowth	Logged, poor regrowth	Quarry	Logged, poor regrowth, Quarry	Mature regrowth	Mature regrowth	Mature regrowth	Mature regrowth
Road Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No

1. Reservoirs have not been modelled, and associated estimated elevations, volumes, areas, and average depths are approximated for discussion only.
2. Flood mapping is requried to accurately assess resulting consequnce of failure, as per Canadian Dam Association (CDA) guidelines.
3. Previously described as B1-B
4. BC Red List Sitka Spruce / Salmonberry Dry Hudson Creek , 2 km north of confluence with Wison Creek
5. Section 16 Map Reserve - Treaty Area
6. Chapman Community Watershed
7. Active -Forest Service Road, LOC - Commuity Facility, Section 17 -Designated Use Area
8. Dakota Ridge Recreation Site, Section 17 -Designated Use Area
9. SEC 17 - Designated Use Area
*** The potential regulatory roadblocks have not been assessed during an in-depth investigation**

Multi-Criteria Analysis - Ranking Worksheet

INTEGRATED SUSTAINABILITY

Project: Raw Water Reservoir Feasibility Study
Subject: Phase 1- Site Assessment Multi-Criteria Analysis
Date: December 10, 2018
Revision: 1

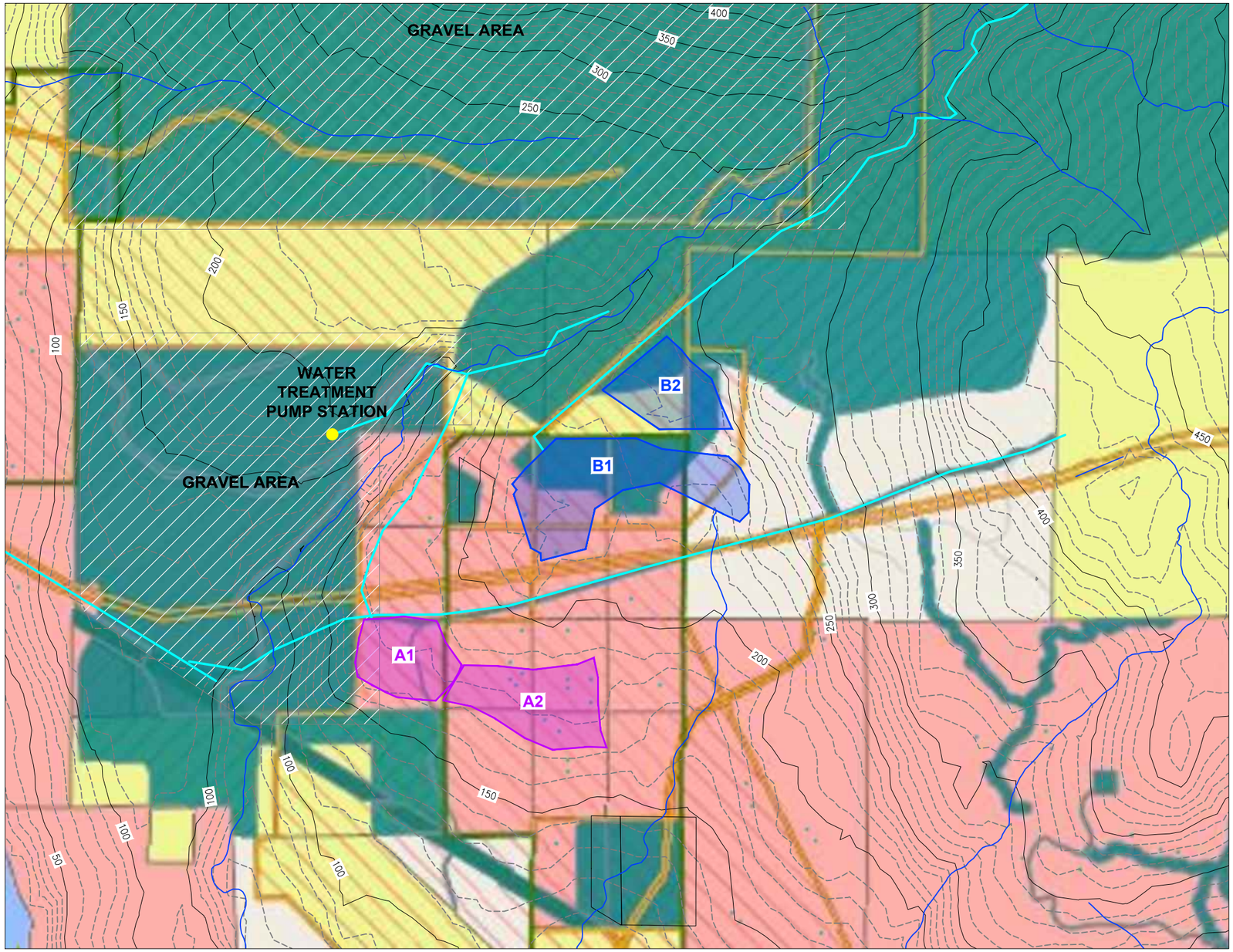
Significant Disadvantage	Moderate Disadvantage	Null	Moderate Advantage	Significant Advantage
1	2	3	4	5

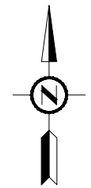
Weighting Sensitivity Case: Base Case

Evaluation Criteria				Options																							
Criteria Heading	Criteria Subheading	Criteria Considerations	Weighting	Option 1: A1: Lower reservoir site (980,000 m3)		Option 2: A1,2-E: Lower reservoir site (2,300,000 m3)		Option 3: A2: Lower reservoir site (990,000 m3)		Option 4: B1: Middle reservoir site (1,800,000 m3)		Option 5: B1-E: Middle reservoir site (2,300,000 m3)		Option 6: B2: Middle reservoir site (1,000,000 m3)		Option 7: B1,2-E: Middle reservoir site (2,300,000 m3)		Option 8: C1: Upper reservoir site (1,700,000 m3)		Option 9: C2: Upper reservoir site (900,000 m3)		Option 10: C3: Upper reservoir site (1,200,000 m3)		Option 11: C4: Upper reservoir site (1,000,000 m3)	
				Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments
Technical Feasibility			**42**																						
	Volume of reservoir	Minimum: 900,000 m3; Targets: 2.3 Mm3 (2035) and 3.6 Mm3 (2050)	8	2	Just above minimum volume required.	5	Meets 2035 demand model.	2	Just above minimum volume required.	4		5	Meets 2035 demand model.	2	Just above minimum volume required.	5	Meets 2035 demand model.	4		1	Minimum volume required.	3		2	Just above minimum volume required.
	Distance to Chapman WTP connection point	Approximate length of pipe to supply WTP (in meters)	4	2	1200 meters	2	1300 meters	2	1300 meters	4	500 meters	4	500 meters	4	600 meters	4	500 meters	5	No piping, distance not a factor	5	No piping, distance not a factor	5	No piping, distance not a factor	5	No piping, distance not a factor
	Conveyance method of water to reservoir	Watershed drainage or pipe supply to reservoir	4	3	Tap into existing raw water pipe at 155 m, 1200 meter pipe supply	3	Tap into existing raw water pipe at 155 m, 1300 meter pipe supply	3	Tap into existing raw water pipe at 155 m, 1300 meter pipe supply	2	Gravity feed from new intake, approximately 2200 meter pipe supply	2	Gravity feed from new intake, approximately 2200 meter pipe supply	3	Gravity feed from new intake, approximately 1600 meter pipe supply	3	Gravity feed from new intake, 1600 meter pipe supply length	5	water shed drainage, low risk of lower than expected volume	5	water shed drainage, low risk of lower than expected volume	5	water shed drainage, low risk of lower than expected volume	5	water shed drainage, low risk of lower than expected volume
	Conveyance method to Water Treatment Plant	Gravity Feed or pump station	5	4	Use existing pump station. 1200 m pipe return	4	Use existing pump station, 1300 m pipe return	4	Use existing pump station, 1300 m pipe return	5	Connect to raw water tie-in at 155 m (500 m pipe). Bypass of existing pump station provides benefit of redundant infrastructure	5	Connect to raw water tie-in at 155 m (500 m pipe). Bypass of existing pump station provides benefit of redundant infrastructure	5	Connect to raw water tie-in at 155 m (600 m pipe). Bypass of existing pump station provides benefit of redundant infrastructure	5	Connect to raw water tie-in at 155 m (500 m pipe). Bypass of existing pump station provides benefit of redundant infrastructure	3	use existing infrastructure	3	use existing infrastructure	3	use existing infrastructure	3	use existing infrastructure
	Addition of Weir	Is a new weir needed?	2	5	No	5	No	5	No	1	Yes	1	Yes	1	Yes	1	Yes	5	No	5	No	5	No	5	No
	Development area (in m2) and classification of land in area	Amount of each of crown land, watershed area, ALR, private land, gravel lands, development agreement applications.	8	2	100,000 m2. Partially in Gravel land, but the area looks to be not useable for that purpose. Negotiations possible	4	338,000 m2. Partially in ALR	4	150,000 m2. Partially in ALR	4	310,000 m2. Partially in ALR	3	249,000 m2. Partially in ALR and watershed reserve.	1	125,000 m2. Partially on Private land (Quarry owner) and watershed reserve.	1	360,000 m2. Partially on Private land (Quarry owner) and ALR	3	250,000 m2. Sub-alpine area, 100% crown land, Dakota ridge rec area	3	130,000 m2. Sub-alpine area, 100% crown land, Dakota ridge rec area	4	150,000 m2. Sub-alpine area, 100% crown land, Sec 17-Designated use area	4	150,000 m2. Sub-alpine area, 100% crown land, Sec 17-Designated use area
	Scalability	Ability to expand for larger capacity (phased approach) by increasing area or dam height	2	1	Can expand in same area to include A2	1	Merged version of A1 and A2	1		5	Can expand in same area (or increase dam height) to achieve larger volume	5	Can expand in same area (or increase dam height) to achieve larger volume	1		1		1	No expansion	1	No expansion	1	No expansion	1	No expansion
	Dam Consequence of Failure Rating	Population & infrastructure at risk below dam	5	2	Medium to High	2	Medium to High	2	Medium to High	3	Low to Medium	3	Low to Medium	3	Low to Medium	3	Low to Medium	3	Low to Medium	3	Low to Medium	3	Low to Medium	3	Low to Medium
	Access	Road access or remote location (helicopter/hike in)	4	5	Road Access	5	Road Access	5	Road Access	5	Road Access	5	Road Access	5	Road Access	5	Road Access	1	No road access	1	No road access	1	No road access	1	No road access
Economic: Capital (CAPEX) and Operational (OPEX) Cost of I			**28**																						
	CAPEX	Capital costs estimated (for high level comparison)-(excludes hydro-electric infrastructure)	12	3	Medium CAPEX (3 side dam). Small reservoir development area. Balance of plant: Medium (piping, fence)	3	Medium to High CAPEX. Large reservoir development area. Balance of plant: Medium (piping, fence)	3	Medium CAPEX (2 side dam). Small reservoir development area-extension to A1. Balance of plant: Medium (piping, fence)	3	Medium to High CAPEX. Balance of plant for B series: High (weir, intake, piping, fence)	2	Medium to High CAPEX. Largest reservoir development area. Balance of plant for B series: High (weir, intake, piping, fence)	1	High CAPEX due to land purchase. Balance of plant for B series: High (weir, intake, piping, fence)	1	High CAPEX due to land purchase. Balance of plant for B series: High (weir, intake, piping, fence)	2	Medium to High CAPEX due to remote construction location (Large, long 2 side dam). Balance of plant for C series: Low (no additional infrastructure required)	4	Medium CAPEX due to remote construction location (1 side dam). Balance of plant for C series: Low (no additional infrastructure required)	4	Medium CAPEX due to remote construction location (1 side dam). Balance of plant for C series: Low (no additional infrastructure required)	4	Medium CAPEX due to remote construction location (1 side dam). Balance of plant for C series: Low (no additional infrastructure required)
	Lifecycle Cost	Asset management cost	8	2	Reservoir, fence, piping are additional assets	2	Reservoir, fence, piping are additional assets	2	Reservoir, fence, piping are additional assets	2	Additional weir, piping, reservoir and fence	2	Additional weir, piping, reservoir and fence	2	Additional weir, piping, reservoir and fence	2	Additional weir, piping, reservoir and fence	4	Reservoir is the only additional asset	4	Reservoir is the only additional asset	4	Reservoir is the only additional asset	4	Reservoir is the only additional asset
	OPEX	Operating costs estimated (for high level comparison)	6	4	Low OPEX	4	Low OPEX	4	Low OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX	3	Low to Medium OPEX
	Hydro development potential- OPEX benefit	Location allows for development of hydro-electric generation	2	4	Yes- up to 100 kW	4	Yes- up to 100 kW	4	Yes- up to 100 kW	5	Yes- Up to 2 MW	5	Yes- Up to 2 MW	5	Yes- Up to 2 MW	5	Yes- Up to 2 MW	2	No	2	No	2	No	2	No
Environmental Impacts			**15**																						
	Impact on aquatic life		6	3	No change to existing intakes or weir	3	No change to existing intakes or weir	3	No change to existing intakes or weir	2	Additional weir/intake will impact aquatic life within Chapman Creek	2	Additional weir/intake will impact aquatic life within Chapman Creek	2	Additional weir/intake will impact aquatic life within Chapman Creek	2	Additional weir/intake will impact aquatic life within Chapman Creek	4	No change to existing intake or weir. Flooding sub-alpine lake will expand aquatic habitat	4	No change to existing intake or weir. Flooding sub-alpine lake will expand aquatic habitat	4	No change to existing intake or weir. Flooding sub-alpine lake will expand aquatic habitat	4	No change to existing intake or weir. Flooding sub-alpine lake will expand aquatic habitat
	Impact on terrestrial habitats/ecosystems		7	4	Logged Area, not in an environmentally sensitive area	1	Logged Area, Environmentally sensitive; BC Red List Sitka Spruce / Salmonberry Dry Hudson Creek , 2 km north of confluence with Wilson Creek	4	Logged Area, not in an environmentally sensitive area	1	Logged Area, Environmentally sensitive. BC Red List Sitka Spruce / Salmonberry Dry Hudson Creek , 2 km north of confluence with Wilson Creek	4	Logged, poor regrowth, Watershed reserve.	3	Logged area, Watershed reserve, and Quarry	3	Logged (poor regrowth) and Quarry	2	Not environmentally sensitive area. Mature regrowth, watershed reserve. Largest area of the sub-alpine sites flooded	2	Not environmentally sensitive area. Mature regrowth, watershed reserve.	2	Not environmentally sensitive area. Mature regrowth, watershed reserve.	2	Not environmentally sensitive area. Mature regrowth, watershed reserve.
	Energy Consumption, GHG emissions		2	3	Utilize existing pump station- current energy consumption	3	Utilize existing pump station- current energy consumption	3	Utilize existing pump station- current energy consumption	3	Utilize existing pump station- current energy consumption	5	Energy efficient, bypass pump station	5	Energy efficient, bypass pump station	5	Energy efficient, bypass pump station	2	Flooding area creates GHG	2	Flooding area creates GHG	2	Flooding area creates GHG	2	Flooding area creates GHG
Regulatory Requirements			**15**																						
	Level of Regulatory Engagement Required	Number of regulatory triggers and high level regulatory timeline review	8	4		3		4		3	New water diversion license	3	New water diversion license	3	New water diversion license	3	New water diversion license	2	May require additional regulatory timeline due to development plan	2	May require additional regulatory timeline due to development plan	2	May require additional regulatory timeline due to development plan	2	May require additional regulatory timeline due to development plan
	Major Regulatory Road Blocks	Preliminary identification of regulatory or permit requirements that are challenging	7	4	Nothing noted during preliminary review	1	Section 16 Map Reserve (Treaty Area); BC Red List Sitka Spruce / Salmonberry	4	Nothing noted during preliminary review	2	BC Red List Sitka Spruce / Salmonberry	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review	4	Nothing noted during preliminary review
Criteria Heading	**Criteria Subheading**	**Considerations for Criteria**	**Weighting**	**Option 1: A1: Lower reservoir site (980,000 m3)**		**Option 2: A1,2-E: Lower reservoir site (2,300,000 m3)**		**Option 3: A2: Lower reservoir site (990,000 m3)**		**Option 4: B1: Middle reservoir site (1,800,000 m3)**		**Option 5: B1-E: Middle reservoir site (2,300,000 m3)**		**Option 6: B2: Middle reservoir site (1,000,000 m3)**		**Option 7: B1,2-E: Middle reservoir site (2,300,000 m3)**		**Option 8: C1: Upper reservoir site (1,700,000 m3)**		**Option 9: C2: Upper reservoir site (900,000 m3)**		**Option 10: C3: Upper reservoir site (1,200,000 m3)**		**Option 11: C4: Upper reservoir site (1,000,000 m3)**	
				Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments	Benefit	Comments
Total Score			**100**	**57**		**55**		**59**		**57**		**63**		**53**		**56**		**55**		**54**		**57**		**56**	
Rank				**3**		**8**		**2**		**3**		**1**		**11**		**6**		**8**		**10**		**3**		**6**	
Total Weighted Score				**310**		**300**		**326**		**303**		**330**		**267**		**291**		**306**		**306**		**330**		**322**	
Rank				**5**		**9**		**3**		**8**		**1**		**11**		**10**		**6**		**6**		**1**		**4**	

INTEGRATED SUSTAINABILITY

Figures





LEGEND:

- OG MAJOR CONTOUR (LiDAR) (50.0m INTERVAL)
- OG MAJOR CONTOUR (LiDAR) (10.0m INTERVAL)
- STREAM NETWORK
- PIPELINE
- CROWN LAND
- CROWN LAND RESERVES AND NOTATIONS
- PRIVATE LAND
- PROPOSED 'A' SERIES SITES
- PROPOSED 'B' SERIES SITES

0 200 400 600 800 1000m

SCALE 1 : 20,000

UTM NAD83 ZONE 10

PREPARED BY

INTEGRATED SUSTAINABILITY

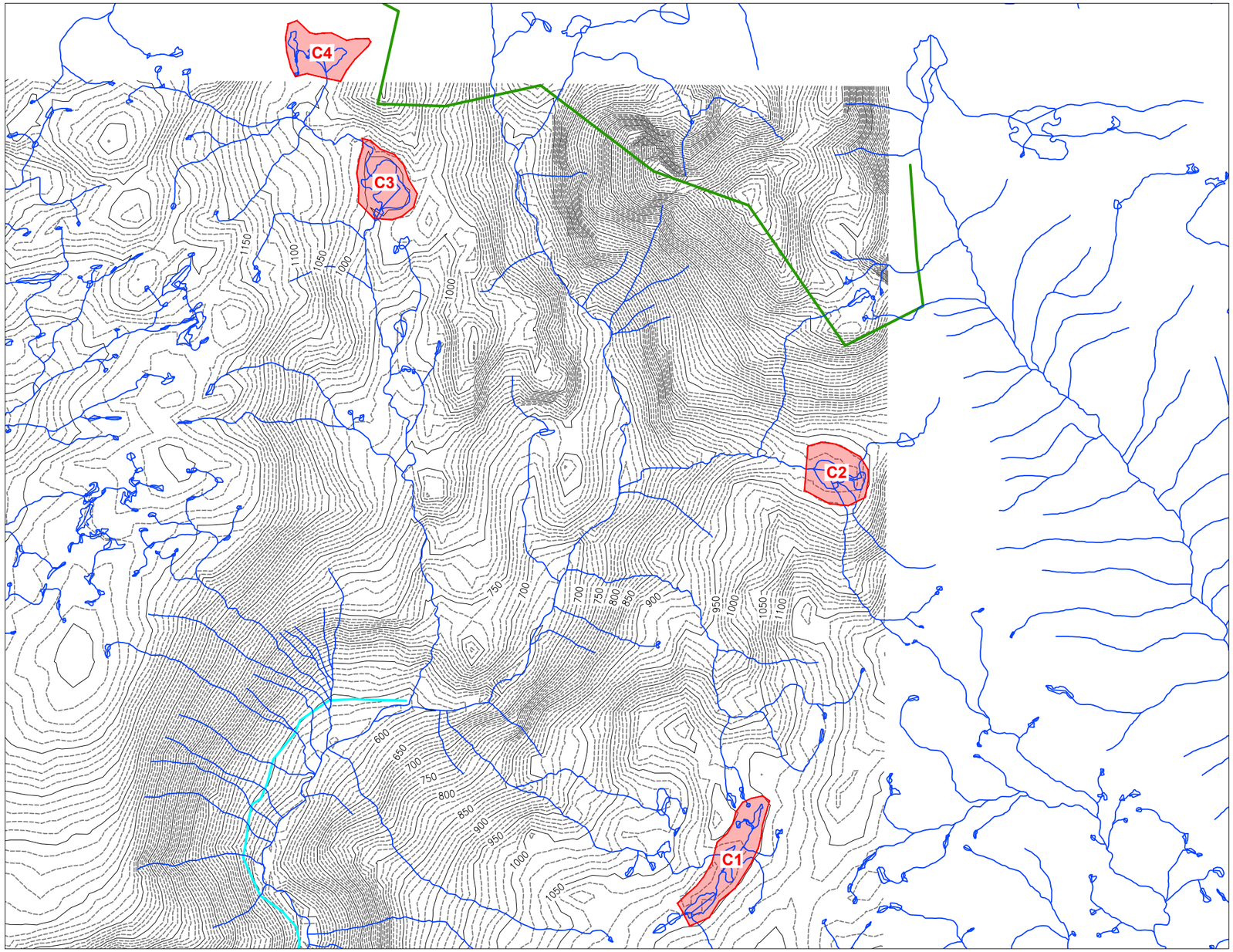
CLIENT

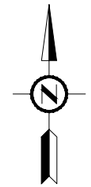
SUNSHINE COAST REGIONAL DISTRICT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
PHASE 1 SITE SELECTION MULTI-CRITERIA ANALYSIS
PROPOSED LOCATIONS WITHIN AREA A AND B

DRAWN BY	CHECKED BY	APPROVED BY	DATE (YYYY-MM-DD)
D. HELYAR	N. BILY	A. SPERSKE	2018-12-06

SCALE	PROJECT NO.	FIGURE NO.	REVISION
1:20,000	VP18-SCR-01-00	FIGURE 1	A





LEGEND:

- OG MAJOR CONTOUR (LiDAR) (50.0m INTERVAL)
- OG MAJOR CONTOUR (LiDAR) (10.0m INTERVAL)
- STREAM NETWORK
- PIPELINE
- TETRAHEDRON PROVINCIAL PARK BOUNDARY
- PROPOSED 'C' SERIES SITES

0 500 1000 1500m

SCALE 1 : 30,000

UTM NAD83 ZONE 10

PREPARED BY

INTEGRATED SUSTAINABILITY

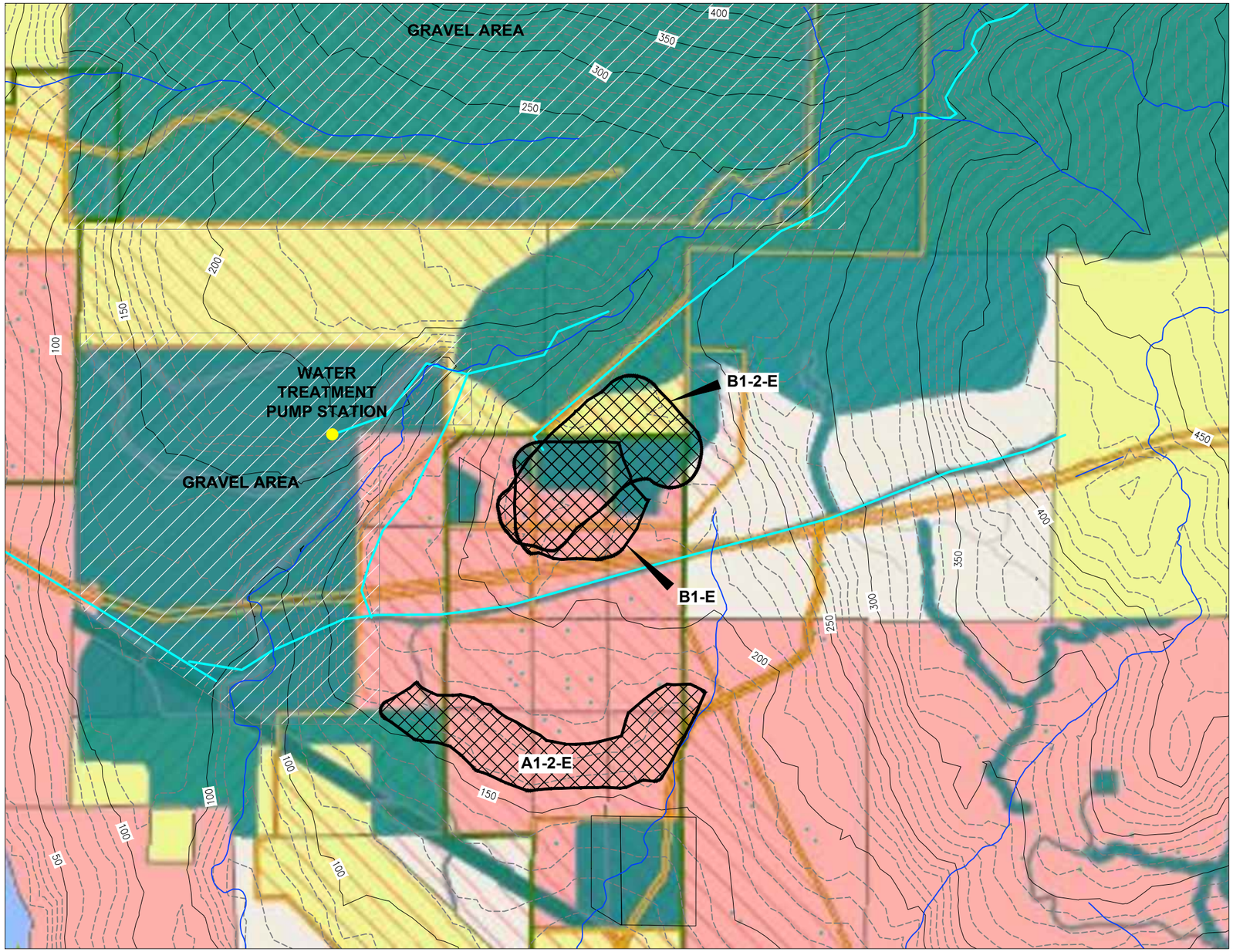
CLIENT

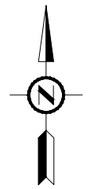
SUNSHINE COAST REGIONAL DISTRICT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
PHASE 1 SITE SELECTION MULTI-CRITERIA ANALYSIS
PROPOSED LOCATIONS WITHIN AREA C

DRAWN BY	CHECKED BY	APPROVED BY	DATE (YYYY-MM-DD)
D. HELYAR	N. BILY	A. SPERSKE	2018-11-16

SCALE	PROJECT NO.	FIGURE NO.	REVISION
1:30,000	VP18-SCR-01-00	FIGURE 2	A





LEGEND:

- OG MAJOR CONTOUR (LiDAR) (50.0m INTERVAL)
- OG MAJOR CONTOUR (LiDAR) (10.0m INTERVAL)
- STREAM NETWORK
- PIPELINE
- CROWN LAND
- CROWN LAND RESERVES AND NOTATIONS
- PRIVATE LAND
- CONCEPTUAL (ENGINEERED) RESERVOIRS

0 200 400 600 800 1000m

SCALE 1 : 20,000

UTM NAD83 ZONE 10

PREPARED BY

INTEGRATED SUSTAINABILITY

CLIENT

SUNSHINE COAST REGIONAL DISTRICT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
PHASE 1 SITE SELECTION MULTI-CRITERIA ANALYSIS
MODELLED LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY	DATE (YYYY-MM-DD)
D. HELYAR	N. BILY	A. SPERSKE	2018-12-06

SCALE	PROJECT NO.	FIGURE NO.	REVISION
1:20,000	VP18-SCR-01-00	FIGURE 3	A

Raw Water Reservoir Feasibility Study

Detailed Desktop Study

Prepared for

Sunshine Coast Regional District

Integrated Sustainability

13 February 2019

Report Submission To:	Remko Rosenboom
Legal Company Name:	Sunshine Coast Regional District
Company Address:	1975 Field Road, Sechelt, BC, V0N 3A1
Contact Phone Number:	+1 (604) 885-6810
Contact Fax Number:	+1 (604) 885-7909
Contact Email Address:	Remko.Rosenboom@scrd.ca

Submitted By:	AJ MacDonald
Legal Company Name:	Integrated Sustainability
Company Address:	620, 1050 West Pender Street Vancouver, B.C. V6C 3S7
Contact Phone Number:	+1 (778) 886-5714
Contact Fax Number:	+1 (587) 331-7919
Contact Email Address:	AJ.MacDonald@integratedsustainability.ca

Document Number:	VP18-SCR-01-00-RPT-CI-Desktop_Study_Rev0
Document Path:	P:\SCR\VP18-SCR-01-00\5.0_Tech_Exec\5.7_Civil\Phase2_Detailed_Desktop_Study\Rev0\VP18-SCR-01-00-RPT-CI-Desktop_Study_Rev0.docx
Document Revision Number:	0

WATER | WASTE | ENERGY

CONSULTING & ENGINEERING

Disclaimer

The information presented in this document was compiled and interpreted exclusively for the purposes stated in Section 1 of the document. Integrated Sustainability provided this document for the Sunshine Coast Regional District solely for the purpose noted above.

Integrated Sustainability has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this document, but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this document is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Integrated Sustainability does not accept any responsibility for the use of this document for any purpose other than that stated in Section 1 and does not accept responsibility to any third party for the use in whole or in part of the contents of this document. Any alternative use, including that by a third party, or any reliance on, or decisions based on this document, is the responsibility of the alternative user or third party.

Any questions concerning the information, or its interpretation should be directed to AJ MacDonald.

Document Revision History

Rev No.	Rev Description	Author	Reviewer	Approver	Rev Date
0	Issued as Final	Haley Massong & Robert Best	Tom Parker	Alexa Sperske	13-Feb-2019

INTEGRATED SUSTAINABILITY

Table of Contents

Figures within Text

Tables

Figures

Appendices

APPENDIX 1 – CONCEPTUAL SITE LAYOUTS

1 INTRODUCTION

Integrated Sustainability has been retained by the Sunshine Coast Regional District (the SCRD) to complete a feasibility study supporting development of a raw water reservoir to supplement supply to the existing Chapman Water System (the Project). The Chapman Water System is located along a coastal portion of the Sunshine Coast region within southwestern British Columbia (BC).

Integrated Sustainability's scope of work for the Project includes two phases:

1) Phase 1: water demand analysis, identification of potential reservoir sites and preliminary desktop review of these sites, preliminary environmental and regulatory review and engagement, and a preliminary Multi-Criteria Analysis (MCA) of the identified sites
2) Phase 2: detailed technical and regulatory review of the top-ranked site locations, conceptual designs and Class D cost estimates for these sites, and a detailed MCA evaluation

1.1 Background

Integrated Sustainability previously completed Phase 1 of the Project, which comprised a water demand analysis, identification and review of potential reservoir sites, and a preliminary MCA.

The purpose of the Phase 1 water demand analysis was to evaluate the current and projected water demands, water supply sources and resultant supply deficit, and provide recommendations on target storage volumes to be used in identification of potential reservoir sites. Further detail on the methodology and findings from the analysis can be found in the Water Demand Analysis report (Integrated Sustainability 2018a).

The remainder of Phase 1 of the Project was comprised of site identification, desktop review, and a preliminary MCA to identify and evaluate potential locations for the raw water reservoir at a desktop level. Integrated Sustainability worked with the SCRD to develop and delineate boundaries for the target area of study for site identification based on logistical, regulatory, and stakeholder-driven constraints and develop criteria by which to identify and evaluate potential site locations. Selected site locations were reviewed and evaluated using a preliminary MCA, which incorporated information collected in the water demand analysis, workshops with the SCRD, and results from the desktop review and preliminary regulatory engagement. Each of the sites was compared and evaluated against one another based on the technical, environmental and regulatory, operational, and economic benefits and risks.

At completion of the preliminary MCA, Integrated Sustainability prepared a report to summarize the Phase 1 siting desktop review and preliminary MCA methodology and results, as well as discussion and recommendations on which of the sites identified and assessed should be progressed for further evaluation during Phase 2 of the Project (Integrated Sustainability 2018b).

It should be noted that during the Phase 1 desktop review and preliminary MCA, the reservoir storage target established was 2,300,000 m^3, based on the modelled supply deficit for the year 2035 as detailed in the Water Demand Analysis Report (Integrated Sustainability 2018a). Potential for combination of more than one site or expansion of storage within a single site area was also evaluated to assess potential to meet the 3,800,000 m^3 storage volume for 2050. Following completion of Phase 1, and prior to commencement of Phase 2, the SCRD requested that Integrated Sustainability update the reservoir storage target to range from 900,000 m^3 to 1,300,000 m^3 for the detailed desktop review and conceptual design conducted during Phase 2.

It is understood that the SCRD may choose to develop one or more of the sites in the short term to meet their current water demands, and then may consider expansion of their storage capacity in the future by developing additional sites or evaluating potential for expansion of storage capacity within developed sites.

1.2 Purpose and Scope

The scope of work for this desktop study is comprised of:

- A detailed desktop review of the five top-ranked sites selected for further evaluation following the Phase 1 site identification and preliminary desktop evaluation
- Recommendations for field assessments

The purpose of this desktop study is to identify and evaluate the site locations according to suitability for development of the proposed reservoir. The desktop study included the following:

- Evaluation of the five areas to determine viable site locations for a reservoir within each area
- Development of conceptual designs for the reservoir within each site location
- Provide recommendations for field assessments at the viable site locations

2 SITE REVIEW AND EVALUATION

2.1 Study Area and Reservoir Locations

The study area for the siting assessment is generally located immediately east of Sechelt, BC and extends north to the southwest boundary of Tetrahedron Provincial Park. A location map indicating the general area of interest is shown in Figure A. During Phase 1 of the Project, this study area was established and divided into three sub-areas, which are defined as follows:

- Area A: Lower sites, located at approximately elevation (El.) 174 m
- Area B: Middle sites, located at elevations ranging from approximately El. 217 m to El. 229 m

- Area C: Upper sites, located in the sub-alpine and ranging in elevation from approximately El. 935 m to El. 1,085 m

The above sub-areas were developed based on their characteristics with respect to how sites within each would be situated relative to key infrastructure within the Chapman Water System, and how water would conceptually be conveyed to and from sites within each.

Area A sites would require water supply and return pipes connected to the existing raw water pipeline and pump station that currently convey water from an intake in Chapman Creek to the Chapman Creek water treatment plant (WTP). Based on the above described concept, sites within this sub-area are constrained by a maximum water level (MWL) in the reservoir of El. 174 m, to allow water to flow from the existing intake location (located at El. 176 m) to an Area A site.

Area B sites would require the addition of a new intake on Chapman Creek located at a higher elevation. However, the Area B reservoirs have potential to convey water to the Chapman Creek WTP via gravity flow (bypassing the existing pump station) and connecting to the existing raw water pipeline upstream of the Chapman Creek WTP.

Area C sites would be designed based on the concept of reservoirs that fill using surface water drainage from the upstream watershed, during periods of high precipitation, and convey water to Chapman Creek via surface water drainage or pipeline during periods of low precipitation and high water demand.

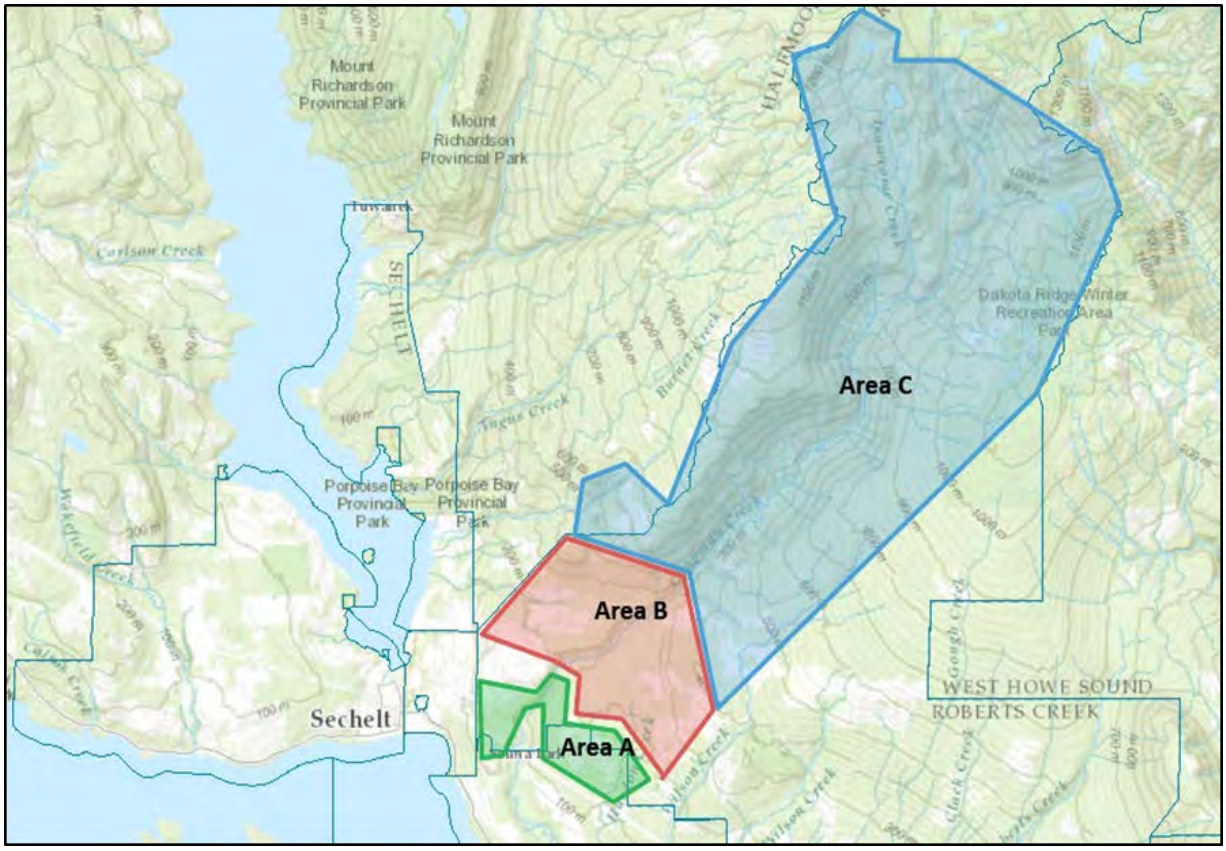


Figure A. Location Map of the Overall Study Area and Sub-Areas

Following identification of all potential sites and desktop review during Phase 1 of the study, 11 potential sites were selected within the study area and were identified as follows: Sites A1, A2, A1-2-E, B1, B2, B1-E, B1-2-E, C1, C2, C3, and C4. Following the desktop review and evaluation during the MCA, five sites were selected to be progressed for further evaluation during Phase 2 of the Project, and are described as follows:

- Site A (area which encapsulates the general area encompassing Sites A1, A2, and A1-2-E) - located within National Topographic System (NTS) Location J/92-G-5
- Site B (area which encapsulates the general area encompassing Sites B1, B2, B1-E, and B1-2-E) - located within NTS Location J/92-G-5
- Site C1 – located within NTS Location A/92-G-12
- Site C3 – located within NTS Location B/92-G-12
- Site C4 – located within NTS Location B/92-G-12

The above five sites are shown in Figure 1, as well as the locations of key infrastructure in the Chapman Water System. As described above, Sites A and B represent Sites A1, A2, and A1-2-E combined and Sites B1, B2, and B1-E, and B1-2-E combined, respectively, and were selected for further evaluation as a whole, with the objective of evaluating the entire areas and selecting an optimal site layout within each.

2.2 Design Criteria

The conceptual layout for each of the sites assumes the following as a basis for the design:

- One storage reservoir, with an operational storage volume at the MWL ranging from 900,000 m^3 to 1,300,000 m^3, with potential for future expansion of the reservoirs at each site taken into consideration, but not modelled
- Design concept for the reservoir comprised of an open (no cover), unlined reservoir and operations pad area within a fenced site
- Freeboard allowance of 2.0 m at MWL, which includes an allowance for a 1.0 m spillway (it is assumed that spillway design would be completed during future design stages and would include wave analysis to confirm that a 1.0 m spillway is sufficient)
- Maximum water level of El. 174 m (Site A only)
- Maximum reservoir embankment height of less than 15 m, so as not to trigger International Coalition of Large Dams (ICOLD) dam safety requirements
- Subsurface conditions allow 3-horizontal to 1-vertical (3H:1V) upstream side slopes and 4H:1V downstream side slopes
- Reservoir to utilize either earthen embankments or an earthen or concrete dam structure, depending on the site characteristics; however, all conceptual layouts show footprints of earthen embankments
- In the case that cut-fill balance is not possible:
  - Excess material will be stockpiled (in the case that there is a larger volume of cut than fill)
  - Additional required material is assumed to be available and hauled to site (in the case that there is a larger volume of required fill than cut)
- Operations pad allowance of at least 30 m wide to provide space for truck in/truck out or pipe in/pipe out connections, equipment laydown, staging area, and space for other operations requirements
- Perimeter embankments are assumed to be 10 m wide, to allow space for perimeter access and barriers on either side of the embankment crest
- Utilization of existing road infrastructure for site access to the greatest extent possible
- Site access onto the operations pad from either existing (if possible) or new roads
- Depth of 200 mm for topsoil stripping and 300 mm for subsoil stripping
- Separate topsoil, subsoil, and excavation stockpiles, with a 30% bulking factor applied for stockpile sizing

Refer to the site layouts included in Appendix 1 for details on the conceptual site layout for each of the sites, including the resulting quantities. A summary of characteristics for each site layout is also provided in Table 1.

2.3 Siting Criteria

The desktop study includes a review of publicly available data such as topography, geology, groundwater, environmental data, and regulatory permitting requirements within the region. The following information and criteria were used as part of this desktop study:

- Land use and ownership data, to position the reservoir on within land owned by the SCRD, Crown land, or Agricultural Land Reserve (ALR) land, and not within Tetrahedron Provincial Park, the gravel lands (as per shíshálh Nation Foundation Agreement), or utility right-of-way's (ROWs)
- Proximity to existing infrastructure, including access roads
- Conceptual methods for conveying water to and from the sites, and approximate conveyance distances
- Topographical and disposition data to evaluate site suitability, constraints, and logistics
- Regional bedrock and surficial geology to evaluate subsurface conditions
- Local terrain data to avoid siting within areas typically susceptible to geohazard activity, including ravines, coulees, and gullies
- Landslide hazard data to maintain adequate setback from potential slope failures
- Proximity to mapped fault locations
- Water features data to maintain required setbacks from wetlands and watercourses
- Available environmental data to evaluate the presence of vegetation, fish, and wildlife
- Historical data and previous uses to evaluate historical and archaeological significance, and previous contamination
- Available current and historical wetland data to evaluate the presence and impact to wetlands within the area
- Existing and abandoned water wells to understand the groundwater users within the area
- Regulatory permitting requirements

2.4 Siting Assessment

The following sections provide discussion and results from the detailed desktop study conducted for the sites progressed to Phase 2 of the Project: Sites A, B, C1, C3, and C4. The locations of these sites are shown in Figure 1, as well as locations of key Chapman Water System infrastructure, streams and creeks, land ownership boundaries and utility ROWs, and roads. A summary comparing desktop results for these sites is provided in Table 1, attached.

It should be noted that early in the evaluation process, a mapped fault was identified as underlying the proposed footprint for Site C1 (Ministry of Energy, Mines and Petroleum Resources - BC Geological Survey 2018). Following identification of this mapped fault, C1 was removed from further evaluation and conceptual design, due to the inferred seismic hazard at this location.

2.4.1 Topographical and Disposition Data

The sites located at lower elevations (Sites A and B) are situated close to existing road infrastructure and can be accessed from the west via an existing, unnamed road, as shown in Figure 1. A minimal amount of access road infrastructure would be required to connect the sites to this existing road.

Based on available aerial imagery and topographical data, Sites A and B are located within an area which generally slopes from northeast to southwest, with gentle to deep undulations, watercourse valleys, and localized areas of high or low topographic relief. Sites C3 and C4 are located within existing alpine lake basins, the bases of which are generally sloped from north to south, in an area characterized by steeply sloped, mountainous terrain that generally slopes from northeast to southwest.

Sites C3 and C4 are located at higher elevations and significantly more remote than Sites A and B, and further from existing road infrastructure. Forestry service roads within the general area of Sites C3 and C4 were identified using available imagery (Google Earth 2018). It is assumed that Sites C3 and C4 would be accessed using these existing roads, either from the south via the road network within the Chapman Creek valley, or via the road network to the west. These existing roads were identified to extend as close as 850 m from Site C3 and as close as 150 m from Site C4. Based on a review of the imagery, it is assumed that the conditions of the roads are likely not currently suitable for access to the higher elevation sites, and that upgrades would be required prior to utilization of this infrastructure. Additionally, new access road infrastructure would be required to connect Sites C3 and C4 to an existing road. Lastly, from an operational perspective, snow removal and other maintenance required would be greater for roads to access Sites C3 and C4 than for Sites A and B.

The Fortis BC gas pipeline, located between Sites A and B, would be crossed to access Site B; however, this crossing would take place via the existing unnamed road that would be used to access Site B. The hydro power transmission line located immediately south of Site A, would be crossed to access Sites A and B, and potentially to access Sites C3 and C4, depending on the selected access route for the sites.

2.4.2 Subsurface Conditions

Regional Bedrock Geology

The underlying bedrock mapped at Sites A and B is comprised of granodioritic intrusive rocks of the Mesozoic era and Jurassic period, which are comprised of variably foliated

granodiorite and lesser quartz diorite. The underlying bedrock mapped at Sites C3 and C4 is comprised of quartz diorite intrusive rocks of the Mesozoic era and Cretaceous period, comprised of variably foliated quartz diorite and lesser granodiorite (Massey et. al. 2005). The regional bedrock geology is shown on Figure 2.

Based on a review of available imagery, it is likely that bedrock depths at Sites C3 and C4 will be near surface. Depending of the bedrock depths at each of the sites, excavation of bedrock may be required to achieve the design reservoir depths. It is recommended that bedrock depths and physical characteristics be confirmed during an intrusive geotechnical investigation during future design stages, and is not included in the current scope of work.

Regional Surficial Geology

Site A was mapped in a region predominantly consisting of glaciomarine veneer sediment deposits of late Pleistocene and Holocene age (Clague et. al. 1982). Glaciomarine and marine sediments in this area were deposited in lowland areas transgressed by the sea, and generally include clay, silt, sand, gravel and diamicton. Site A is situated in a location with surficial deposits specifically mapped to comprise a thin layer (less than 2 m thick) of coarse grained soils deposited in the near-shore zone, overlying a thicker layer of fine grained soils.

Site B was mapped in a region predominantly consisting of sandy glacial till deposits of Holocene age. These deposits are generally comprised of thin, continuous (1 m to 3 m thick) layers of sand, with variable amounts of gravel, cobbles, and boulders, overlying bedrock. The clasts in this unit are generally comprised of minerals reflective of the underlying bedrock, including granodiorite, diorite, quartzodiorite, quartmonzonite, and other crystalline metamorphic rocks. Based on the mapped thickness of soils within the general area of Site B, there is potential for there to be limited mineral soil present at Site B that could be used for construction material.

Sites C3 and C4 were mapped in a region predominantly consisting of rock with discontinuous colluvium on steep slopes, which is generally comprised of rock landforms and discontinuous colluvial rubble that increases in thickness near slope toes and valley floors, and localized, thin patches of till. There is likely little mineral soil present at Sites C3 and C4 that could be used for construction material.

The regional surficial geology is shown on Figure 3.

Depending on the characteristics of the subsurface soils at each site, one or more of the following may require considerations:

- The presence of coarse materials (sand, gravel, cobbles) may result in water loss from the reservoir
- The presence of weak, unstable soils and bedrock may constrain the reservoir excavation depths, embankment heights, and embankment slope angles

It is recommended that the subsurface soils at each site are confirmed during an intrusive geotechnical site investigation during future design stages. Following this, it can be determined as to whether the soils at each site are suitable for construction, or if unsuitable, if offsite construction materials will be required. Confirmation of subsurface soil conditions is not included in this scope of work.

2.4.3 Seismic Hazard

The region in which the sites are situated is ranked as having a relative seismic hazard of high (NRC 2017). The Government of BC database of mapped faults (Ministry of Energy, Mines and Petroleum Resources - BC Geological Survey 2018) was reviewed to evaluate the proximity of each of the site locations to previously identified faults in the region. One fault was identified to be mapped within the general area of the sites, with several additional faults mapped to the west of Sechelt inlet and to the east on Gambier Island. The locations of mapped faults relative to the site locations are shown on Figure 2. Sites A and B are located within 8 km to 20 km of mapped faults to the northeast and northwest. Sites C3 and C4 are located within 4 km to 15 km to mapped faults located to the southeast, east, and southwest.

As detailed previously, a fault was identified as underlying the proposed footprint for Site C1. Because of this, Site C1 was not progressed for further evaluation based on the inferred seismic hazard at this location.

Further evaluation of the seismic hazard for each of the site locations is recommended to be completed during future design stages. This work would include, but not necessarily be limited to, further delineation and characterization, intrusive geotechnical site investigation at each of the site locations to characterize the soils and bedrock, and site-specific seismic site hazard analysis. Further evaluation of the seismic hazard for the sites is not included in this scope of work.

2.4.4 Landslide Susceptibility

Landslide susceptibility for Sites A, B, C3, and C4 was evaluated using available aerial imagery, topographical data, and other available data sources.

In general, landslide susceptibility in the area in which Sites A and B are located is higher along valley slopes and on localized steep areas. Within the general proximity of Sites A and B, evidence of previous slope movement was observed to typically be indicative of rotational and translational failures, and no evidence of avulsion (debris flows) was identified.

Within the general proximity of Site A, the following characteristics and features were noted and observed:

- Site A is situated in an area classified as having low likelihood of occurrence of rapid mass movement in a clear-cut area (Howes et. al. 1987).
- No indicators of potential for large scale instability were located within the immediate proximity of Site A.

- Site A is located approximately 350 m from the east crest of the Chapman Creek valley, which generally corresponds with zones classified as having high likelihood of occurrence of rapid mass movement in clear-cut areas (Howes et. al. 1987). The slopes along the Chapman Creek valley demonstrate evidence of numerous previous landslides. Several locations of potential previous slope movement along the Chapman Creek valley near Site A, characterized by landslide scarps, are shown in Figure 4 (labelled as Feature A-1). It is unlikely that a slope failure along the Chapman Creek valley would propagate as far as Site A.
- Site A is located approximately 100 m north of an area classified as having a high likelihood of rapid mass movement in clear-cut area (Howes et. al. 1987). Within this area, the topography slopes steeply to the southwest towards the hydro power transmission line, and evidence of previous slope movement within this area was observed. Several locations of potential previous slope movement are shown in Figure 4 (labelled as Feature A-2). As Site A is located upslope of this area, and it is mapped as having high potential for instability when disturbed, introduction of a reservoir in this location may increase the risk of large-scale slope instability.
- Evidence of several shallow instabilities, likely related to road development, were observed to the east of Site A. These features are shown in Figure 4 (labelled as Feature A-3).
- Site A is located within an area that has been clear-cut, with additional clear-cut land located to the north and northwest. The clear-cut areas may be susceptible to instability due to the disturbance to the land and decreased vegetation. The clear-cut areas located north and northwest of Site A are shown in Figure 4, labelled as Feature A-4.

Within the general proximity of Site B, the following characteristics and features were noted and observed:

- Site B is situated within an area classified as having low likelihood of occurrence of rapid mass movement in a clear-cut area (Howes et. al. 1987).
- No indicators of potential for large scale instability were located within the immediate proximity of Site B.
- Site B is located approximately 100 m from the east crest of the Chapman Creek valley, which generally corresponds with zones classified as having high likelihood of occurrence of rapid mass movement in clear-cut areas (Howes et. al. 1987). The slopes along the Chapman Creek valley demonstrate evidence of numerous previous landslides. Several locations of potential previous slope movement along the Chapman Creek valley near Site B, characterized by landslide scarps and a drop block (evidence of a large, translational slope movement in which the sliding mass remained relatively coherent), are shown in Figure 4,as Feature B-1. Given the close proximity of the Chapman Creek valley to the northwest of Site B, and that this valley is mapped as having high potential for instability, introduction of a reservoir may

increase the risk of large-scale slope instability. However, because of the setback from the area and more gentle topography, it is considered a lower risk than the Site A.

- A localized watercourse valley was observed immediately west of the southwest corner of Site B, which may be susceptible to instabilities. This valley is shown in Figure 4 (labelled as Feature B-2).

Within the general proximity of Sites C3 and C4, the following characteristics and features were noted and observed:

- Sites C3 and C4 are not located directly within an area identified as having large scale slope instabilities and are situated within an area classified as having low likelihood of occurrence of rapid mass movement in clear-cut areas (Howes et. al. 1987). Landslide susceptibility in the area of Sites C3 and C4 is generally higher along steep valley slopes and gullies. Zones classified as having high potential for instability and containing mapped location of previous landslides are located approximately 100 m to 200 m west of Sites C3 and C4, and generally correspond to steep creek valley slopes.
- The valley slopes confining Sites C3 and C4 appear to be well vegetated, which likely increases the stability of surficial deposits within this area.
- Evidence of previous slope movement within the immediate proximity of Sites C3 and C4 is limited; however, several locations within the general area were observed to be indicative of shallow sloughing and minor avulsion. These locations are shown in Figure 5 (labelled as Feature C-1).
- Sites C3 and C4 are located within valleys that could serve as catchment areas for large scale debris flow slope movement, which appears to be the dominant slope failure mechanism in the area.
- The clear-cut area northwest of Site C4 may be susceptible to instability due to the disturbance to the land and decreased vegetation. This area is shown in Figure 5 and labelled as Feature C-2.

2.4.5 Dam Consequence of Failure Classification

The consequence of failure classification of the dam for each of the sites was evaluated at a conceptual level. A dam breach assessment is used to understand the ultimate discharge (i.e. flood wave) from a hypothetical breach of the dam and its downstream impacts (CDA 2007). The consequence of failure from a dam breach is based on the loss or damage caused by a failure of a dam, and evaluates loss of life, injury, and general disruption of the lives of the population in the inundated area, environmental and cultural impacts, and damage to infrastructure and economic assets (CDA 2007).

For the purposes of providing a high-level classification based on the conceptual layouts for this Project, the conceptual dam consequence of failure was evaluated based on estimating the approximate flow path and impact (evaluation did not consider velocity, depth, or width of flow) of a breach given the embankment design included in the

conceptual layouts, topography downstream of the sites, and the characteristics and locations of natural features (e.g. watercourses) and infrastructure downstream of the sites. A full dam break analyses will be required at later stages in design, and will include evaluating the break, depth of flow, velocity, and potential impacts to surroundings. Execution of a full dam break analysis is not included in the current scope of work.

Based on the conceptual design for Site A, a failure along the south embankment of the reservoir represents a worst-case scenario, as the spill volume from the reservoir is the greatest at this location. Based on a review of the topography downstream of Site A, the inundation zone may include, but not necessarily be limited to, the Sechelt-Gibsons Airport and Chapman Creek. Based on a preliminary review, the largest impacts will be to the environment (Chapman Creek), which will depend on the impact due to change in flow and siltation, and to critical municipal infrastructure (Sechelt-Gibsons airport). If the dam breach effects the flood plain of Chapman Creek, it has the potential to then impact downstream populations and additional downstream infrastructure, including, but not limited to, populations and infrastructure within the District of Sechelt, Area D - Roberts Creek, and the Sunshine Coast Highway. At this phase, it is recommended that the dam failure consequence classification for Site A be rated as very high to extreme.

Based on the conceptual design for Site B, a location along the east end of the south embankment of the reservoir represents a worst-case scenario, as the spill volume from the reservoir is the greatest at this location. Based on a review of the topography downstream of Site B, the inundation zone may include, but not necessarily be limited to, Hudson Creek. Based on a preliminary review, the largest impacts will be to the environment (Hudson Creek), which will depend on the impact due to change in flow and siltation. If the dam breach effects the flood plain of Hudson Creek, it has the potential to then impact downstream populations and additional downstream infrastructure, including, but not limited to, populations and infrastructure within the District of Sechelt, Area D - Roberts Creek, and the Sunshine Coast Highway. At this phase, it is recommended that the dam failure consequence classification for Site B be rated as high to very high.

At Site C3, a location to the east of the centre of the dam embankment represents a worst-case scenario, as the embankment height is greatest at this location. At Site C4, a location on the east end of the dam embankment represents a worst-case scenario, as the embankment height is greatest at this location. Based on a review of the topography downstream of Sites C3 and C4, in the case of a dam breach the inundation zone may include, but not necessarily be limited to, a tributary to Chapman Creek (located south of Sites C3 and C4) and Chapman Creek. Based on a preliminary review, the largest impact will be to the environment (Chapman Creek) and will depend on the impact due to change in flow and siltation. If the dam breach effects the flood plain of Chapman Creek, it has the potential to then impact populations and surrounding infrastructure. At this phase, it is recommended that the dam failure consequence classifications for Sites C3 and C4 are rated as high, but may increase to very high, pending further investigation.

A detailed study should be conducted during future design stages to evaluate and determine the consequence of failure classification of the dams at the selected locations.

2.4.6 Environmental Conditions

Existing environmental conditions were identified within and near the Site from desktop resources. Details and recommendations for the known environmental features are below.

The four sites (Sites A, B, C3, and C4) that are being investigated as part of the siting assessment are all located in the Lower Mainland Ecoregion, which is part of the Pacific Maritime Ecozone southwestern British Columbia (Ecological Framework of Canada 2016; Ecological Stratification Working Group 1995). Based on a review of available satellite imagery, Sites A and B are located in a primarily forested region, which displays evidence of historic logging operations. In contrast, Sites C3 and C4 appear to overlap natural waterbodies (lakes) and are heavily forested with evidence of historic logging activities identified to the northwest of Site C3 and C4. As a result of the natural waterbodies, there is a high likelihood of wetlands within the boundaries of Sites C3 and C4, which would require field level investigations. However, a search of the Freshwater Atlas Wetlands database in iMapBC was completed and no wetlands were identified within the site boundaries (Province of British Columbia 2019a). Table 1 provides a summary of the results from the desktop assessment of the potential site locations.

A search of the Environmental Remediation Sites database in iMapBC was also completed and no results were located within the boundary of any of the potential site locations (Province of British Columbia 2019a).

Aquatic and Terrestrial Species

A search of iMapBC was conducted to identify fish species with documented presence within waterbodies that may be influenced by the development of each potential site (iMapBC 2019). A full list of fish species with documented presence is included in Table 1. Of the 10 fish species with documented presence near Site A and Site B, as well as the nine fish species with documented presence near Site C3 and Site C4, none are included as species at risk on the Red or Blue List for British Columbia (BC Conservation Data Centre 2019) or listed under Schedule 1 of the *Species at Risk Act* (Government of Canada 2019).

A search of iMapBC was also conducted to identify terrestrial species (mammals, birds, reptiles, and amphibians) with documented presence within a 10 km radius of each potential site (Province of British Columbia 2019a). A full list of terrestrial species with documented presence is included in Table 1, with the corresponding provincial or federal species at risk status (if applicable).

In addition to documented species presence, a desktop review of important or special habitats was completed for each potential site location, with results presented in Table 1 (Province of British Columbia 2019a). Two important habitats/ecosystems were identified in the vicinity of the potential site locations; federally listed critical habitat for marbled

murrelet (all site locations) and the provincially protected (Red List) Sitka spruce / salmonberry Dry ecosystem (Site A and Site B).

Cultural

A review of the Archaeology and Culture Areas layers within iMapBC was also completed, to document potential archaeological, cultural, or historic resources within the boundaries of the potential site locations. No archaeological, cultural, or historic resources were documented within the boundaries of the potential site locations (Province of British Columbia 2019a).

2.4.7 Regulatory Requirements

Regulatory requirements were identified for the sites from desktop resources and conversations with the regulators. Specific permits and authorizations are summarized below. As project design is refined, additional regulatory requirements may be identified including for example, third party consents to cross or encroach upon infrastructure, and additional environmental approvals.

Fisheries and Oceans Canada

Fisheries and Oceans Canada (DFO) is responsible for managing Canada's fisheries, oceans and freshwater resources (DFO 2019). The following requests and authorizations may apply to this project.

- Request for review
- Authorization

SCRD Development Permits

As the proposed reservoirs will alter the land, it is understood that a development permit (DP) will be required for all the sites. DP Areas are established where there are natural hazardous conditions, to protect the environment or to regulate the form and character of commercial development (SCRD 2015). The following permits may be required from the SCRD:

- Geotechnical Hazard Development Permits
- Riparian Development Permits

Land Act

The BC Land Act (Queen's Printer 2018a) is the main legislation governing the disposition of provincial Crown land in BC. The following licence to occupy and use Crown land will apply to the project.

Licence of Occupation (Section 39)Vancouver Coastal Health

Drinking Water Officers throughout the Vancouver Coastal Health Authority approve, inspect and monitor drinking water supplies for compliance with regulatory requirements (Vancouver Coastal Health 2017).

Water Sustainability Act

The Water Sustainability Act (WSA) (Queen's Printer 2018b) is the provincial water legislation in BC which came into force on 29 February 2016. This Act manages the diversion and use of water resources in the province. The following authorizations will apply to the project.

- Licence (Section 9)
- Dam Safety Regulation (Province of British Columbia 2019b)

3 SUMMARY OF KEY DIFFERENTIATING SITE FEATURES

Following the detailed desktop review of the five top-ranked sites based on the conceptual designs, topographic and disposition data, expected subsurface conditions, seismic hazard, landslide susceptibility, dam consequence of failure, available environmental data for the area, and regulatory requirements identified, Sites A, B, C3, and C4 appear to be conceptually suitable for development, pending a field assessment to validate the results of this desktop study. As discussed in Section 2.4, Site C1 was deemed unsuitable for development due to the inferred seismic hazard at this site location and was eliminated from further evaluation and conceptual design.

Key differentiating features for Sites A, B, C3, and C4 are summarized below:

- The conceptual designs for Sites A and B have more storage capacity than Sites C3 and C4 (approximately 320,000 m^3 to 510,000 m^3 more storage), when maintaining maximum embankment heights at all sites of 15 m or less.
- The conceptual designs for Sites A and B would require larger earthworks volumes (e.g. bulk excavation to stockpile, placement of fill material, etc.) on a per m^3 of water storage basis to achieve the design storage volumes than for Sites C3 and C4.
- Sites A and B are located closer to existing infrastructure and are more easily accessible using existing roads. Given this, it is assumed that the extent of road upgrades to existing roads, as well as the length of access roads required to connect the sites to existing roads, would be significantly lower for Sites A and B than for Sites C3 and C4.
- Sites C3 and C4 are situated in a more remote area than Sites A and B. Construction and operations at Sites A and B would generally be more attractive from a logistics and economics perspective, given the constraints associated with constructing and operating remote sites.

- None of the sites are located within Tetrahedron Provincial Park; however, Sites C3 and C4 are located within close proximity (100 m to 300 m) of the park boundary, which some stakeholders may view as undesirable.
- Conceptually, Sites C3 and C4 would not require any new pipeline infrastructure to convey water to and from the reservoir, whereas water pipelines would be required to convey water to and from the reservoirs at Sites A and B. It should be noted that additional hydrological modelling would be required to determine feasibility of the reservoirs at Sites C3 and C4 to both receive and convey water via surface water drainage. Additionally, if water is conveyed overland between Sites C3 and C4 to Chapman Creek, there is potential to lose water during this process via ground infiltration, and cause erosion and additional sedimentation.
- Conceptually, Sites A, C3, and C4 would not require construction of a new intake on Chapman Creek to convey water into the reservoirs, whereas Site B would require a new intake on Chapman Creek to convey water to the reservoir.
- Conceptually, water could be conveyed from Sites B, C3, and C4 to the Chapman Creek WTP via gravity flow, whereas for Site A, water would need to be pumped upgradient to direct it to the Chapman Creek WTP.
- Based on the expected subsurface conditions at Sites A and B, it is expected that bedrock will be encountered near surface (1 m to 3 m below existing ground surface) at Site B, whereas it is expected to be encountered further from surface at Site A. Depending on the depth to bedrock at Site B, there is potential for this site to have limited materials available for use in construction. Based on the expected subsurface conditions at Sites C3 and C4, it is assumed that little to no soils suitable for use as construction materials are available onsite, and that offsite material would need to be hauled to site for use as fill material.
- Available information on surficial geology suggests that subsurface materials at Sites A and Site B may be largely comprised of coarse-grained soils (e.g. sand, gravel, cobbles, boulders). Coarse grained soils can pose design challenges due to their high hydraulic conductivity, which can result in seepage of water out of an unlined reservoir through the reservoir base and side slopes.
- Site A is located within close proximity (100 m) to an area ranked as having high potential for slope instability. Sites B, C3, and C4 area situated in areas with identified potential geohazards, are not located within as close of proximity to an area of high concern. Results of the desktop geohazards review will be validated during the field assessment conducted as part of this scope of work.
- No mapped wetlands were identified with the site footprints for any of the sites; however, there is potential for a wetland to exist within the Site C3 and C4 footprints, based on a review of the available satellite imagery.
- Existing water bodies are located within the footprints of Sites C3 and C4; however, no documented fish presence has been recorded within the existing water bodies at

either site. No existing surface water bodies have been mapped within the footprints of Sites A and B.

- All sites contain one or more Provincial Species of Concern. Sites A and B both contain one or more Provincial Species at Risk; however, Sites C3 and C4 have none identified.
- Sites A and B are situated within close proximity (300 m and 225 m, respectively) of important or special habitats, including the provincially protected (Red List) Sitka spruce / salmonberry Dry ecosystem, whereas Sites C3 and C4 are not.
- An Agricultural Land Reserve (ALR) application for non-farm use will be required for Sites A and B; however, Sites C3 and C4 are situated outside of ALR lands and do not require the non-farm use application.
- Preliminary investigation for Site B Land Tenure has identified that the Sunshine Coast Rod and Gun Club (SCRGC) currently holds a provincial land tenure under LOC No. 2407106. The SCRD will need to engage with the SCRGC regarding the area of overlap between their tenure and the reservoir (and stockpiles) as it's currently designed.
- When evaluated for their conceptual dam consequence of failure, all sites were classified as having a minimum of high failure classification, based on the potential downstream impacts in a dam breach scenario. However, Site A was classified as having a higher failure classification (very high to extreme), due to the potential impacts to critical municipal infrastructure (Sechelt-Gibsons airport). Sites B, C3, and C4 were classified as having high to very high failure classifications.

The above discussion on key differentiating features should be used to evaluate and compare the sites on a conceptual level. Further evaluation and ranking of Sites A, B, C3, and C4 will be conducted and documented within a Feasibility Study Report following the Phase 2 MCA. It should be noted that field investigations, analyses, and design will be required in future design phases to confirm and expand upon the works completed to date.

4 FIELD ASSESSMENT RECOMMENDATIONS

It is recommended that a visual environmental field assessment and site reconnaissance is completed to confirm conditions identified within this desktop study. The field assessment is recommended to be completed when ground conditions are suitable for evaluation (e.g. no snow cover) to maximize the quality of information collected.

The geotechnical portion of the field assessment will be comprised of completing a visual site assessment at and within the general area of each of the sites, confirming surficial conditions identified during the desktop review, and identifying any additional features at the field level.

The environmental portion of the site assessment will be comprised of completing a visual review of site conditions and other critical locations of interest.

5 LIMITATIONS

Integrated Sustainability's services consist of professional opinions, conclusions, and recommendations that are made in accordance with generally accepted, local engineering principles and practices at the time our services were performed. This warranty is in lieu of all other warranties, either express or implied.

The recommendations contained in this report are based on the data obtained and discussions between Integrated Sustainability and the Sunshine Coast Regional District for the evaluation conducted.

This report has been prepared for the exclusive use of the Sunshine Coast Regional District and their consultants for specific application of the Raw Water Reservoir Feasibility Study project, as described herein. In the event that there are any changes in the ownership, nature, design, or location of the proposed project, or if any future additions are planned, the conclusions and recommendations contained in this report should not be considered valid unless (1) the project changes are reviewed by Integrated Sustainability, and (2) the conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for un-consulted use of segregated portions of this report.

6 CLOSURE

Integrated Sustainability would like to thank the Sunshine Coast Regional District for the opportunity to support the Raw Water Reservoir Feasibility Study project. We trust that this Detailed Desktop Study Report meets the needs and expectations of the Sunshine Coast Regional District. If you have any questions, please contact the undersigned at any time.

Sincerely,

Integrated Sustainability

Haley Massong, P.Eng.
Geotechnical Engineer

Robert Best, P. Bio.
Aquatic Biologist

Reviewed by:

Alexa J. Sperske, P.Eng.
Senior Geotechnical Engineer

Tom Parker
Senior Environment & Regulatory Advisor

7 REFERENCES

BC Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Ministry of Environment. Victoria, B.C. Available at: http://a100.gov.bc.ca/pub/eswp/. Accessed 22 January 2019.

Canadian Dam Association (CDA). 2007. Technical Bulletin: Inundation, Consequences, and Classification for Dam Safety. Canadian Dam Association.

Clague, J.J., Fulton, R.J., and Ryder, J.M., 1982. Surficial geology, Vancouver Island and adjacent mainland, British Columbia, map. Geological Survey of Canada, Open File 837, 1:1,000,000 scale.

Ecological Framework of Canada, 2016. Ecoregions of Canada, Peace Lowland. Available at: http://ecozones.ca/english/region/138.html. Accessed 22 January 2019.

Ecological Stratification Working Group. 1995. A National Ecological Framework for Canada. Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research and Environment Canada, State of the Environment Directorate. Ecozone Analysis Branch, Ottawa/Hull. Report and national map at 1:7 500 000 scale. Available at: http://sis.agr.gc.ca/cansis/publications/manuals/1996/cad-map.jpg. Accessed 22 January 2019.

Fisheries and Oceans Canada (DFO). 2019. Available at: http://www.dfo-mpo.gc.ca/index-eng.htm. Accessed 22 January 2019.

Google Earth V 7.3.2.5491 (Google Earth). Monday, July 23, 2018 9:31:27 PM UTC. Sunshine Coast Regional District, British Columbia, Canada. DigitalGlobe 2018, NASA, SCRD, Landsat/Copernicus. http://www.googleearthpro.com. Accessed 21 January 2019.

Government of Canada. 2019. Species at Risk Public Registry. Available at: https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm. Accessed 22 January 2019.

Howes, D.E., Dawson, E., Porteous, B. (Howes, et al). 1987. Chapman Creek Highlighted Potential Clear-cut Landslide and Stream Impact Rating, Map No. 307145, scale 1:20 000.

Integrated Sustainability. 2018a. Water Demand Analysis. VP18-SCR-01-00-LET-WW-WaterDemandAnalysis_Rev3. Rev. 3. Vancouver, BC.

Integrated Sustainability. 2018b. Raw Water Reservoir Feasibility Study, Desktop Assessment & Multi-Criteria Analysis Report. VP18-SCR-01-00-RPT-CI-Reservoir_MCA_Rev0. Rev. 0. Vancouver, BC.

Massey, N.W.D., MacInture, D.G., Desjardins, P.J. and Cooney, R.T. (Massey et al.). 2005. British Columbia Geological Survey. Geology of British Columbia. Geoscience Map 2005-3, scale 1:1,000,000.

Ministry of Energy, Mines and Petroleum Resources - BC Geological Survey. 2018. Geology Faults, Licensed under Open Government Licence - British Columbia. Scale 1:100 000.

Natural Resources Canada (NRC). 2017. Seismic Hazard Map, British Columbia, Geological Survey of Canada.

Province of British Columbia. 2019a. iMapBC Application. Available at: https://maps.gov.bc.ca/ess/hm/imap4m/

Province of British Columbia. 2019b. *Water Sustainability Act*. Dam Safety Regulation. Available at: http://www.bclaws.ca/civix/document/id/complete/statreg/40_2016. Retrieved 19 January 2019.

Queen's Printer. 2018a. Land Act. Available at: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96245_01. Assessed 21 January 2019.

Queen's Printer. 2018b. *Water Sustainability Act*. Available at: http://www.bclaws.ca/civix/document/id/complete/statreg/14015. Accessed 21 January 2019.

Sunshine Coast Regional District (SCRD). 2015. Available at: http://www.scrd.ca/Development-Permits. Accessed 17 January 2019.

Vancouver Coastal Health. 2017. Available at: http://www.vch.ca/locations-services/result?res_id=157. Accessed 21 January 2019.

INTEGRATED SUSTAINABILITY

Tables

Table 1 - Desktop Assessment Summary

Project Name: Raw Water Reservoir Feasibility Study - Phase 2 Detailed Desktop Assessment
Client Name: Sunshine Coast Regional District
Project Manager: AJ MacDonald

Project Number: VP18-SCR-01-00
Date: 2019-Feb-13
Rev: 0

Criteria	Site A	Site B	Site C3	Site C4
Site Characteristics				
Approximate Site Location (UTM Nad 83 Zone 10)	J/92-G-5	J/92-G-5	B/92-G-12	B/92-G-12
Site Topography (%)	6.4 to 7.4 (slopes downwards from northeast to southwest)	2.2 to 3.5 (slopes downwards from northeast to southwest)	20 to 40 (reservoir located within an existing waterbody basin within a valley that slopes steeply upward to the east, west, and north)	15 to 30 (reservoir located within an existing waterbody basin within a valley that slopes moderately upward to the east and steeply upward to the west and north)
Site Lease Area (ha)	45.1	45.5	41.1 (not currently including stockpiles or operations pad area)	34.7 (not currently including stockpiles or operations pad area)
Site Dimensions (L x W) (m)	840 x 590	800 x 660	-	-
Reservoir Dimensions (L x W x D) (m) (depth defined as the elevation difference between embankment crest and the lowest point in the base of the reservoir)	660 x 250 x 15	670 x 340 x 12	550 x 430 x 9.1 (maximum depth)	550 x 410 x 13 (maximum depth)
Maximum Excavation Depth[1] (m)	13.2	10.3	0	0
Maximum Embankment Height (m)	14.1	14.0	15.0	14.1
Total Operational Storage Volume[2] (m^3)	1,180,300	1,291,600	781,900	856,000
Earthworks Excavation Volume (m^3)	797,100	672,500	2	0
Earthworks Fill Volume (m^3)	372,300	362,200	47,200	65,600
Offsite Fill Material Required (m^3)	No (assuming that onsite excavated material is suitable)	No (assuming that onsite excavated material is suitable)	Yes (either fill material or concrete)	Yes (either fill material or concrete)
Excavation Stockpile Volume (m^3)	552,200	403,500	-	-
Topsoil Stockpile Volume (m^3)	86,800	107,900	-	-
Subsoil Stockpile Volume (m^3)	128,700	143,400	-	-
Scalability (ability to expand for larger capacity (phased approach) by increasing area or dam height)	Potential for lateral expansion of reservoir to the east Potentials to increase reservoir volume by raising the embankments, which results in embankments >15 m	Potential for expansion of reservoir to the northwest (would extend over current location of the Sunshine Coast Rod and Gun Club (SCRGC). Potentials to increase reservoir volume by raising the embankments, which results in embankments >15 m	Potentials to increase reservoir volume by raising the embankments, which results in embankments >15 m	Potentials to increase reservoir volume by raising the embankments, which results in embankments >15 m
Access				
Road Access	Yes	Yes	No	No
Road Type	Forestry service road	Forestry service road	N/A	N/A
Proximity to Road	Site is located close to an existing unnamed road to the west, an approximately 120 m long access road would be required to access the site form this road	Site is located close to an existing unnamed road to the west, an approximately 150 m long access road would be required to access the site form this road	Site is not located within close proximity to any currently suitable roads Site is located approximately 850 m and 2000 m from unnamed roads to the northwest and south, respectively; however, it is assumed that these roads are not currently suitable for access, and that upgrading works would be required to utilize these roads	Site is not located within close proximity to any currently suitable roads Site is located approximately 150 m from an unnamed road to the northwest; however, it is assumed that this road is not currently suitable for access, and that upgrading works would be required to utilize this road
Pipeline/Easement Crossings	Site is located approximately 575 m north of a hydro transmission line which would be crossed to access the site, and immediately south of a Fortis BC gas pipeline	Site is located immediately north of a Fortis BC gas pipeline, which would be crossed via the unnamed existing road to access the site	No	No
Other Access Requirements	None	None	None	None
Land Use				

Criteria	Site A	Site B	Site C3	Site C4
Located within Tetrahedron Provincial Park	No	No	No, site is located approximately 200 m south of the park boundary	No, site is located approximately 100 m west and 300 m south of the park boundary
Located within Agricultural Land Reserve	Yes	Yes	No	No
Located within Gravel Lands (as per shíshálh Nation Foundation Agreement)	No	No	No	No
Water Supply and Distribution				
Water Supply Source	Chapman Creek	Chapman Creek	Surface water	Surface water
Conveyance method from source to reservoir site	Utilize existing raw water pipeline, and construct new pipeline branch to convey water to reservoir site	Utilize existing raw water pipeline, and construct new pipeline branch to convey water to reservoir site	Overland surface water flow *Note - surface water modelling is required to accurately size the reservoir volume based on expected volume	Overland surface water flow *Note - surface water modelling is required to accurately size the reservoir volume based on expected volume
New Chapman Creek Intake Required?	No	Yes	No	No
Conveyance method from reservoir site to Chapman Creek WTP	Pipeline; utilize existing pump station	Pipeline; utilize existing pump station	Overland surface water flow or pipeline to Chapman Creek, then utilize existing infrastructure *Note - if water will be conveyed overland from site to Chapman Creek, there is potential to lose water during this process into the ground	Overland surface water flow or pipeline to Chapman Creek, then utilize existing infrastructure *Note - if water will be conveyed overland from site to Chapman Creek, there is potential to lose water during this process into the ground
Subsurface Conditions				
Surficial Geology[3]	Glaciomarine - Veneer Sediments (GMv) - Comprised of discontinuous, thin marine and glaciomarine deposits; dominantly comprised of sand and gravel occurring as lag overlying glacial or glaciomarine sediments and glaciomarine stony silt and clay, generally <2 m in thickness	Glacial - Sandy Till Veneer (Tv) - Comprised of discontinuous, thin till material of generally 1m to 3 m, overlying bedrock It is likely that bedrock will be encountered near surface at this site location	Colluvial - Veneer (Cv) - Comprised of steeply sloped rock landforms with discontinuous colluvial rubble which is thicker near slope toes, localized patches of till are present, unconsolidated sediments are generally <2 m thick It is likely that little mineral soils will be available on site for use as construction materials	Colluvial - Veneer (Cv) - Comprised of steeply sloped rock landforms with discontinuous colluvial rubble which is thicker near slope toes, localized patches of till are present, unconsolidated sediments are generally <2 m thick It is likely that little mineral soils will be available on site for use as construction materials
Bedrock Geology[4,5]	Granodioritic intrusive rocks of the Mesozoic era and Jurassic period, comprised of variably foliated granodiorite; lesser quartz diorite	Granodioritic intrusive rocks of the Mesozoic era and Jurassic period, comprised of variably foliated granodiorite; lesser quartz diorite	Quartz diorite intrusive rocks of the Mesozoic era and Cretaceous period, comprised of variably foliated quartz diorite; lesser granodiorite	Quartz diorite intrusive rocks of the Mesozoic era and Cretaceous period, comprised of variably foliated quartz diorite; lesser granodiorite
Proximity to Mapped Faults[6]	Site located approximately 9 km and 20 km from mapped faults located to the northeast and approximately 10 km from a mapped fault located to the northwest	Site is located approximately 8 km and 20 km from mapped faults located to the northeast and approximately 9 km from a mapped fault located to the northwest	Site is located approximately 4 km from a mapped fault located to the southeast, approximately 15 km from a mapped fault located to the east, and approximately 13 km from a mapped fault located to the southwest	Site is located approximately 5 km from a mapped fault located to the southeast, approximately 15 km from a mapped fault located to the east, and approximately 13 km from a mapped fault located to the southwest
Landslide Rating within Proximity of Site[7]	Site is located in an area ranked as 1L (low likelihood of occurrence of rapid mass movement in clear-cut area, low likelihood of clear-cut landslide debris entering the adjacent stream system), zone ranked as 4H (high likelihood of rapid mass movement in clear-cut area, high likelihood of clear-cut landslide debris entering the adjacent stream system) located approximately 100 m to the southwest, near the Chapman Creek valley	Site is located in an area ranked as 1L (low likelihood of occurrence of rapid mass movement in clear-cut area, low likelihood of clear-cut landslide debris entering the adjacent stream system), zone ranked as 4H (high likelihood of rapid mass movement in clear-cut area, high likelihood of clear-cut landslide debris entering the adjacent stream system) located approximately 100 m to the west, near the Chapman Creek valley	Site is located in an area ranked as 1L (low likelihood of occurrence of rapid mass movement in clear-cut area, low likelihood of clear-cut landslide debris entering the adjacent stream system), zones ranked as 1H and 2H (low likelihood of rapid mass movement in clear-cut area, high likelihood of clear-cut landslide debris entering the adjacent stream system) located within 100 m to the east, near the Chapman Creek valley, along which mapped previous landslides are located	Site is located in an area ranked as 1L (low likelihood of occurrence of rapid mass movement in clear-cut area, low likelihood of clear-cut landslide debris entering the adjacent stream system), zones ranked as 1H and 2H (low likelihood of rapid mass movement in clear-cut area, high likelihood of clear-cut landslide debris entering the adjacent stream system) located 100 m to 200 m to the east, near the Chapman Creek valley, along which mapped previous landslides are located
Identified Potential Geohazards and Slope Instability Triggers[8,9]	Evidence of previous slope movement approximately 100 m south/southwest of site, likely corresponds with 4H zone (detailed above) Evidence of previous slope movement along Chapman Creek valley, located approximately 350 m west of the site Clear-cut area immediately north/northwest of site may be susceptible to instability	Evidence of previous slope movement along Chapman Creek valley (corresponds with a 4H zone as detailed above), located approximately 100 m west of the site Localized valley located west of the southwest corner of the site, may be susceptible to instability	Evidence of previous slope movement characterized by shallow sloughing and minor avulsion (debris flow)	Evidence of previous slope movement characterized by shallow sloughing and minor avulsion (debris flow) Clear-cut area immediately northwest of the site may be susceptible to instability
Environmental				
Mapped Wetlands within the Reservoir Footprint[10]	None identified	None identified	None identified - However, it should be noted that there is the potential for a wetland to surround the existing natural waterbody, which would likely be impacted by the placement of a reservoir. A review of satellite imagery appears to support this potential.	None identified - However, it should also be noted that there is the potential for a wetland to surround the existing natural waterbody, which would likely be impacted by the placement of a reservoir. A review of satellite imagery appears to support this potential.

Criteria	Site A	Site B	Site C3	Site C4
Closest Surface Water[11]	Hudson Creek (325 m east of site boundary) Chapman Creek (725 m west of site boundary)	Hudson Creek (280 m southeast of site boundary) Chapman Creek (380 m north of site boundary)	Located on a natural unnamed lake Chapman Creek (650 m east of site boundary) Multiple smaller waterbodies, including tributaries within 500 m	Located on a natural unnamed lake Chapman Creek (800 m east of site boundary) Multiple smaller waterbodies, including tributaries within 500 m Unnamed lake (640 m north of site boundary)
Proximity to Mapped Wetlands[10]	2.2 km	1.8 km	2.6 km	1.7 km
Fish Presence (in waterbodies downslope of Site locations) 12	No documented fish presence within the site boundary, as there appears to be no waterbody within the site boundary. However, waterbodies were identified to both the west (approximately 750 m) and east (approximately 325 m) of the site boundary. These waterbodies, including upstream and downstream extents have the documented presence of brook trout, chinook salmon, chum salmon, coho salmon, cutthroat trout, dolly varden, lamprey, pink salmon, rainbow trout, and sculpin.	No documented fish presence within the site boundary, as there appears to be no waterbody within the site boundary. However, waterbodies were identified to both the north (approximately 380 m) and southeast (approximately 280 m) of the site boundary. These waterbodies, including upstream and downstream extents have the documented presence of brook trout, chinook salmon, chum salmon, coho salmon, cutthroat trout, dolly varden, lamprey, pink salmon, rainbow trout, and sculpin.	No documented fish presence within the existing natural waterbody, located within the site boundary. This may be due to a lack of fishing effort on this waterbody. However, various species were identified within downstream waterbodies that provide surface flow to Chapman Creek, including brook trout, chinook salmon, chum salmon, coho salmon, cutthroat trout, dolly varden, pink salmon, rainbow trout. Migratory species are unlikely to be present in the existing waterbody (due to potential fish barriers), however, resident sportfish may be present and would require a fish survey to further investigate.	No documented fish presence within the existing natural waterbody, located within the site boundary. This may be due to a lack of fishing effort on this waterbody. However, various species were identified within downstream waterbodies that provide surface flow to Chapman Creek, including brook trout, chinook salmon, chum salmon, coho salmon, cutthroat trout, dolly varden, pink salmon, rainbow trout. Migratory species are unlikely to be present in the existing waterbody (due to potential fish barriers), however, resident sportfish may be present and would require a fish survey to further investigate.
Landscape	Forest	Forest	Forest and lake habitat	Forest and lake habitat
Wildlife Presence (10 km Radius)[13]	American robin, bald eagle, band-tailed pigeon, bobcat, black-headed grosbeak, black-throated gray warbler, brown-headed cowbird, Cassin's vireo, cedar waxwing, chestnut-backed chickadee, coastal tailed frog, common raven, dark-eyed junco, european starling, glaucous-winged gull, golden-crowned kinglet, hairy woodpecker, Hammond's flycatcher, harbour seal, Hutton's vireo, Johnson's hairstreak, MacGillivray's warbler, mule deer, northern alligator lizard, northern flicker, northern goshwak (Laingi subspecies), northern red-legged frog, northern rubber boa, northwestern crow, olive-sided flycatcher, orange-crowned warbler, pacific-slope flycatcher, pelagic cormorant, pine siskin, purple finch, red crossbill, red-breasted nuthatch, ruffed grouse, Rufous hummingbird, snow bramble, song sparrow, sooty grouse, spotted towhee, Steller's jay, Swainson's thrush, Townsend's warbler, turkey vulture, varied thrush, violet-green swallow, warbling vireo, western tanager, western wood-pewee, white-crowned sparrow, winter wren, yellow-rumped warbler	American robin, bald eagle, band-tailed pigeon, bobcat, black-headed grosbeak, black-throated gray warbler, brown-headed cowbird, Cassin's vireo, cedar waxwing, chestnut-backed chickadee, coastal tailed frog, common raven, dark-eyed junco, european starling, glaucous-winged gull, golden-crowned kinglet, hairy woodpecker, Hammond's flycatcher, harbour seal, Hutton's vireo, Johnson's hairstreak, MacGillivray's warbler, mule deer, northern alligator lizard, northern flicker, northern goshwak (Laingi subspecies), northern red-legged frog, northern rubber boa, northwestern crow, olive-sided flycatcher, orange-crowned warbler, pacific-slope flycatcher, pelagic cormorant, pine siskin, purple finch, red crossbill, red-breasted nuthatch, ruffed grouse, Rufous hummingbird, snow bramble, song sparrow, sooty grouse, spotted towhee, Steller's jay, Swainson's thrush, Townsend's warbler, turkey vulture, varied thrush, violet-green swallow, warbling vireo, western tanager, western wood-pewee, white-crowned sparrow, winter wren, yellow-rumped warbler	American robin, band-tailed pigeon, barred owl, black-headed grosbeak, black-throated gray warbler, brown-headed cowbird, Cassin's vireo, cedar waxwing, chestnut-backed chickadee, common raven, dark-eyed junco, golden-crowned kinglet, hairy woodpecker, Hammond's flycatcher, Johnson's hairstreak, MacGillivray's warbler, northern flicker, northwestern crow, olive-sided flycatcher, orange-crowned warbler, pacific-slope flycatcher, pine siskin, red-breasted nuthatch, ruffed grouse, Rufous hummingbird, spotted towhee, Steller's jay, Swainson's thrush, Townsend's warbler, varied thrush, violet-green swallow, warbling vireo, western tanager, white-crowned sparrow, willow flycatcher, Wilson's warbler, winter wren, yellow-rumped warbler	American robin, band-tailed pigeon, barred owl, black-headed grosbeak, black-throated gray warbler, brown-headed cowbird, Cassin's vireo, cedar waxwing, chestnut-backed chickadee, common raven, dark-eyed junco, golden-crowned kinglet, hairy woodpecker, Hammond's flycatcher, Johnson's hairstreak, MacGillivray's warbler, northern flicker, northwestern crow, olive-sided flycatcher, orange-crowned warbler, pacific-slope flycatcher, pine siskin, red-breasted nuthatch, ruffed grouse, Rufous hummingbird, spotted towhee, Steller's jay, Swainson's thrush, Townsend's warbler, varied thrush, violet-green swallow, warbling vireo, western tanager, white-crowned sparrow, willow flycatcher, Wilson's warbler, winter wren, yellow-rumped warbler
Special habitat zone[14]	Multiple areas of federally listed Critical Habitat for Marbled Murrelet within 10 km of site. Closest is within 500 m.	Multiple areas of federally listed Critical Habitat for Marbled Murrelet within 10 km of site. Closest is within 200 m.	Multiple areas of federally listed Critical Habitat for Marbled Murrelet within 10 km of site. Closest is approximately 110 m.	Multiple areas of federally listed Critical Habitat for Marbled Murrelet within 10 km of site. Closest is approximately 290 m.
Federal Species at Risk[15]	Band-tailed pigeon - *Special Concern* Coastal tailed frog - *Special Concern* Northern goshawk (Laingi subspecies) - *Threatened* Northern red-legged frog - *Special Concern* Northern rubber boa - *Special Concern* Olive-sided flycatcher - *Threatened*	Band-tailed pigeon - *Special Concern* Coastal tailed frog - *Special Concern* Northern goshawk (Laingi subspecies) - *Threatened* Northern red-legged frog - *Special Concern* Northern rubber boa - *Special Concern* Olive-sided flycatcher - *Threatened*	Band-tailed pigeon - *Special Concern* Olive-sided flycatcher - *Threatened*	Band-tailed pigeon - *Special Concern* Olive-sided flycatcher - *Threatened*
Provincial Species at Risk[16]	Hutton's vireo - Red List Northern goshawk (Laingi subspecies) - Red List	Hutton's vireo - Red List Northern goshawk (Laingi subspecies) - Red List	None identified	None identified
Provincial Species of Concern[16]	Band-tailed pigeon (Blue List) Northern red-legged frog (Blue List) Olive-sided flycatcher (Blue List) Winter wren (Blue List)	Band-tailed pigeon (Blue List) Northern red-legged frog (Blue List) Olive-sided flycatcher (Blue List) Winter wren (Blue List)	Band-tailed pigeon (Blue List) Olive-sided flycatcher (Blue List) Winter wren (Blue List)	Band-tailed pigeon (Blue List) Olive-sided flycatcher (Blue List) Winter wren (Blue List)

Criteria	Site A	Site B	Site C3	Site C4
Important Habitats and Special Access Zone[17]	Sitka spruce / salmonberry Dry ecosystem - Red List (within 300 m)	Sitka spruce / salmonberry Dry ecosystem - Red List (within 225 m)	N/A	N/A
Contaminated Site History[18]	None identified	None identified	None identified	None identified
Archaeological Site History[19]	None identified	None identified	None identified	None identified
Water Wells (5 km radius)[20]	18 (monitoring wells)	18 (monitoring wells)	None identified	None identified
Abandoned Wells (5 km radius)[20]	None identified	None identified	None identified	None identified
Regulatory				
Development Permit (SCRD)[21]	Yes	Yes	Potential	Potential
Geotechnical Development Permit (SCRD)[21]	Yes	Yes	Yes	Yes
Riparian Development Permit (SCRD)[21]	No	Yes	Potential	Potential
Licence (Section 9)[22]	Yes	Yes	Yes	Yes
Licence of Occupation (Section 39)[23]	Yes	Yes	Yes	Yes
Conduct a Non-Farm Use activity within the ALR (Agricultural Land Reserve)[24]	Yes	Yes	No	No
DFO - Request for Review application	Potential	Potential	Yes	Yes
DFO - Authorization	Potential	Potential	Potential	Potential
Vancouver Coastal Health[25]	Yes	Yes	Yes	Yes
Environmental Management Act (Potential)[26]	Potential	Potential	Potential	Potential
Preliminary Dam Classification				
Dam Consequence of Failure[27]	Very High to Extreme	High to Very High	High to Very High	High to Very High

Notes:

1. Allowable excavation depth to be confirmed by geotechnical investigation during preliminary design (not included in this scope of work).
2. Storage volume assumes 2 m freeboard at the maximum water level.
3. Clague, J.J., Fulton, R.J., and Ryder, J.M., 1982. Surficial geology, Vancouver Island and adjacent mainland, British Columbia, map. Geological Survey of Canada, Open File 837, 1:1,000,000 scale.
4. Massey, N.W.D., MacInture, D.G., Desjardins, P.J. and Cooney, R.T. (Massey et al.). 2005. British Columbia Geological Survey. Geology of British Columbia. Geoscience Map 2005-3, scale 1:1,000,000.
5. Bedrock depths should be confirmed during an intrusive geotechnical investigation during future design stages (not included in the currently scope of work).
6. Ministry of Energy, Mines and Petroleum Resources - BC Geological Survey. 2018. Geology Faults, Licenced under Open Government License - British Columbia. Scale 1:100 000.
7. Howes, D.E., Dawson, E., Porteous, B. (Howes, et al). 1987. Chapman Creek Highlighted Potential Clear-cut Landslide and Stream Impact Rating, Map No. 307145, scale 1:20 000.
8. Google earth V 7.3.2.5491. Monday, July 23, 2018 9:31:27 PM UTC. Sunshine Coast Regional District, British Columbia, Canada. DigitalGlobe 2018, NASA, SCRD, Landsat/Copernicus. http://www.googleearthpro.com. Accessed 21 January 2019.
9. Local surficial slope conditions to be confirmed onsite during the visual field reconnaissance as part of this Project. An intrusive geotechnical investigation is recommended to be completed at the site locations during future design stages and is not included in this scope of work.
10. iMapBC - Freshwater Atlas Wetlands. Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
11. iMapBC - Freshwater Atlas Stream Network, Rivers, Lakes. Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
12. iMapBC - Fish Wildlife and Plant Species (All fish points). Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
13. iMapBC - Fish Wildlife and Plant Species (Amphibians, Reptiles and Turtles, Wildlife Species Inventory). Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
14. iMapBC - Critical Habitat for Federally-Listed Species at Risk - Posted. Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
15. Government of Canada. 2019. Species at Risk Public Registry. Accessed 22 January 2019. https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm
16. British Columbia Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. BC Ministry of Environment. Accessed 22 January 2019. http://a100.gov.bc.ca/pub/eswp/
17. iMapBC - Species and Ecosystems at Risk - Publicly Available Occurrences. Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
18. iMapBC - Waste - Environmental Remedian Sites. Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
19. iMapBC - Archaeology and Culture Areas (Archaeological Culture Areas, Archaeology Borden Grid, First Nation Community Locations, Fossil - Important Areas, and Historic Environment). Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
20. iMapBC - Waste (Environmental Monitoring Stations - Water Sites [Well]). Accessed 22 January 2019. https://maps.gov.bc.ca/ess/hm/imap4m/
21. Sunshine Coast Regional District, Development Permits. http://www.scrd.ca/Development-Permits
22. Water Sustainability Act. http://www.bclaws.ca/civix/document/id/complete/statreg/14015
23. Land Act. http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96245_01
24. Agricultural Land Commission. https://www.alc.gov.bc.ca/alc/content/applications-and-decisions
25. Vancouver Coastal Health. http://www.vch.ca/public-health/environmental-health-inspections/drinking-water
26. Environmental Management Act. http://www.bclaws.ca/Recon/document/ID/freeside/03053_00

INTEGRATED SUSTAINABILITY

Figures

F/92-G-12

G/92-G-12

H/92-G-12

CHAPMAN LAKE

TETRAHEDRON PROVINCIAL PARK

MT RICHARDSON PROVINCIAL PARK

C4

C3

C1

C/92-G-12

B/92-G-12

A/92-G-12

CHAPMAN CREEK

PORPOISE BAY

GRAVEL LANDS

EXISTING CHAPMAN CREEK INTAKE

EXISTING PUMP STATION

CHAPMAN CREEK WTP

MISCELLANEOUS LAND USES
PLANNING/MARKETING/DEVELOP PROJECTS

GRAVEL LANDS

B

A

GAS

P

HUDSON CREEK

J/92-G-5

RURAL RESIDENTIAL

I/92-G-5

LEGEND:

- STREAM NETWORK
- FORTIS GAS PIPELINE — GAS
- HYDROPOWER TRANSMISSION LINE — P — P
- PARK BOUNDARY
- ROADS
- TRAILS
- PROPOSED 'A' SITE
- PROPOSED 'B' SITE
- PROPOSED 'C' SITES

0 1 2 3 km

SCALE 1 : 60,000

UTM NAD83 ZONE 10

PREPARED BY

INTEGRATED SUSTAINABILITY

CLIENT

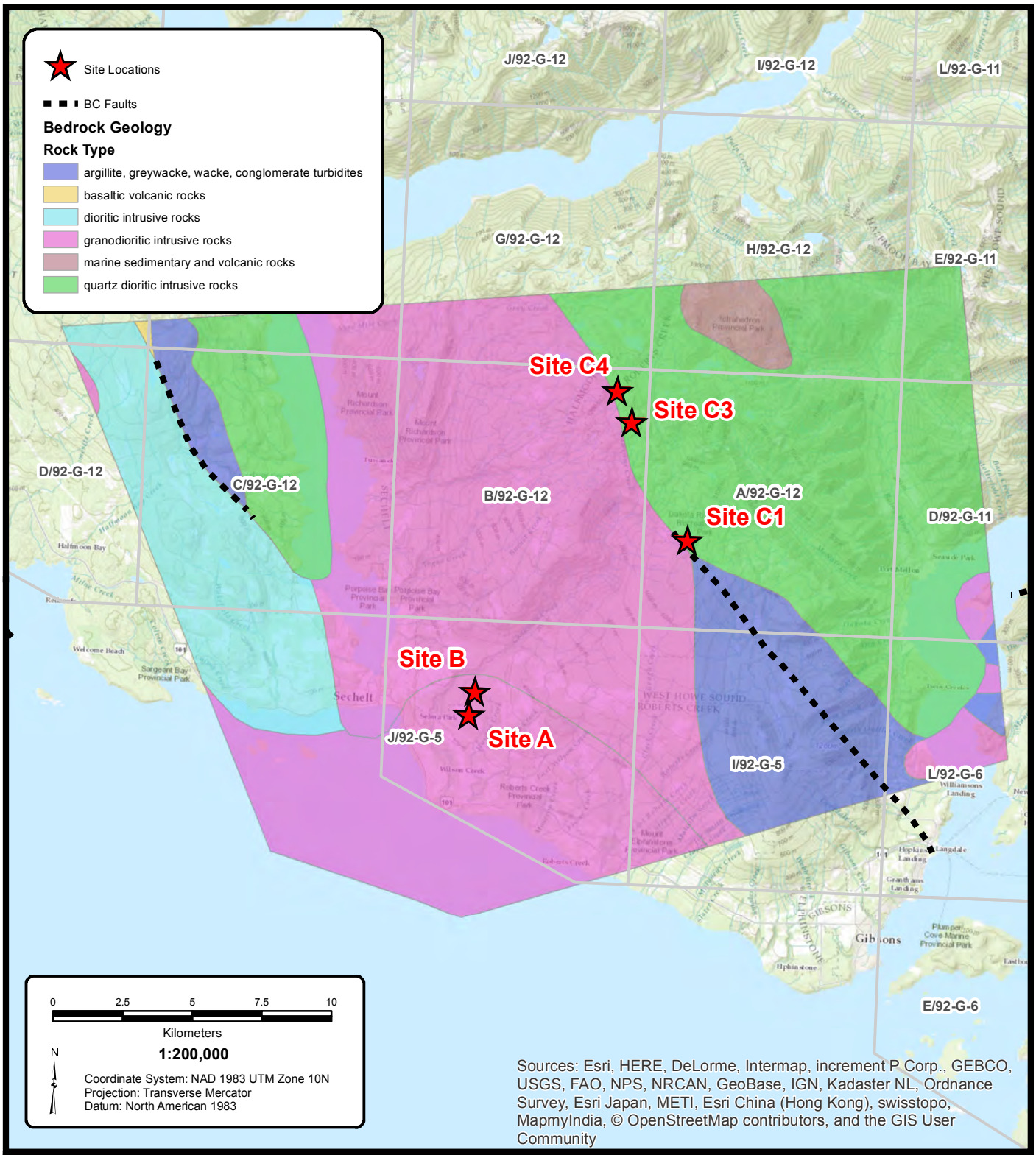
SUNSHINE COAST REGIONAL DISTRICT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
DETAILED DESKTOP STUDY
SITE LOCATION MAP

DRAWN BY	CHECKED BY	APPROVED BY	DATE (YYYY-MM-DD)
C. DORNAN	H. MASSONG	A. SPERSKE	2019-02-13

SCALE	PROJECT NO.	FIGURE NO.	REVISION
1:60,000	VP18-SCR-01-00	FIGURE 1	0

BY: CHERYL DORNAN, PLOTTED: 2019-02-08 2:39 PM, FILENAME: W:\Sunshine Coast Regional District\VP18-SCR-01-00\58 Civil-Earthworks\SK\VP18-SCR-01-00_Civil-Earthworks_SK_VP18-SCR-01-CI-002.dwg



PREPARED BY: INTEGRATED SUSTAINABILITY

CLIENT: SUNSHINE COAST REGIONAL DISTRICT

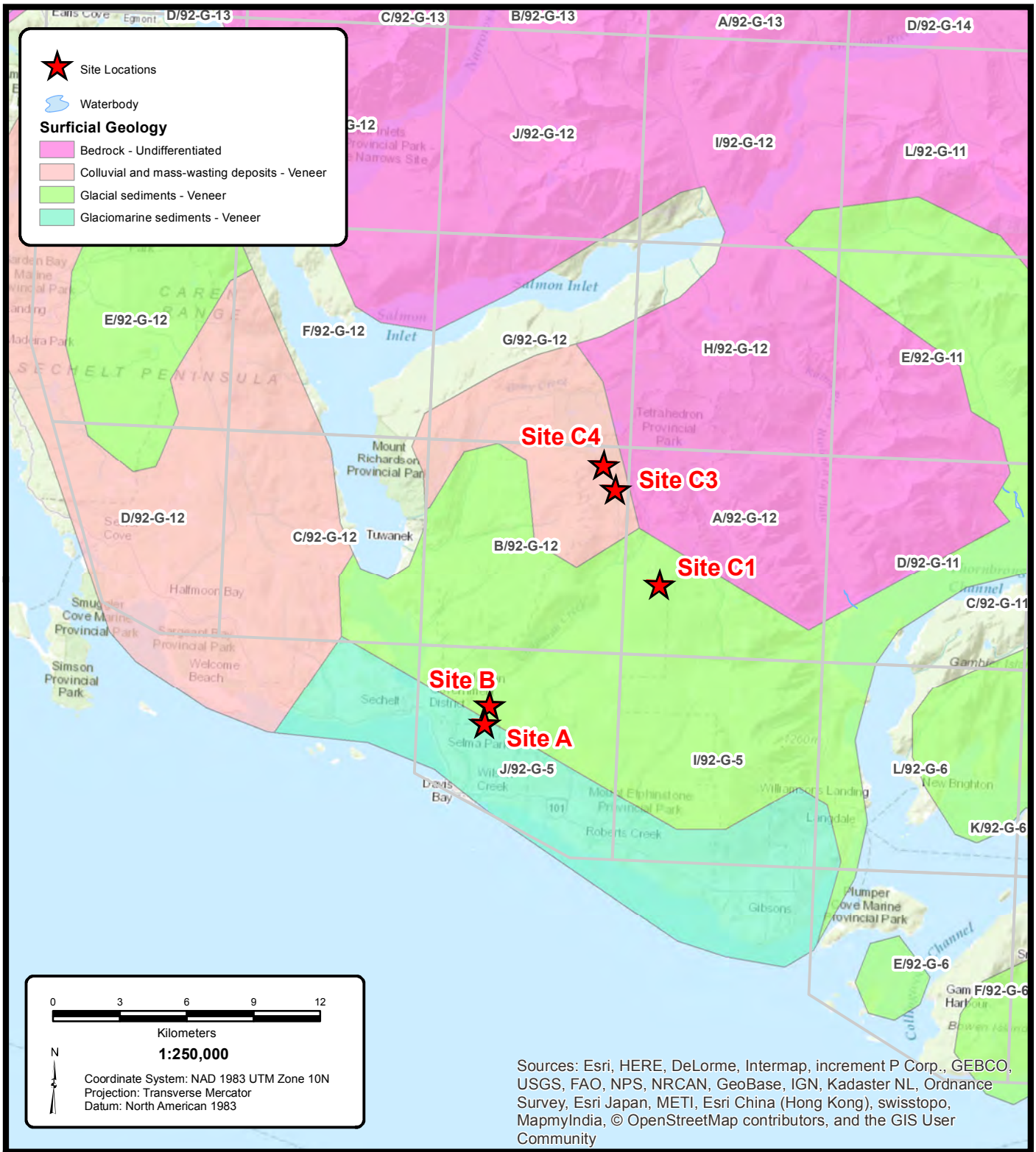
RAW WATER RESERVOIR FEASIBILITY STUDY
DETAILED DESKTOP STUDY
REGIONAL BEDROCK GEOLOGY AND MAPPED FAULTS

DRAWN BY:	CHECKED BY:	APPROVED BY:
J.TITUS	H.MASSONG	A.SPERSKE

PROJECT NO.	FIGURE NO.	REVISION:
VP18-SCR-01-00	2	A

NOTES:

Document Path: N:\Projects\SCR\VP18-SCR-01-00\MXD\Bedrock_Geology.mxd,



PREPARED BY: INTEGRATED SUSTAINABILITY

CLIENT: SUNSHINE COAST REGIONAL DISTRICT

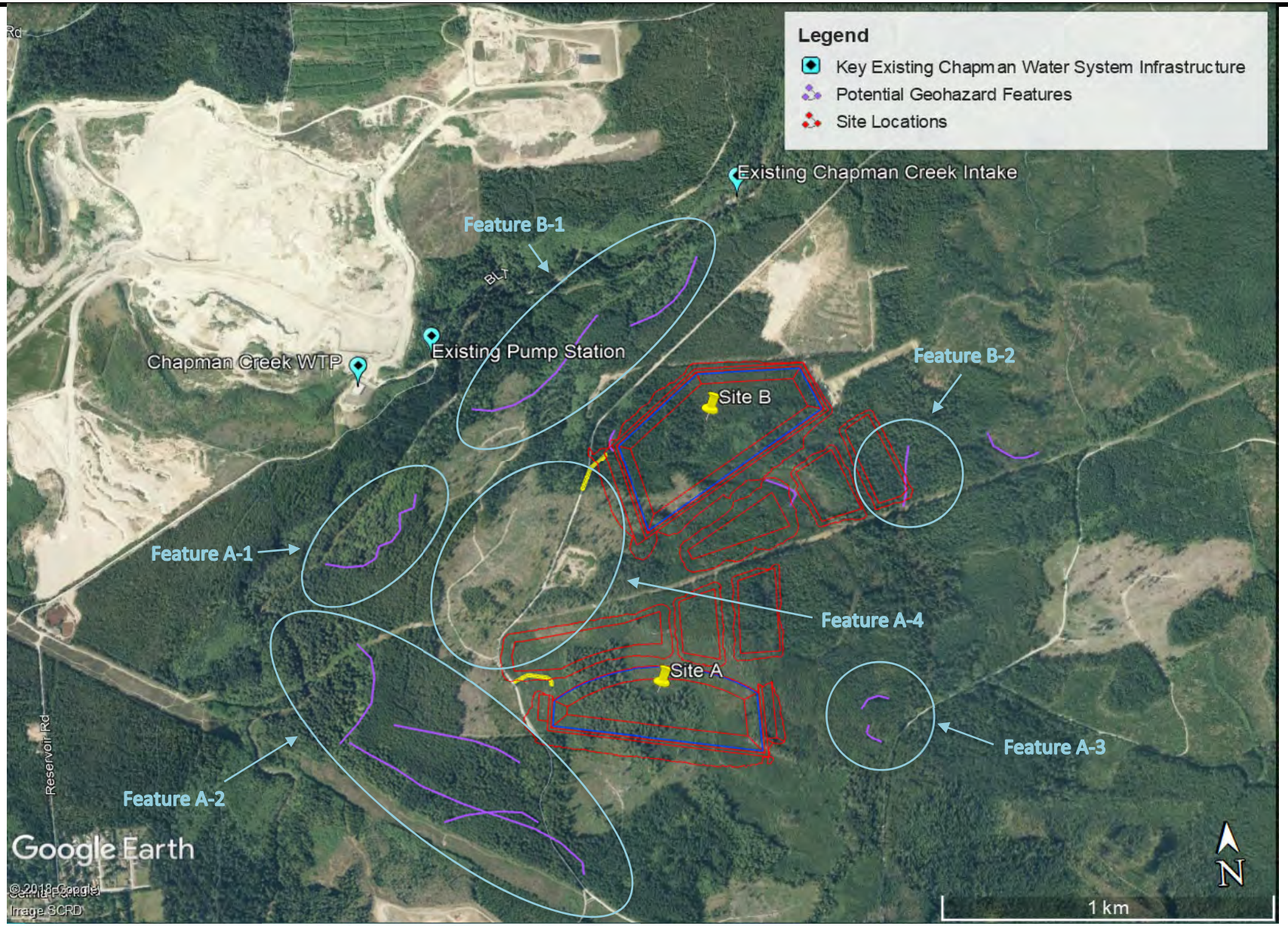
RAW WATER RESERVOIR FEASIBILITY STUDY
DETAILED DESKTOP STUDY
REGIONAL SURFICIAL GEOLOGY

DRAWN BY:	CHECKED BY:	APPROVED BY:
J.TITUS	H.MASSONG	A.SPERSKE

PROJECT NO.	FIGURE NO.	REVISION:
VP18-SCR-01-00	3	A

NOTES:

Document Path: N:\Projects\SCR\VP18-SCR-01-00\MXD\Surficial_Geology.mxd



PREPARED BY

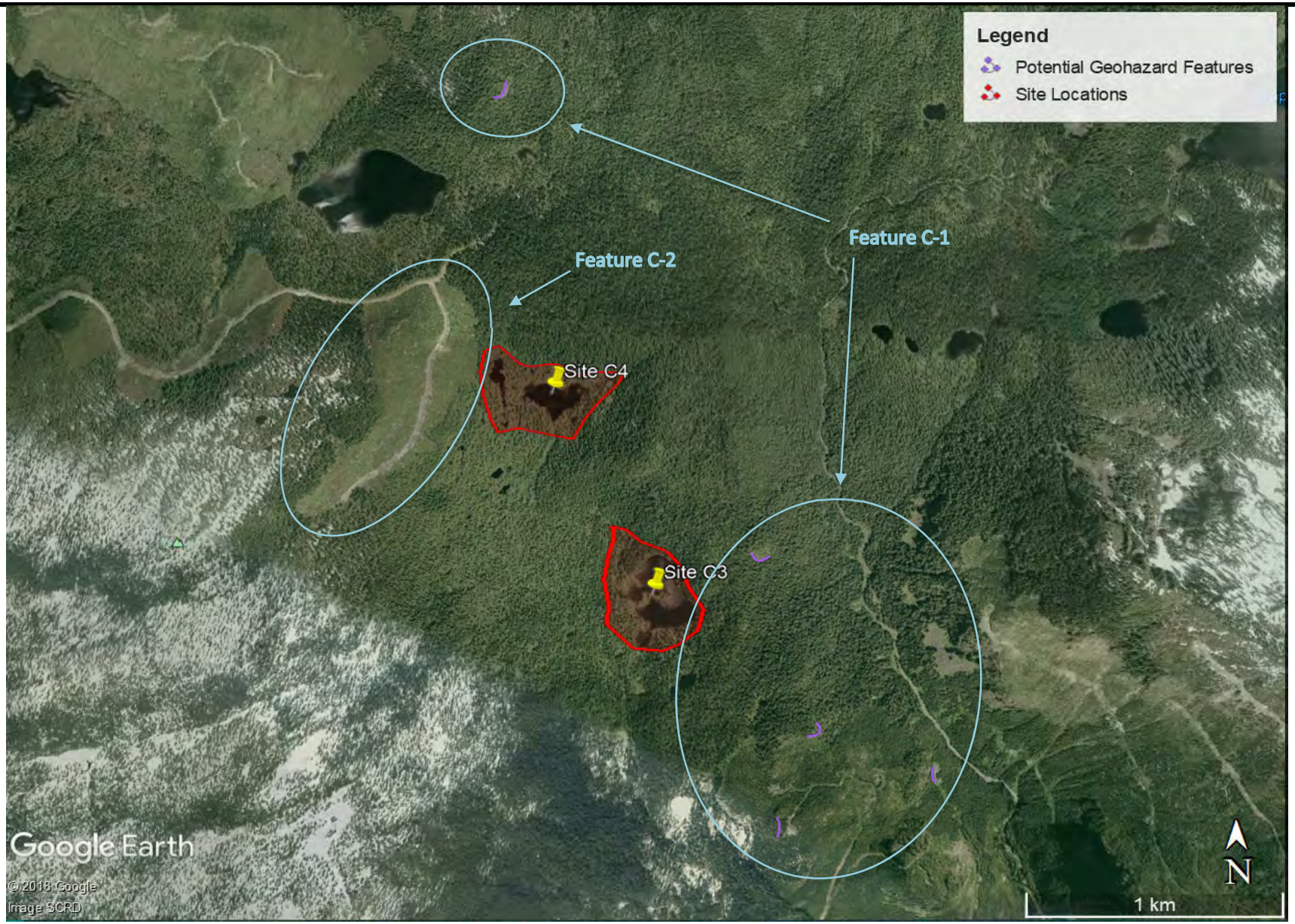
INTEGRATED SUSTAINABILITY

CLIENT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
DETAILED DESKTOP STUDY
SITES A AND B - POTENTIAL GEOHAZARDS LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY.	DATE
H.MASSONG	A.SPERSKE	A.SPERSKE	2019-01-25

SCALE	PROJECT NO.	FIGURE NO.	REVISION
NTS	VP18-SCR-01-00	FIGURE 4	A



PREPARED BY

INTEGRATED SUSTAINABILITY

CLIENT

SUNSHINE COAST REGIONAL DISTRICT
RAW WATER RESERVOIR FEASIBILITY STUDY
DETAILED DESKTOP STUDY
SITES C3 AND C4 - POTENTIAL GEOHAZARDS LOCATIONS

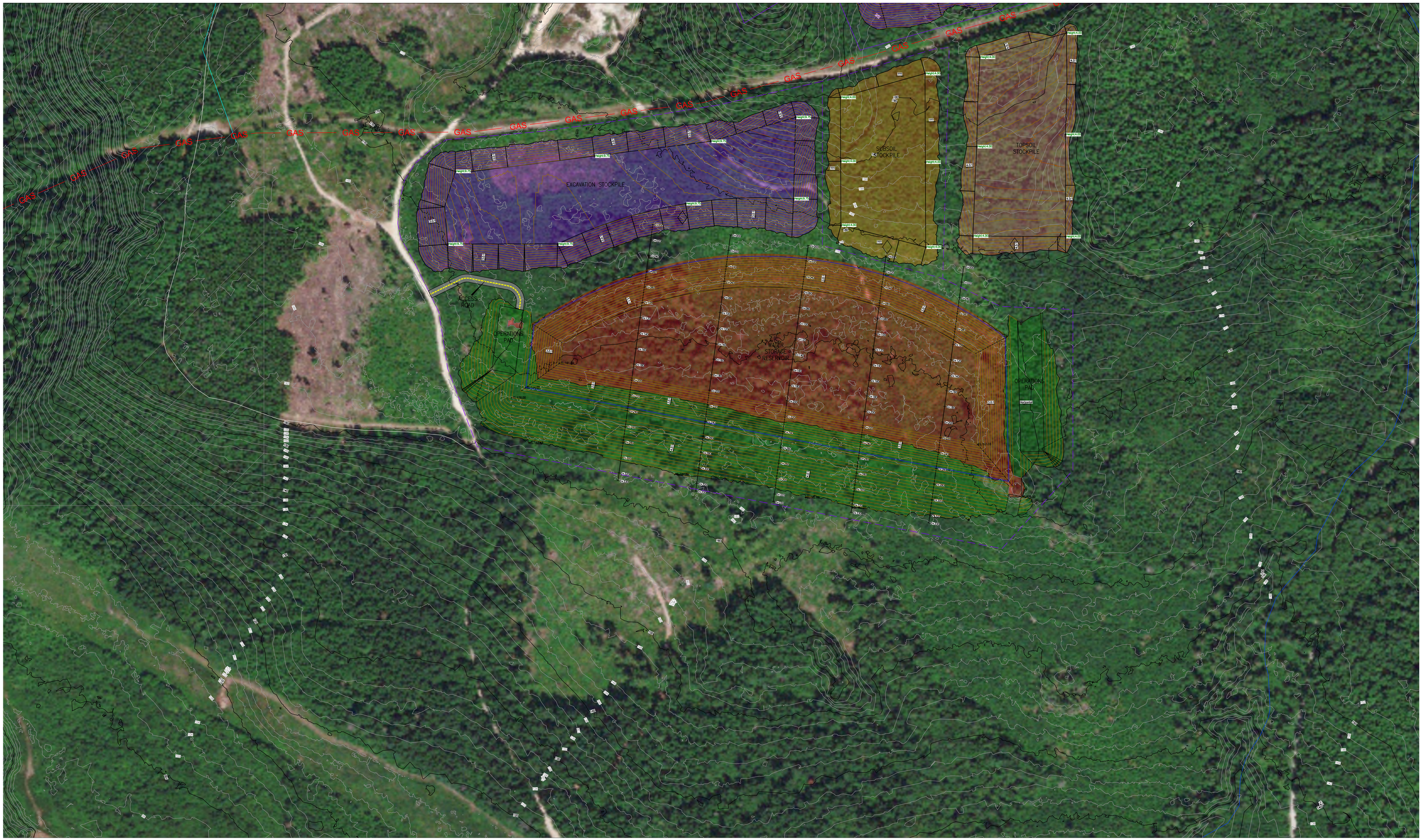
DRAWN BY	CHECKED BY	APPROVED BY.	DATE
H.MASSONG	A.SPERSKE	A.SPERSKE	2019-01-25

SCALE	PROJECT NO.	FIGURE NO.	REVISION
NTS	VP18-SCR-01-00	FIGURE 5	A

INTEGRATED SUSTAINABILITY

Appendices

Appendix 1 – Conceptual Site Layouts


GAS
EXCAVATION STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
ACCESS ROAD
OPERATIONS PAD
WATER STORAGE RESERVOIR
OPERATIONS PAD

GAS

EXCAVATION STOCKPILE

SUBSOIL STOCKPILE

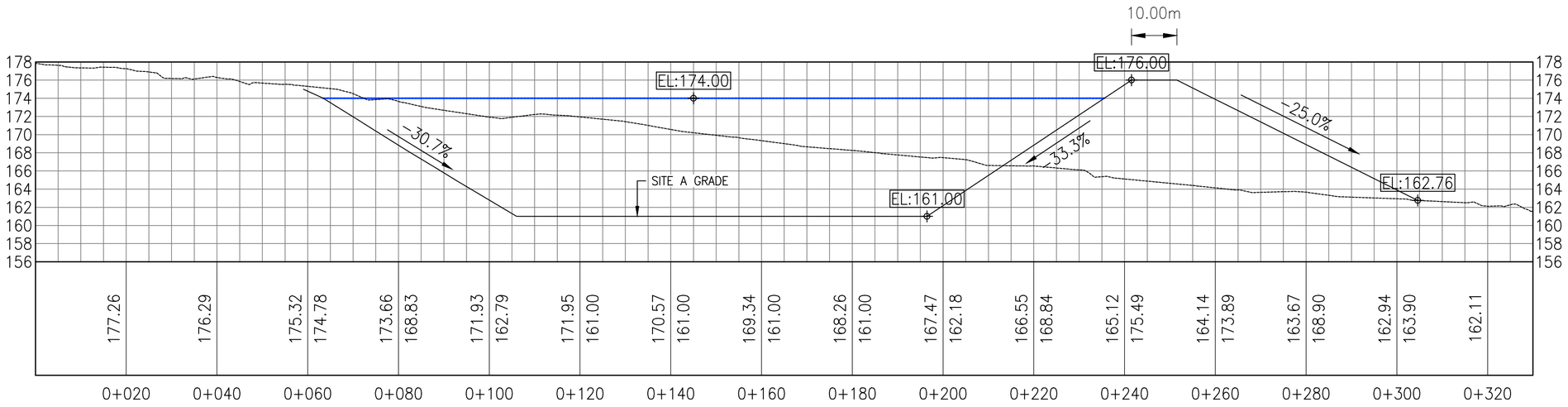
TOPSOIL STOCKPILE

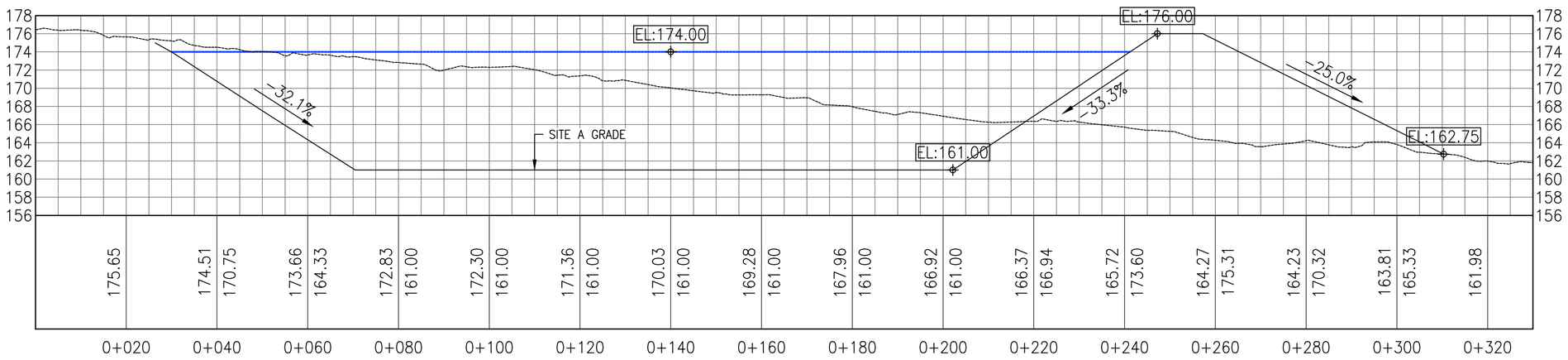
ACCESS ROAD

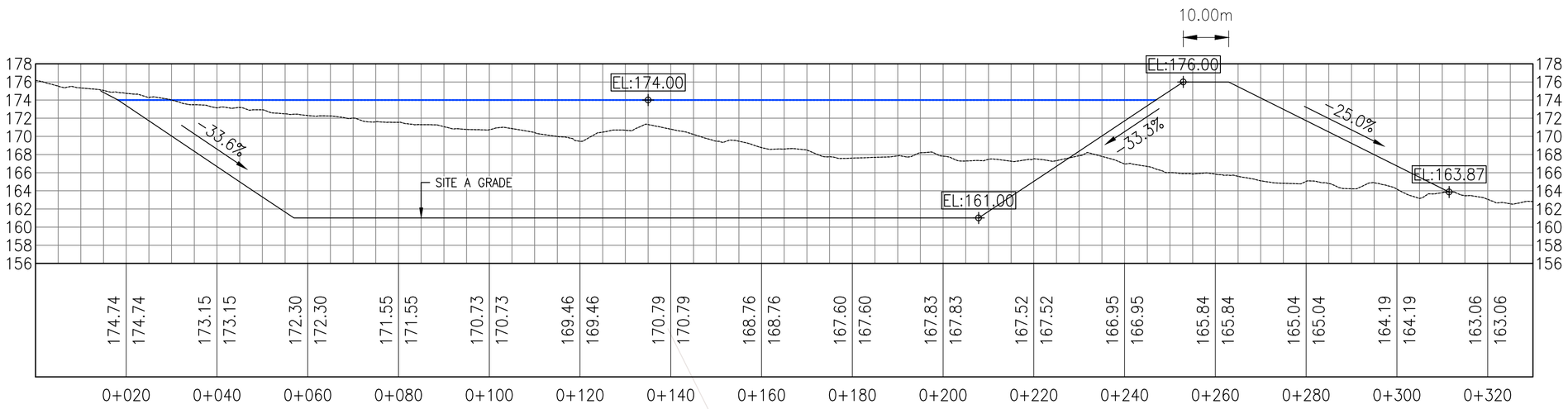
OPERATIONS PAD

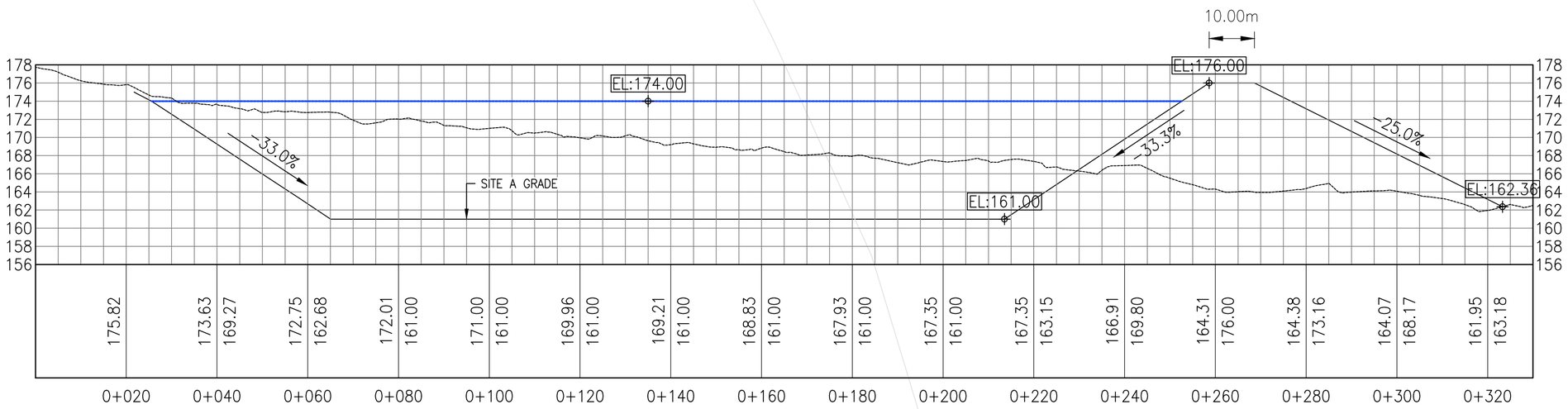
WATER STORAGE RESERVOIR

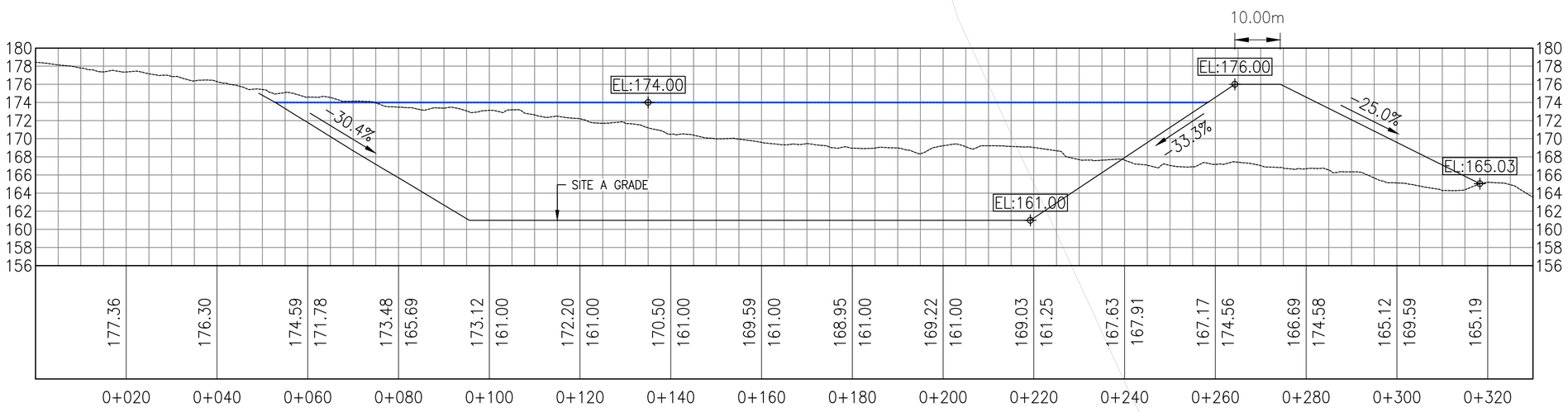
OPERATIONS PAD











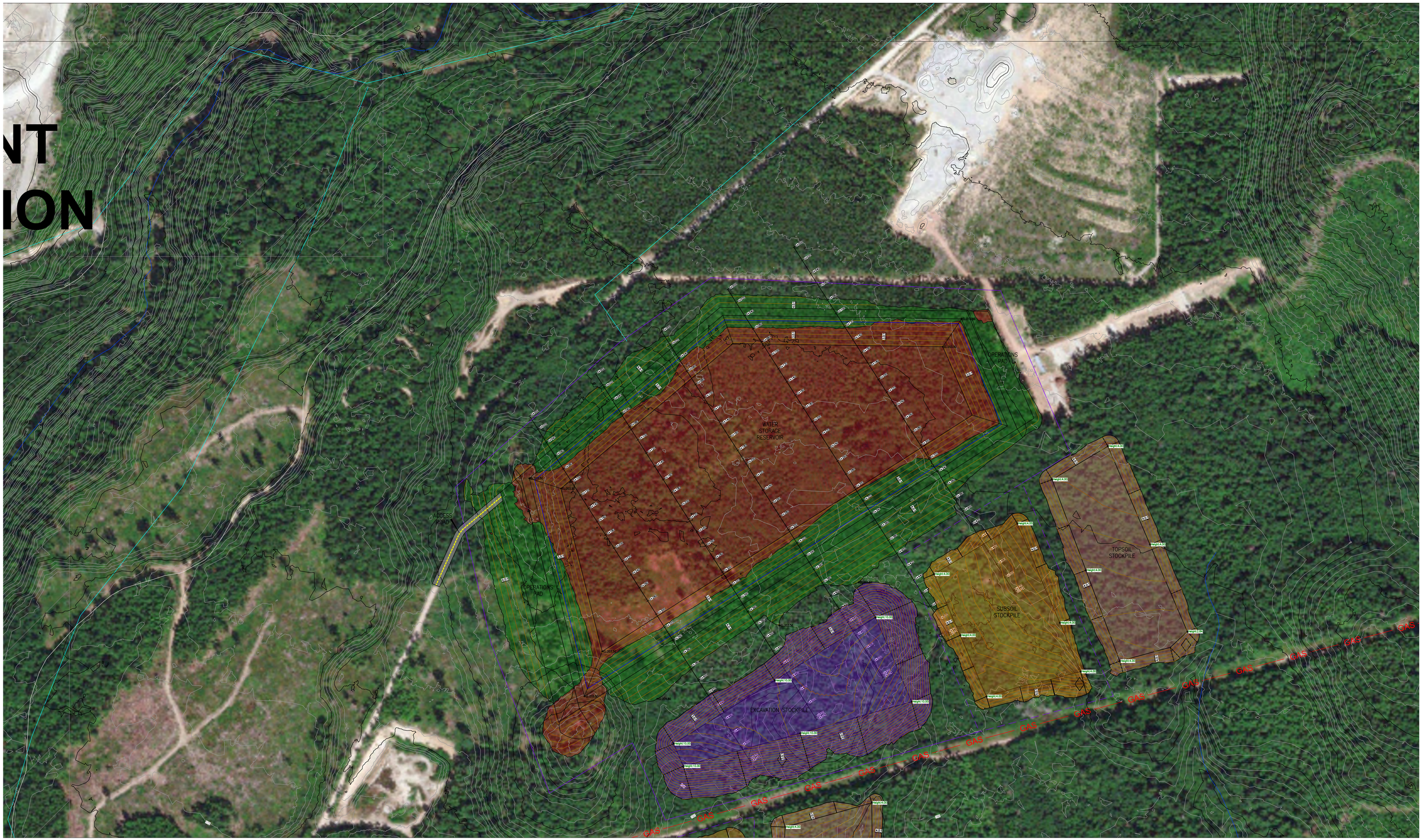
= FILL
= CUT
= CAPACITY

Cut/Fill Summary

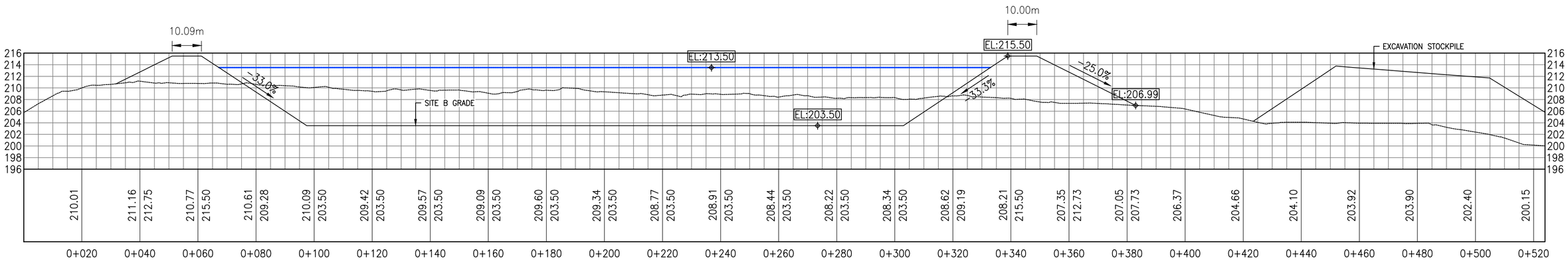
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Vol - Site A	1.000	1.000	186434.27sq.m	797003.98 Cu. M.	372238.69 Cu. M.	424765.28 Cu. M.<Cut>
Vol - Site A MWL	1.000	1.000	118736.29sq.m	0.00 Cu. M.	1180350.12 Cu. M.	1180350.12 Cu. M.<Fill>
Vol - Site A STP (excavation)	1.000	1.000	75062.69sq.m	0.00 Cu. M.	555910.59 Cu. M.	555910.59 Cu. M.<Fill>
Vol - Site A STP (topsoil)	1.000	1.000	38704.29sq.m	0.00 Cu. M.	128387.01 Cu. M.	128387.01 Cu. M.<Fill>
Vol - Site A STP (subsoil)	1.000	1.000	32283.46sq.m	159.01 Cu. M.	89817.24 Cu. M.	89658.24 Cu. M.<Fill>
Totals			451221.00sq.m	797162.98 Cu. M.	2326703.66 Cu. M.	1529540.67 Cu. M.<Fill>

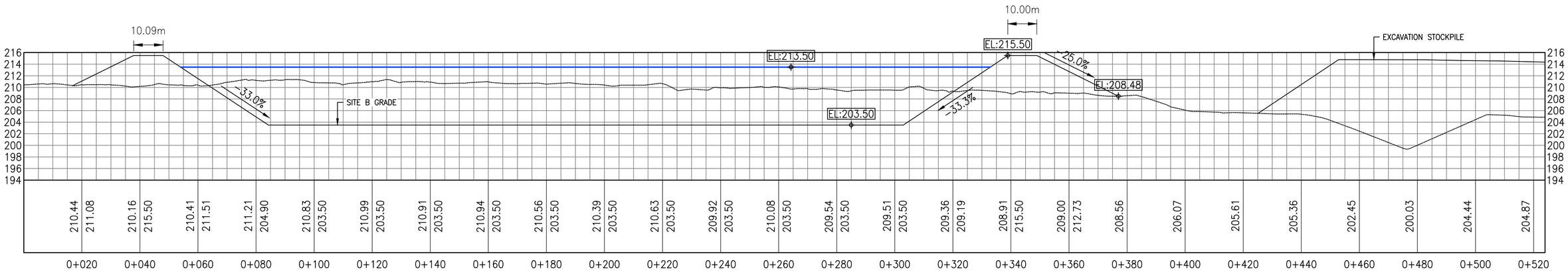
TOPSOIL STRIPPING (200mm) 333,514m^2 x 0.2 = 66,703 + 30% = 86,714m^3
SUBSOIL STRIPPING (300mm) 329,859m^2 x 0.3 = 98,958 + 30% = 128,645m^3
EXCAVATION 424,765 x 30% = 552,195 m^3

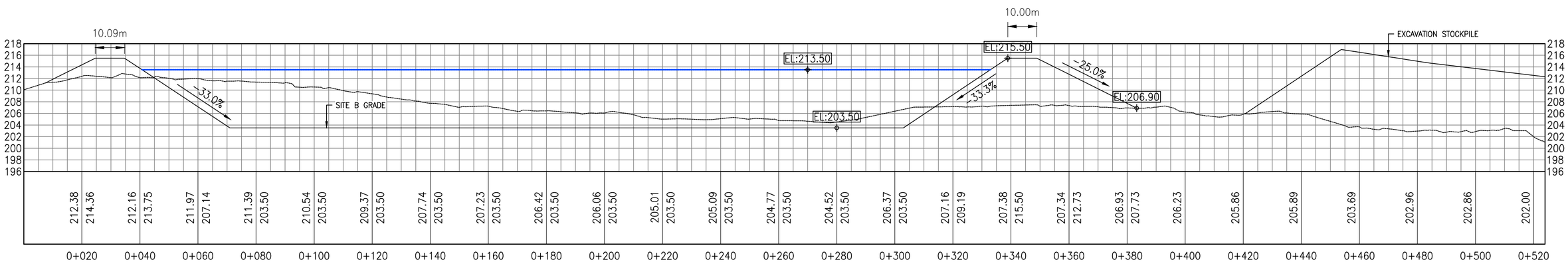
NT
ION

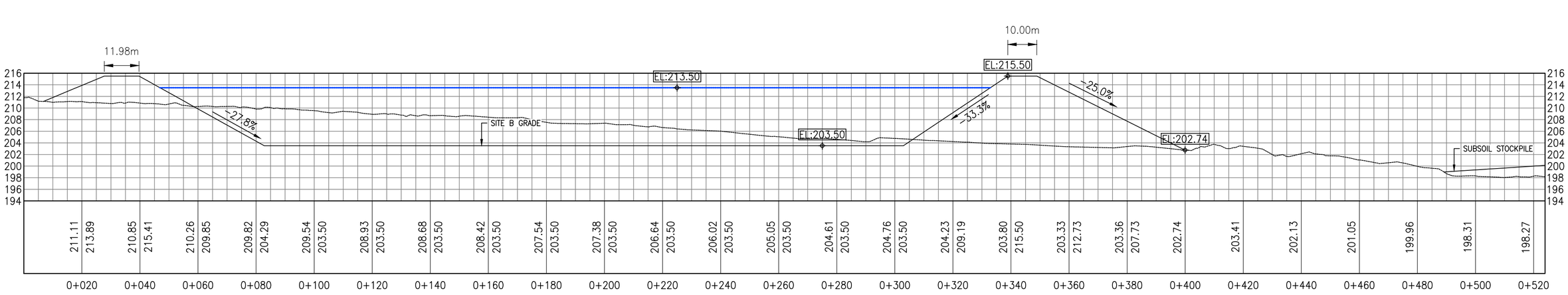

WATER STORAGE RESERVOIR
OPERATIONS PAD
ACCESS ROAD
OPERATIONS PAD
EXCAVATION \STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
GAS

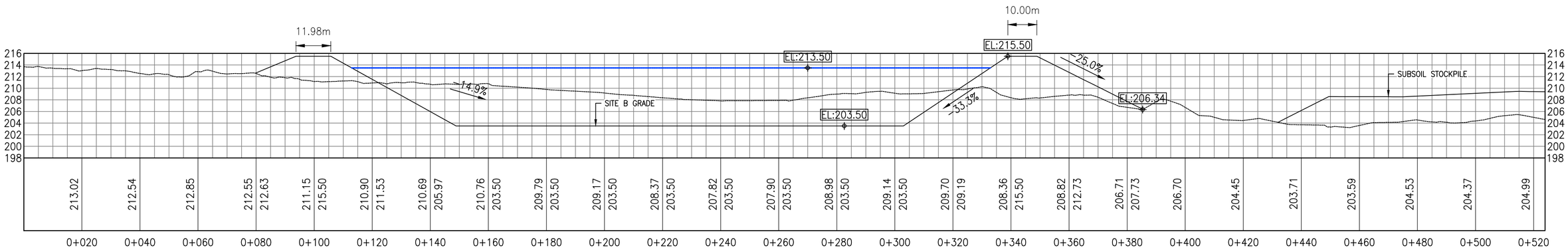

NT
ION
ACCESS ROAD
OPERATIONS PAD
WATER STORAGE RESERVOIR
OPERATIONS PAD
EXCAVATION STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
EL:215.50
EL:203.50
EL:203.56
EL:204.80
EL:201.61
Height:10.00
Height:4.00
Height:2.84
4.0:1
3.0:1
GAS









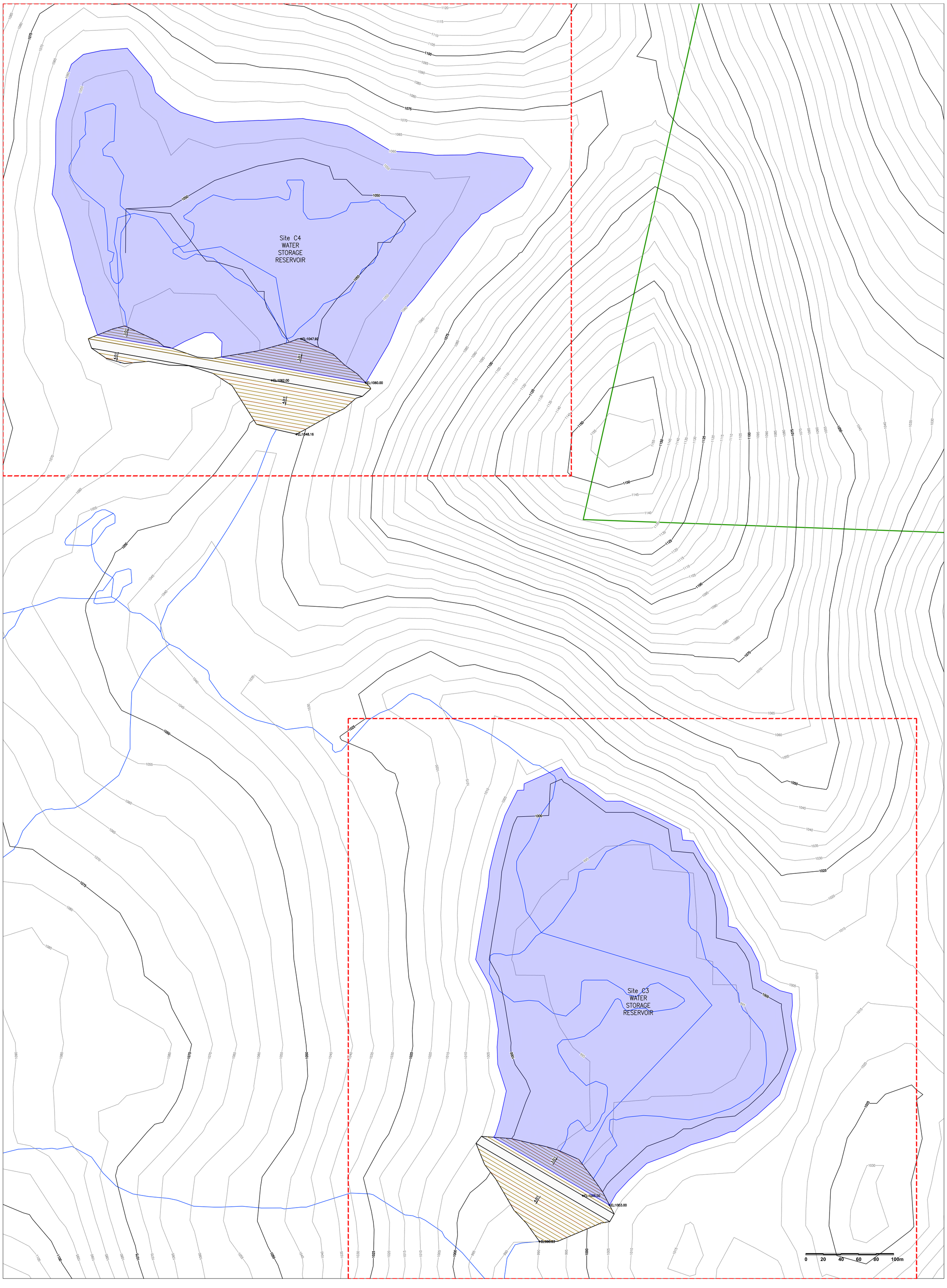


= FILL
= CUT
= CAPACITY

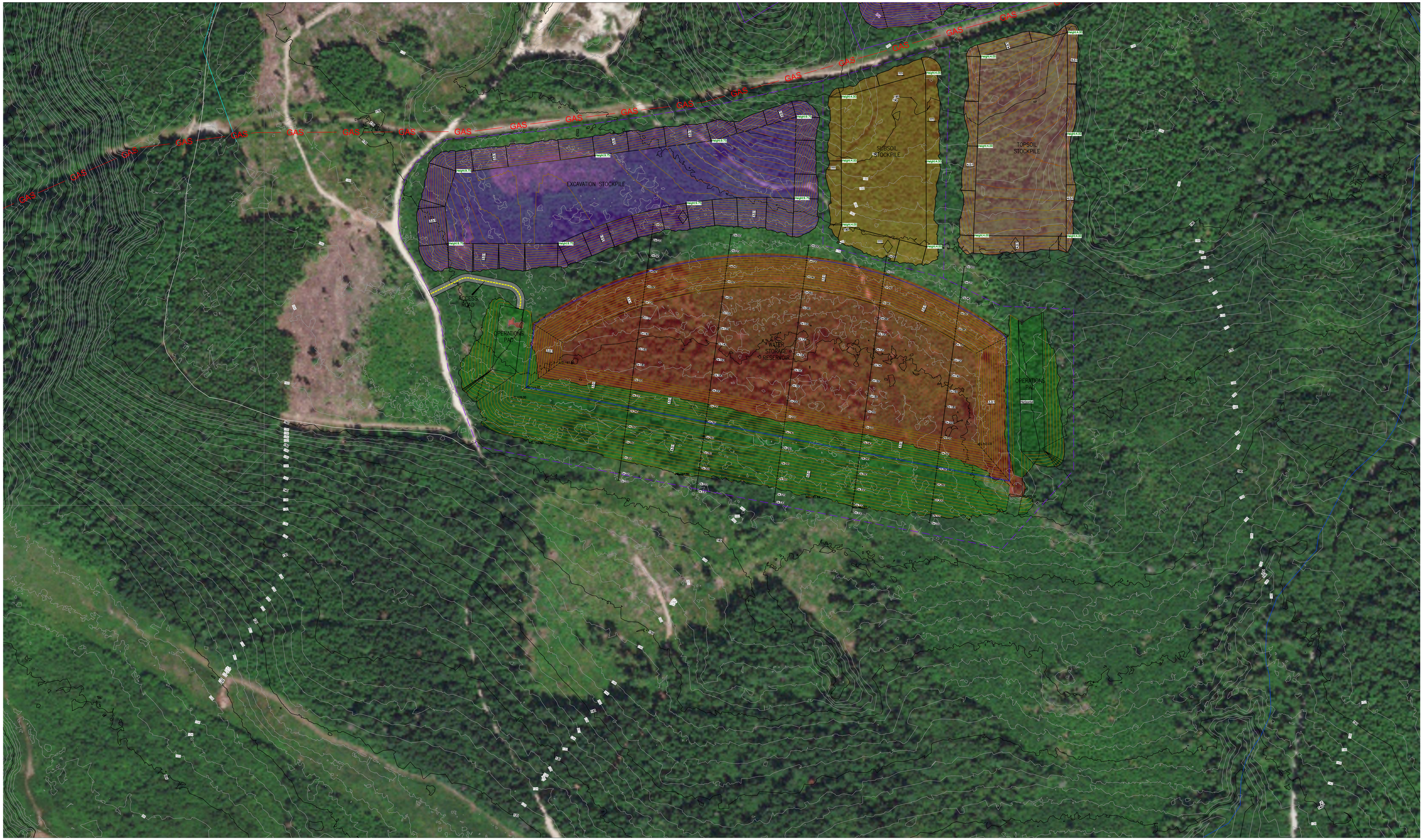
Cut/Fill Summary

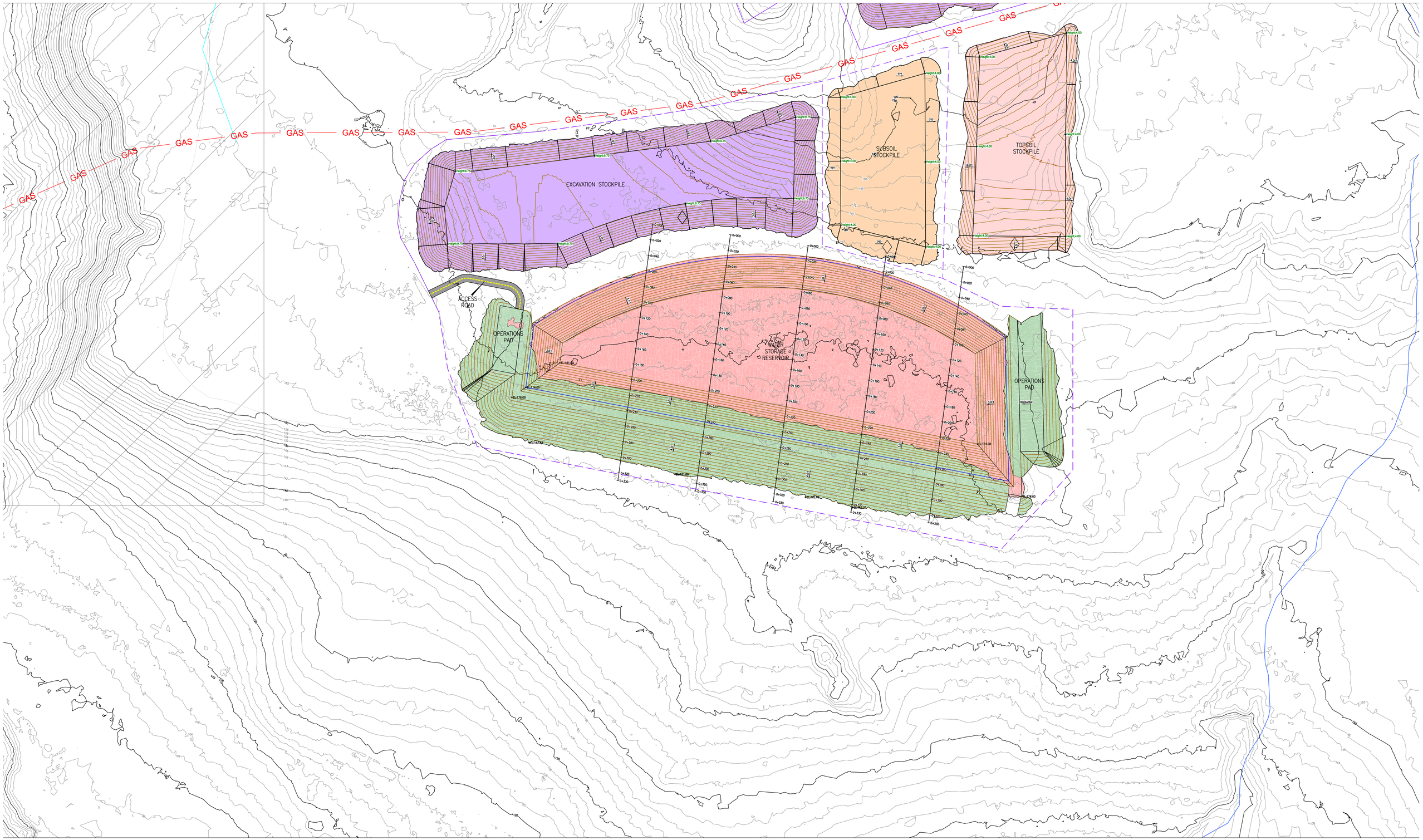
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Vol - Site B MWL	1.000	1.000	152841.47sq.m	0.00 Cu. M.	1291643.33 Cu. M.	1291643.33 Cu. M.<Fill>
Vol - Site B	1.000	1.000	239414.71sq.m	672495.03 Cu. M.	362182.88 Cu. M.	310312.15 Cu. M.<Cut>
Vol - Site B STP (excavation)	1.000	1.000	54200.48sq.m	0.00 Cu. M.	412897.91 Cu. M.	412897.90 Cu. M.<Fill>
Vol - Site B STP (subsoil)	1.000	1.000	33528.71sq.m	0.03 Cu. M.	147004.42 Cu. M.	147004.40 Cu. M.<Fill>
Vol - Site B STP (topsoil)	1.000	1.000	34186.63sq.m	0.00 Cu. M.	112437.07 Cu. M.	112437.06 Cu. M.<Fill>
Totals			514172.00sq.m	672495.06 Cu. M.	2326165.61 Cu. M.	1653670.55 Cu. M.<Fill>

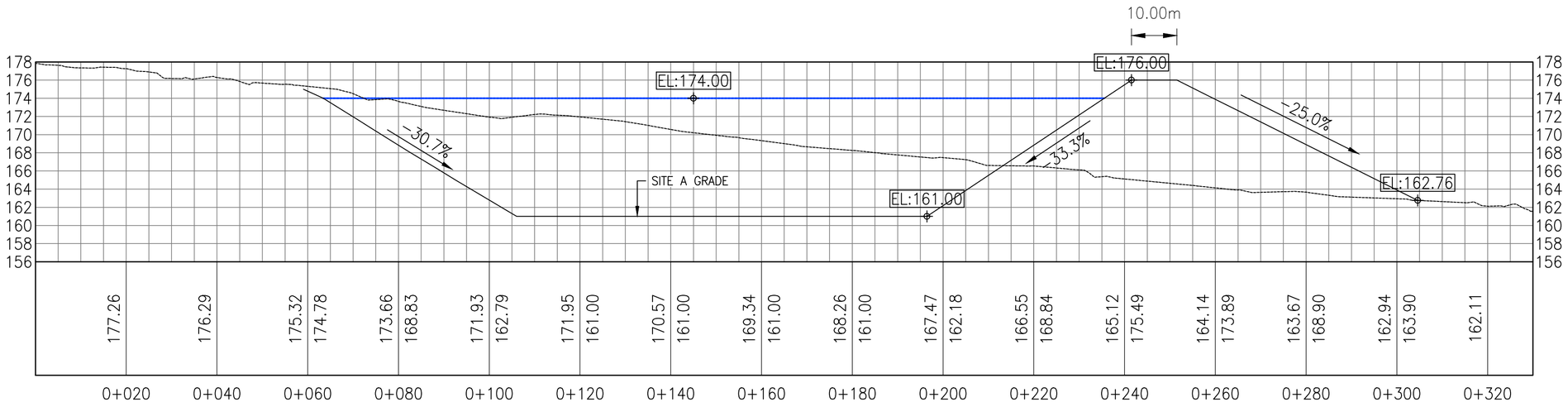
TOPSOIL STRIPPING (200mm) 414,757m^2 x 0.2 = 82,951 + 30% = 107,837m^3
SUBSOIL STRIPPING (300mm) 367,441m^2 x 0.3 = 110,232 + 30% = 143,302m^3
EXCAVATION 310,312 x 30% = 403,406 m^3

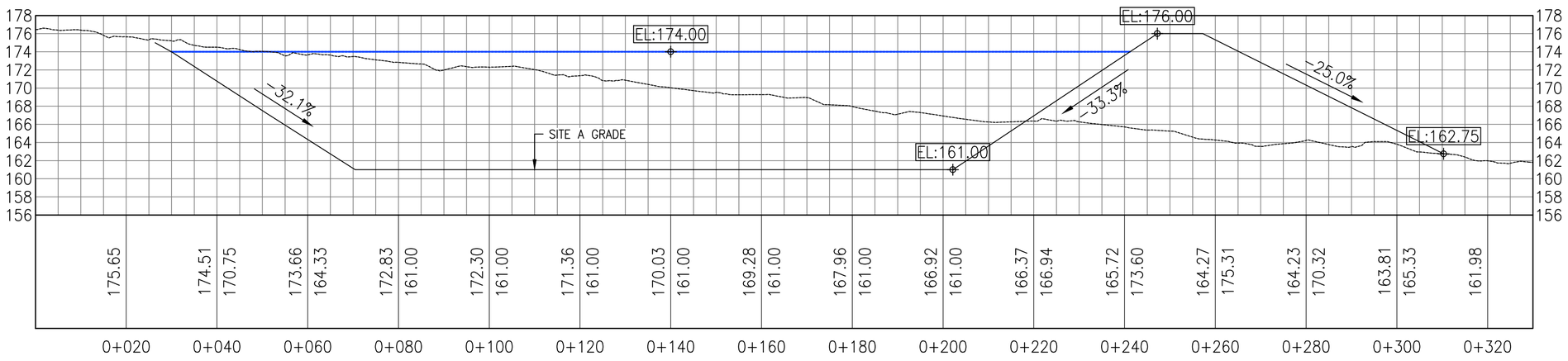

Site C4
WATER
STORAGE
RESERVOIR
EL:1047.92
3.0m
4.0m
EL:1062.00
EL:1060.00
4.0m
EL:1048.16
Site C3
WATER
STORAGE
RESERVOIR
3.0m
EL:1006.00
EL:1003.00
EL:990.83
0
20
40
60
80
100m

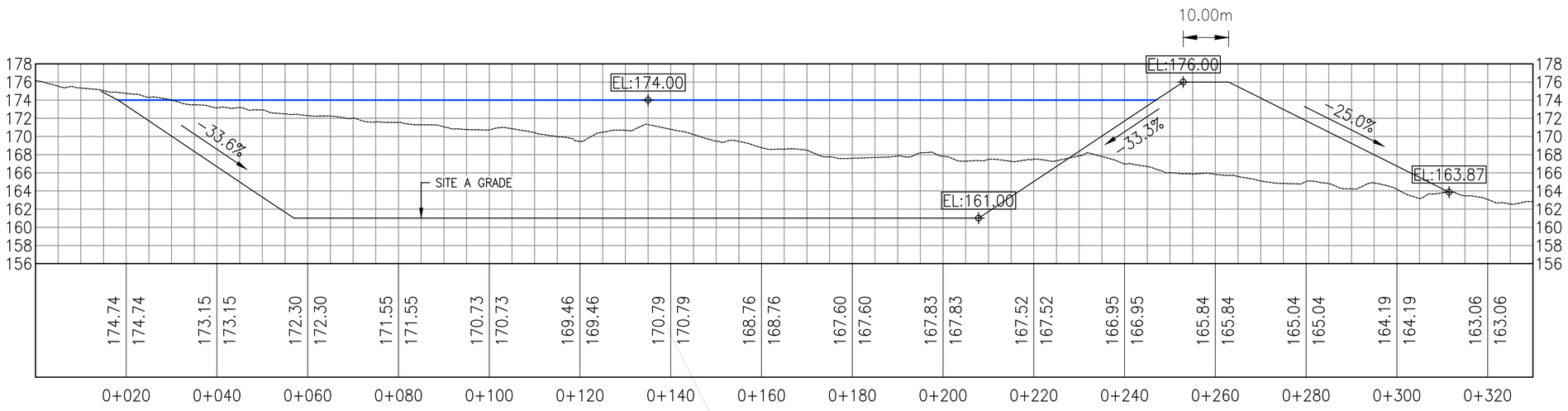

Site C4
WATER
STORAGE
RESERVOIR
3.0(1)
4.0(1)
FL:1047.92
3.0(1)
FL:1062.00
4.0(1)
FL:1048.36
Cut/Fill Summary
Name Cut Factor Fill Factor 2D Area Cut Fill Net
Vol - Site C4 1.000 1.000 Cut 60sqm 0.00 Cu. M. Fill 0.00 Cu. M. <Fill>
Vol - Site C4 MVL 1.000 1.000 Cut 0sqm 0.00 Cu. M. Fill 0.00 Cu. M. <Fill>
Totals
Site C3
WATER
STORAGE
RESERVOIR
1.0(1)
4.0(1)
FL:1006.00
FL:1003.09
Cut/Fill Summary
Name Cut Factor Fill Factor 2D Area Cut Fill Net
Vol - Site C3 1.000 1.000 Cut 13051.67sqm 2.07 Cu. M. Fill 47202.84 Cu. M. <Fill>
Vol - Site C3 MVL 1.000 1.000 Cut 19609.49sqm 0.00 Cu. M. Fill 782903.27 Cu. M. <Fill>
Totals 13066.16sqm 2.07 Cu. M. 829006.07 Cu. M. -829006.00 Cu. M. <Fill>
© 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS © 2019 HERE

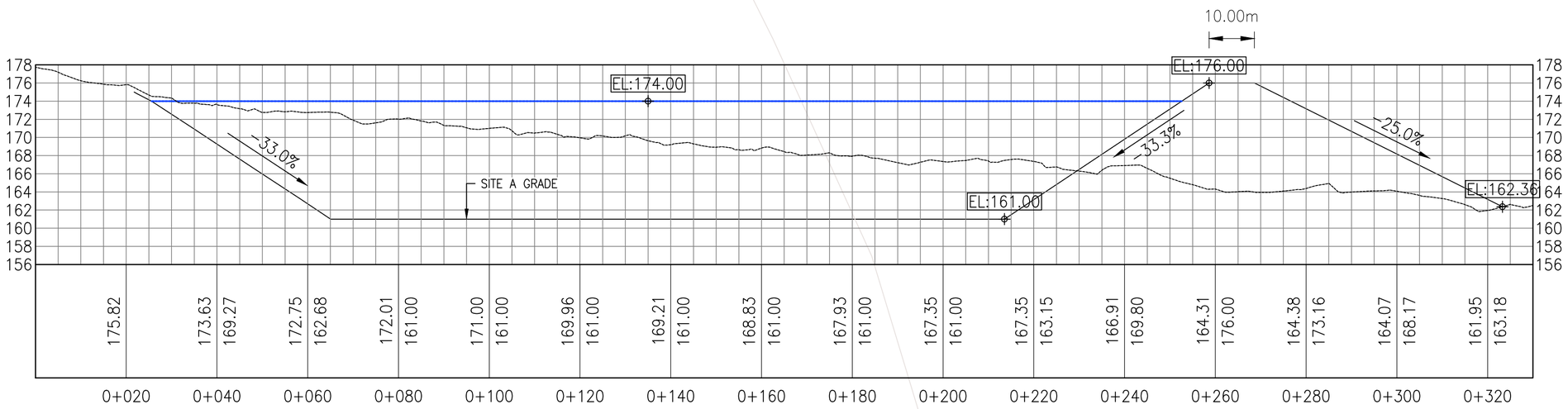

GAS
EXCAVATION STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
ACCESS ROAD
OPERATIONS PAD
WATER STORAGE RESERVOIR
OPERATIONS PAD

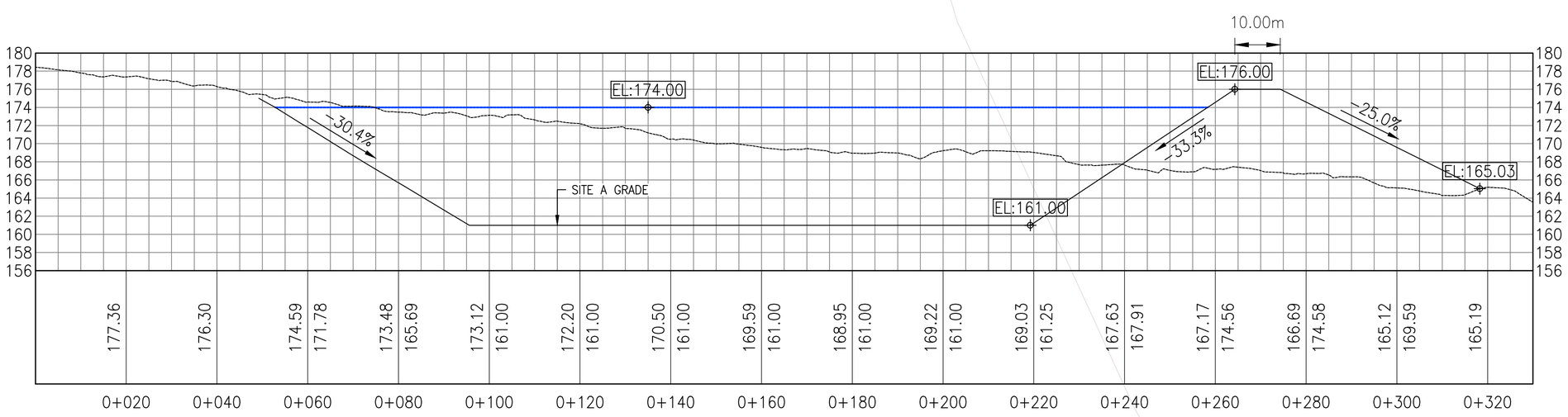

GAS
EXCAVATION STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
ACCESS ROAD
OPERATIONS PAD
WATER STORAGE RESERVOIR
OPERATIONS PAD











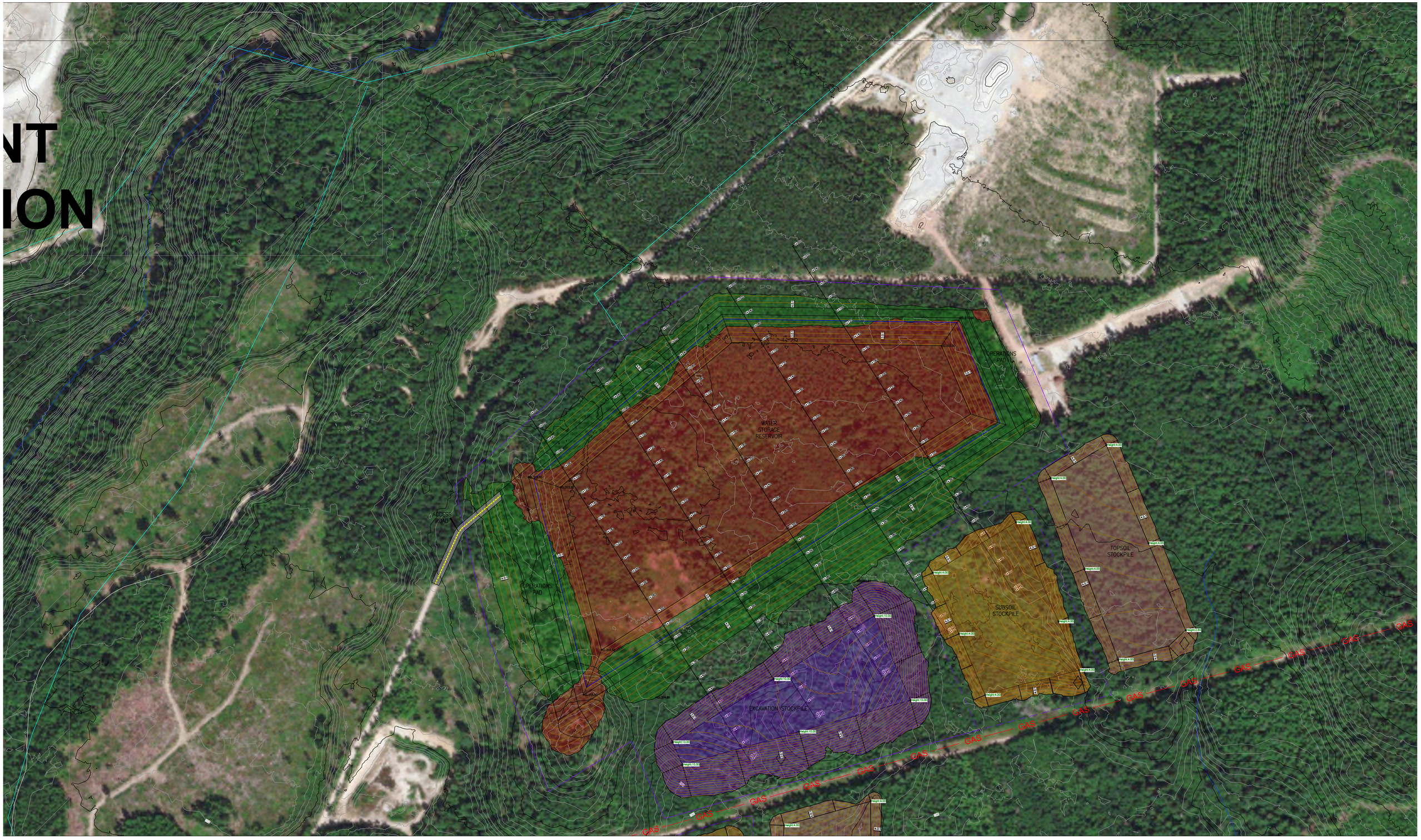
= FILL
= CUT
= CAPACITY

Cut/Fill Summary

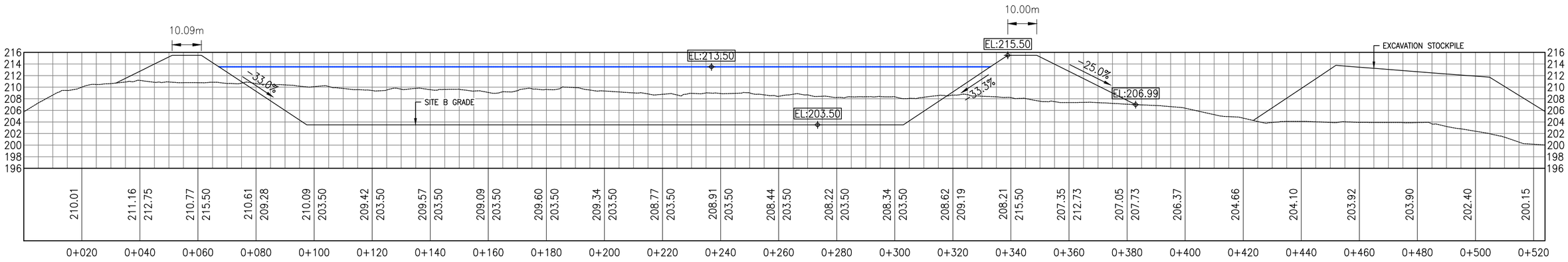
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Vol - Site A	1.000	1.000	186434.27sq.m	797003.98 Cu. M.	372238.69 Cu. M.	424765.28 Cu. M.<Cut>
Vol - Site A MWL	1.000	1.000	118736.29sq.m	0.00 Cu. M.	1180350.12 Cu. M.	1180350.12 Cu. M.<Fill>
Vol - Site A STP (excavation)	1.000	1.000	75062.69sq.m	0.00 Cu. M.	555910.59 Cu. M.	555910.59 Cu. M.<Fill>
Vol - Site A STP (topsoil)	1.000	1.000	38704.29sq.m	0.00 Cu. M.	128387.01 Cu. M.	128387.01 Cu. M.<Fill>
Vol - Site A STP (subsoil)	1.000	1.000	32283.46sq.m	159.01 Cu. M.	89817.24 Cu. M.	89658.24 Cu. M.<Fill>
Totals			451221.00sq.m	797162.98 Cu. M.	2326703.66 Cu. M.	1529540.67 Cu. M.<Fill>

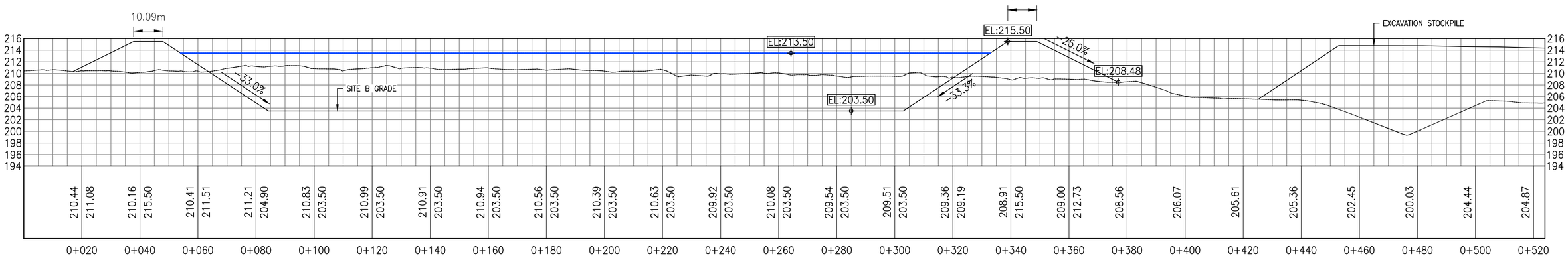
TOPSOIL STRIPPING (200mm) 333,514m^2 x 0.2 = 66,703 + 30% = 86,714m^3
SUBSOIL STRIPPING (300mm) 329,859m^2 x 0.3 = 98,958 + 30% = 128,645m^3
EXCAVATION 424,765 x 30% = 552,195 m^3

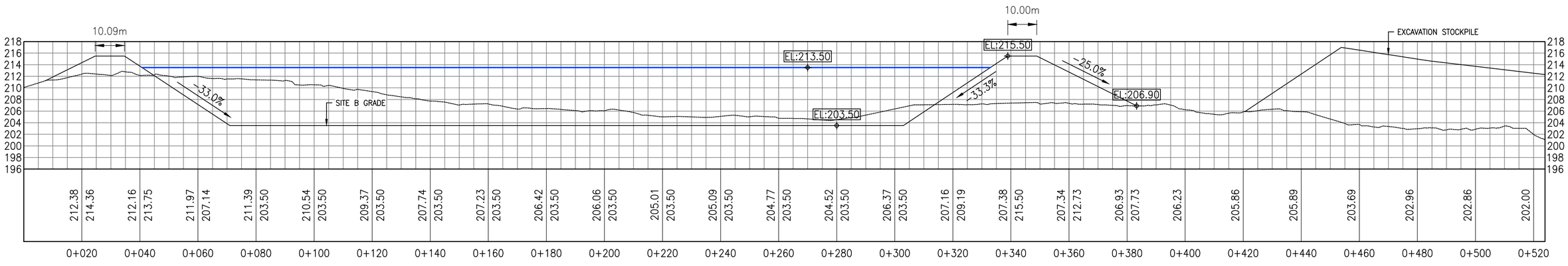
NT
ION

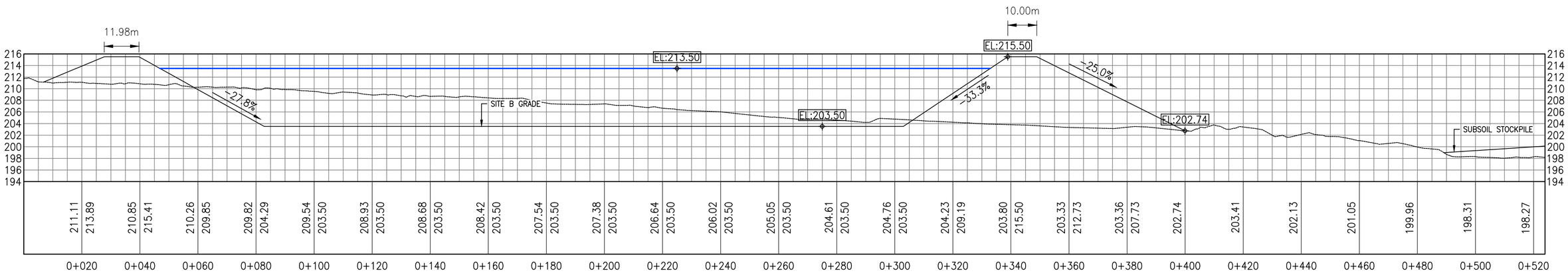

WATER STORAGE RESERVOIR
OPERATIONS PAD
ACCESS ROAD
OPERATIONS PAD
EXCAVATION /STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
GAS

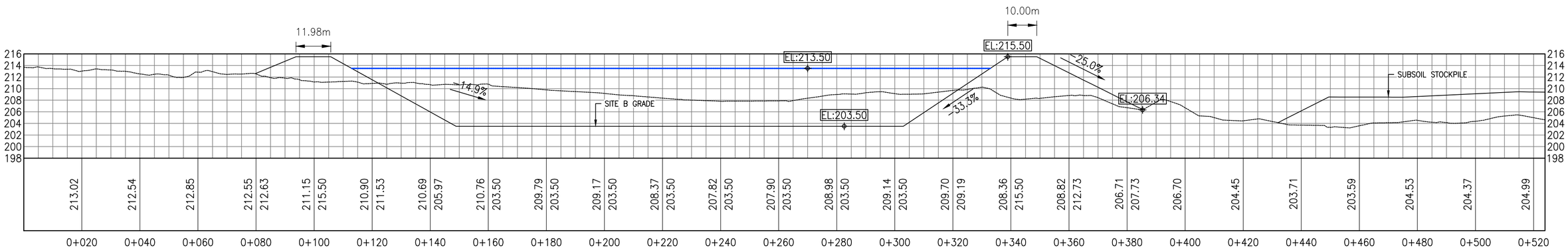

NT
ION
ACCESS ROAD
OPERATIONS PAD
WATER STORAGE RESERVOIR
OPERATIONS PAD
EXCAVATION STOCKPILE
SUBSOIL STOCKPILE
TOPSOIL STOCKPILE
EL:215.50
EL:203.50
EL:203.56
EL:204.80
EL:201.61
GAS











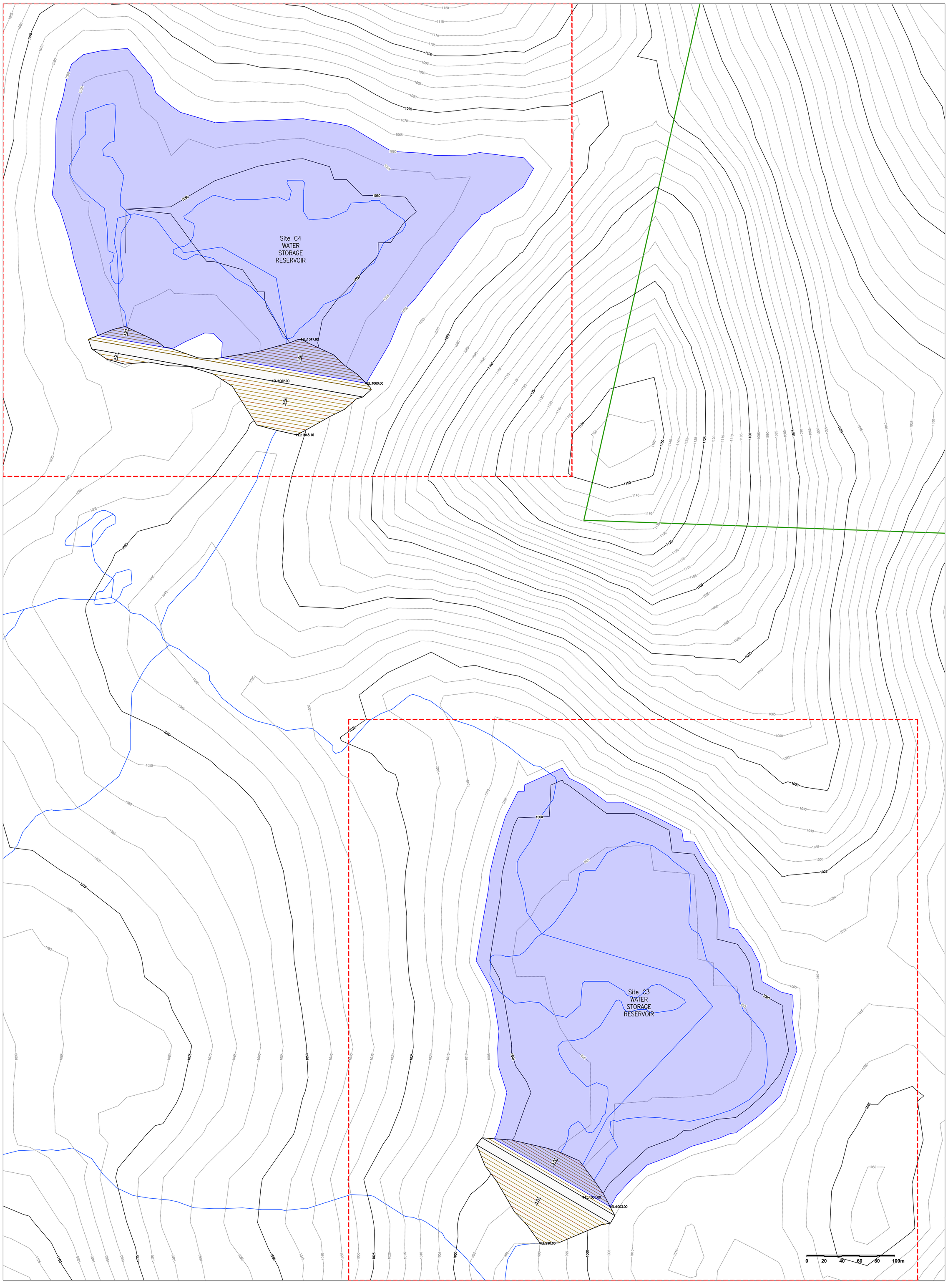
= FILL
= CUT
= CAPACITY

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Vol - Site B MWL	**1.000**	**1.000**	152841.47sq.m	0.00 Cu. M.	1291643.33 Cu. M.	1291643.33 Cu. M.<Fill>
Vol - Site B	**1.000**	**1.000**	239414.71sq.m	672495.03 Cu. M.	362182.88 Cu. M.	310312.15 Cu. M.<Cut>
Vol - Site B STP (excavation)	**1.000**	**1.000**	54200.48sq.m	0.00 Cu. M.	412897.91 Cu. M.	412897.90 Cu. M.<Fill>
Vol - Site B STP (subsoil)	**1.000**	**1.000**	33528.71sq.m	0.03 Cu. M.	147004.42 Cu. M.	147004.40 Cu. M.<Fill>
Vol - Site B STP (topsoil)	**1.000**	**1.000**	34186.63sq.m	0.00 Cu. M.	112437.07 Cu. M.	112437.06 Cu. M.<Fill>
Totals			514172.00sq.m	672495.06 Cu. M.	2326165.61 Cu. M.	1653670.55 Cu. M.<Fill>

TOPSOIL STRIPPING (200mm) 414,757m^2 x 0.2 = 82,951 + 30% = 107,837m^3
SUBSOIL STRIPPING (300mm) 367,441m^2 x 0.3 = 110,232 + 30% = 143,302m^3
EXCAVATION 310,312 x 30% = 403,406 m^3

Site C4
WATER
STORAGE
RESERVOIR
3.0:1
4.0:1
EL:1047.92
EL:1062.00
EL:1060.00
EL:1048.16
Cut/Fill Summary
Name Cut Factor Fill Factor 2d Area Cut Fill Net
Vol - Site C4 1.000 1.000
Vol - Site C4 MWL 1.000 1.000
Totals
Site C3
WATER
STORAGE
RESERVOIR
3.0:1
4.0:1
EL:1005.00
EL:1003.00
Cut/Fill Summary
Name Cut Factor Fill Factor 2d Area Cut Fill Net
Vol - Site C3 1.000 1.000 11051.67sq.m 2.07 Cu. M. 47104.90 Cu. M. 47102.84 Cu. M.<Fill>
Vol - Site C3 MWL 1.000 1.000 119609.49sq.m 0.00 Cu. M. 781903.27 Cu. M. 781903.27 Cu. M.<Fill>
Totals 130661.16sq.m 2.07 Cu. M. 829008.17 Cu. M. 829006.10 Cu. M.
© 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS © 2019 HERE


Site C4
WATER
STORAGE
RESERVOIR
EL:1047.92
EL:1062.00
EL:1060.00
EL:1048.16
Site C3
WATER
STORAGE
RESERVOIR
EL:1006.00
EL:1003.00
EL:990.83
0 20 40 60 80 100m

INTEGRATED SUSTAINABILITY

Raw Water Reservoir Feasibility Study
Class D Basis of Estimate

Prepared for
Sunshine Coast Regional District

Integrated Sustainability

13 February 2019

Report Submission To:	Remko Rosenboom
Legal Company Name:	Sunshine Coast Regional District
Company Address:	1975 Field Rd, Sechelt, BC, V0N 3A1
Contact Phone Number:	604-885-6810
Contact Email Address:	Remko.Rosenboom@scrd.ca

Submitted By:	AJ MacDonald
Legal Company Name:	Integrated Sustainability
Company Address:	620-1050 West Pender St, Vancouver, BC, V6E 3S7
Contact Phone Number:	778-886-5714
Contact Email Address:	AJ.MacDonald@IntegratedSustainability.ca

Document Number:	VP18-SCR-01-00-EST-CI-BOE_ClassD-Rev0.docx
Document Path:	P:\SCR\VP18-SCR-01-00\5.0_Tech_Exec\5.12_Estimating\VP18-SCR-01-00-EST-CI-BOE_ClassD-Rev0.docx
Document Revision Number:	0

WATER | WASTE | ENERGY

CONSULTING & ENGINEERING

Disclaimer

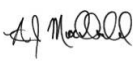
The information presented in this document was compiled and interpreted exclusively for the purposes stated in Section 1. Integrated Sustainability provided this document for Sunshine Coast Regional District. solely for the purpose noted above.

Integrated Sustainability has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this document, but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this document is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Integrated Sustainability does not accept any responsibility for the use of this document for any purpose other than that stated in Section 1 and does not accept responsibility to any third party for the use in whole or in part of the contents of this document. Any alternative use, including that by a third party, or any reliance on, or decisions based on this document, is the responsibility of the alternative user or third party.

Any questions concerning the information, or its interpretation should be directed to AJ MacDonald.

Document Revision History

Rev No.	Rev Description	Author	Reviewer	Approver	Rev Date
0	Issued as Final				13-Feb-2019
		Heather Kalf	Ingo Gloge	AJ MacDonald	

INTEGRATED SUSTAINABILITY

Table of Contents

Tables within Text

Tables

1 INTRODUCTION

Integrated Sustainability has been retained by the Sunshine Coast Regional District (the SCRD) to complete a feasibility study supporting development of a raw water reservoir to supplement supply to the existing Chapman Water System (the Project). The Chapman Water System is located along a coastal portion of the Sunshine Coast region within southwestern British Columbia (BC).

Integrated Sustainability's scope of work for the Project includes two phases:

- Phase 1: water demand analysis, identification of potential reservoir sites and preliminary desktop review of these sites, preliminary environmental and regulatory review and engagement, and a preliminary Multi-Criteria Analysis (MCA) of the identified sites
- Phase 2: detailed technical and regulatory review of the top-ranked site locations, conceptual designs and Class D cost estimates for these sites, and a detailed MCA evaluation

2 CONCEPTUAL DESIGN

The conceptual design basis for the raw water reservoirs assumes the following:

- One storage reservoir, with an operational storage volume at the MWL ranging from 900,000 m^3 to 1,300,000 m^3, with potential for future expansion of the reservoirs at each site taken into consideration, but not modelled
- Design concept for the reservoir comprised of an open (no cover), unlined reservoir and operations pad area within a fenced site
- Freeboard allowance of 2.0 m at MWL, which includes an allowance for a 1.0 m spillway (it is assumed that spillway design would be completed during future design stages and would include wave analysis to confirm that a 1.0 m spillway is sufficient)
- Maximum water level of El. 174 m (Site A only)
- Maximum reservoir embankment height of less than 15 m, so as not to trigger International Coalition of Large Dams (ICOLD) dam safety requirements
- Subsurface conditions allow 3-horizontal to 1-vertical (3H:1V) upstream side slopes and 4H:1V downstream side slopes
- Reservoir to utilize either earthen embankments or an earthen or concrete dam structure, depending on the site characteristics; however, all conceptual layouts show footprints of earthen embankments
- In the case that cut-fill balance is not possible:
  - Excess material will be stockpiled (in the case that there is a larger volume of cut than fill)

  - Additional required material is assumed to be available and hauled to site (in the case that there is a larger volume of required fill than cut)
- Operations pad allowance of at least 30 m wide to provide space for truck in/truck out or pipe in/pipe out connections, equipment laydown, staging area, and space for other operations requirements
- Perimeter embankments are assumed to be 10 m wide, to allow space for perimeter access and barriers on either side of the embankment crest
- Utilization of existing road infrastructure for site access to the greatest extent possible
- Site access onto the operations pad from either existing (if possible) or new roads
- Depth of 200 mm for topsoil stripping and 300 mm for subsoil stripping
- Separate topsoil, subsoil, and excavation stockpiles, with a 30% bulking factor applied for stockpile sizing

Refer to the site layouts included in Appendix 1 of the Detailed Desktop Study (Integrated Sustainability 2019) to see the conceptual site layout for each of the sites, including the resulting quantities.

3 BASIS OF ESTIMATE

3.1 Estimate Purpose

The purpose of this Basis of Estimate (BOE) is to outline the rationale and assumptions used to develop the Class D cost estimates.

The Class D cost estimates were developed to compare the cost of development of four raw water reservoir options. As defined by APEGBC Budget Guidelines for Consulting Engineers (APEGBC 2009), the target accuracy of the Class D cost estimates is -50% to +50%.

3.2 Estimate Methodology

The Class D cost estimates have been developed using parametric units, based on preliminary quantities identified from the conceptual design. Indirect field costs have been estimated based on percentages applied the direct field costs. Design / Development Allowances and Contingency have been allocated based on level of engineering maturity and historical information. No risk or client contingencies have been included.

3.3 Design Basis for Cost Estimates

Engineering deliverables are at a conceptual stage with the project definition deliverables being approximately 3% complete.

The Class D cost estimates are based on the conceptual designs, and our understanding of the site conditions, the options evaluated, our experience with similar projects, and

budgetary costs provided by local vendors and industry average. Table 1 provides the construction quantities resulting from the reservoir conceptual designs.

3.4 Planning Basis

The planning basis is still conceptual, with the assumption that the sites can be constructed within the construction duration shown in Table 2. It is assumed at this stage that all activities are performed sequentially, and no efficiencies are gained by overlap between activities. Some activities can be completed concurrently with other activities, which will reduce the overall construction duration, but this has not been evaluated at this stage.

The following production rates have been used as the basis for the overall construction duration:

- Site clearing and grubbing at a rate of 0.75 ha/day.
- Topsoil stripping and stockpiling at a rate of 1,000 m^3/day
- Subsoil stripping and stockpiling at a rate of 1,200 m^3/day
- Earthworks excavation and embankment/pad construction at a rate of 3000 m^3/day
- Bulk excavation (including soil and bedrock), movement and stockpiling at a rate of 11,330 m^3/day
- Finishing earthworks surface of reservoir interior at a rate of 13,000 m^2/day
- Gravel placement on operations pads, perimeter embankment, and access roads at a rate of 2,000 m^3/day
- Installation of perimeter fencing and gates at a rate of 100 m/day
- Construction of site access roads at a rate of 100 m/day
- An allowance of 40 days for placement of erosion control measures, traffic barriers, intake and outtake systems, and other miscellaneous earthworks and site upgrades

3.5 Allowances

Allocation of allowances for material take-offs (MTOs), design, and development are based upon the maturity of the design information at this time. Allowances are based on AACEI recommended practices and standards (AACEI 2006), with adjustments for this project.

Table A. Allowances

Commodity	Design Development/MTO Allowance
Site Preparation	5%
Reservoir Construction	10%

Commodity	Design Development/MTO Allowance
Ancillary Infrastructure (piping, roads, etc.)	15%

3.6 Assumptions

The following assumptions apply to the cost estimates:

- All costs have been developed on a first Quarter 2019 basis.
- All costs are reported in Canadian Dollars (CAD).
- Unit rates are based on costs from previous projects and factored to adjust for geographic location and the construction equipment required.
- It is assumed that labour is locally sourced in British Columbia.
- Site clearing and grubbing activities are required for the entire lease area.
- Topsoil/subsoil stripping is required for the entire lease area excluding the area below the topsoil and subsoil stockpiles.
- Site fencing and security gates are both required. Site fencing to follow the site lease perimeter and encompass all site infrastructure.
- Riprap and non-woven geotextile materials have not been estimated as quantities, but an allowance is included for erosion control measures.
- Mobilization/demobilization costs have been estimated as follows to build up the overall lump sum costs:
  - Assumed only one equipment mobilization and demobilization to and from the site
  - Clearing and grubbing equipment can be sourced locally. Clearing and grubbing contractor mobilization/demobilization costs were estimated at 3% of the total field costs.
  - Excavation and hauling equipment mobilization/demobilization costs for the reservoir construction were estimated at 8% of the total field costs to account for use of lager equipment that cannot be sourced locally.
- It is assumed existing access roads are suitable for construction equipment traffic.
- Construction of new access roads are estimated for a 10-metre wide access road. Lengths of access roads are shown in Table 1.
- Lengths of water conveyance pipelines for Sites A and B are approximate and based on direct measurements from the sites to Chapman Creek and other existing SCRD infrastructure. It is assumed that for Sites C3 and C4, water will be conveyed via overland surface water flow and no pipelines will be required.

- It is assumed that at Sites A and B, excavated materials are suitable for fill and offsite fill material is not required.
- Allowances have been used in the cost estimates to account for site infrastructure including intake and outtake systems, riprap and non-woven geotextile, and other miscellaneous equipment and materials.
- Allowances have been included for ancillary site infrastructure that would be required to tie the reservoir sites into existing infrastructure, including water conveyance pipelines.
- It is assumed that construction is completed on a 12-hour day schedule.
- Construction management costs account for site services including site medic, waste containers, washrooms, utility locates, lighting facilities, and site office trailer.
- Construction management costs are estimated as a percentage of the direct field costs.
- Engineering costs are comprised of preliminary engineering and regulatory services, detailed engineering, Construction Quality Assurance and Quality Control (QA/QC), and post construction services.
- Engineering costs are estimated as a percentage of the direct field costs, based on the level of engineering/regulatory effort assumed to be required for each site.
- QA/QC services and field engineering are required for the duration of the earthworks and other site infrastructure construction (where applicable).
- Post construction services include record drawing preparation, construction completions report, and required reporting documentation updates for dam compliance.
- Freight is included as an allowance to account for shipping of equipment and materials, such as pumps, piping, fence, and gates.

3.7 Exclusions

The following items are excluded from the cost estimates:

- Construction activities are assumed to be completed sequentially with no efficiencies for concurrently completed activities
- Costs for a new intake or weir on Chapman Creek for Site B
- Costs of blasting rock
- SCRD's costs, including, but not limited to, acquiring land, permits, operations, and engineering and surveying completed by others
- Upgrades to existing roads, road and site maintenance costs (snow removal, gravel, dust control, etc.) prior to or during construction
- Insurance, taxes and duties
- Escalation and inflation

- Costs for lost time or significant health, safety, and environment incidents or reporting
- Operational costs
- Risk evaluation on scope, schedule, and cost has not been completed at this stage of the project
- QA/QC services for site preparation activities including clearing, grubbing, and stripping
- Estimated construction duration does not account for delays due to permitting or negotiations
- Estimated construction duration does not include construction of other ancillary infrastructure (e.g. water conveyance pipelines) or required upgrades to existing infrastructure to complete construction at the sites (e.g. access road upgrades)
- Groundwater and surface water control measures during construction
- Camp and/or lodging allowances for contractors

3.8 Exceptions

The conceptual designs for each site only account for the reservoirs, not the ancillary infrastructure, such as the roads and pipelines. As such, the cost estimates should be used only for comparison between reservoir site options.

3.9 Risks and Opportunities

No qualitative or quantitative risk analysis was carried out in identifying the overall cost or schedule impacts for this project. We recommend a Risk Analysis is carried out prior to the detailed engineering design phase.

We recommend a Constructability Review is conducted after a reservoir site has been selected to identify opportunities for construction cost savings and reducing construction duration.

3.10 Containments

No containment costs for prevention or mitigation of risk events is included within the cost estimates.

3.11 Contingencies

Contingency was applied to the total installed cost. The applied contingencies do not include delays due to regulatory approvals, start of construction delays (weather, etc.), impacts due to health and safety, operations, or business activities. Contingency is only based on the increased costs associated with unknowns in execution of scope.

A 25% contingency was applied to the total installed cost for each of the activities. This applied contingency is based on industry standards and is intended to cover

uncertainties in design, events, items, and conditions, which will likely result in additional costs (e.g. general delays and unknown scope).

Allowances and contingencies are not intended to be used for project scope changes due to client omissions or changes in execution strategies, acceleration in schedule and risk allocations.

3.12 Management Reserve

If a requirement for coverage of unexpected changes in project scope is required, it is recommended that a qualitative risk analysis with high level scope, cost, time and quality be carried out.

3.13 Reconciliation

No reconciliation is included for the estimates and would be executed only if information for the preliminary costs are available.

3.14 Benchmarking

The Class D cost estimates were developed based on Integrated Sustainability's experience with freshwater storage reservoir construction projects, previous construction experience in BC, and using unit rates from historical projects.

3.15 Estimate Quality Assurance

It is anticipated that an estimate review with all parties involved will be conducted prior to final acceptance by SCRD.

3.16 Estimating Team

Integrated Sustainability project management, engineering, construction management, and project services provided inputs for quantities and costs.

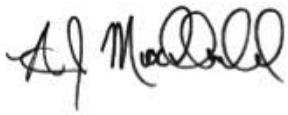
4 CLOSURE

Integrated Sustainability would like to thank Sunshine Coast Regional District for the opportunity to support the Raw Water Reservoir Feasibility Study with this BOE and the associated Class D cost estimates. We trust that this report meets your needs and expectations. If you have any questions, please contact the undersigned at any time.

Sincerely,

Integrated Sustainability

Heather Kalf, P.Eng.
Project Engineer



AJ MacDonald, M.A.Sc, P.Eng.
Project Manager

5 REFERENCES

Association of Professional Engineering and Geoscientists BC (APEGBC), 2009. APEGBC Budget Guidelines for Consulting Engineers.

AACE International (AACEI). 2006. Cost Estimate Classification System as Applied in Engineering, Procurement, and Construction for the Process Industries. AACE International Recommended Practice No. 18R-97.

Integrated Sustainability. 2019. Desktop Study Report for the Raw Water Reservoir Feasibility Study. Document No.: VP18-SCR-01-00-RPT-CI-Desktop_Study_RevA.

INTEGRATED SUSTAINABILITY

Tables

Table 1 – Key Quantities Summary

INTEGRATED SUSTAINABILITY

Project Name:	Raw Water Reservoir Feasibility Study	**Project Number:**	VP18-SCR-01-00
Client Name:	Sunshine Coast Regional District	**Date:**	13-Feb-19
		Rev:	0

Construction quantities in Table 1 are based on the conceptual layouts included in the Desktop Study Report, Appendix 1 (VP18-SCR-01-00-RPT-CI-Desktop_Study_RevA).

TABLE 1. Key Quantities Summary

Site Name	Layout/Reservoir Design	Total Operational Storage Volume (m^3)	Maximum Height of Embankment (m)	Maximum Depth of Excavation (m)	Lease Area (ha)	Total Excavation Volume (m^3)	Total Fill Volume (m^3)	Offsite Fill Materials (m^3)	Bulk Excavation Volume (m^3) (to stockpile)	Topsoil Stripping Volume (m^3)	Subsoil Stripping Volume (m^3)	Trafficable Surface Area (m^2)	Length of Traffic Barriers (m)	Fence Length (m)	Site Security Gates (ea.)	Length of Water Pipeline to and from Site (lm)	Site Access Road Length (lm)
Site A	One Reservoir, unlined	1,180,300	14.1	13.2	45.1	797,100	372,300	-	424,800	66,800	99,000	16,900	1000	2200	4	2,600	150
Site B	One Reservoir, unlined	1,291,600	14.0	10.3	45.5	672,500	362,200	-	310,400	83,000	110,300	28,500	1700	2200	4	2,700	150
Site C3	One Reservoir, unlined	781,900	15.0	0.0	41.1	21,000	47,200	47,200	21,000	4,200	6,300	20,000	200	2600	2	-	1,000
Site C4	One Reservoir, unlined	856,000	14.1	0.0	34.7	21,000	65,600	65,600	21,000	4,200	6,300	20,000	350	2400	2	-	200

Table 2 – Capital Cost Estimate Summary

INTEGRATED SUSTAINABILITY

Project Name: Raw Water Reservoir Feasibility Study
Client Name: Sunshine Coast Regional District
Project Number: VP18-SCR-01-00
Date: 13-Feb-19
Rev: 0

TABLE 2. Class D Capital Cost Estimate Summary

Site	Layout/Reservoir Design	Total Operational Storage Volume (m^3)	Cost Breakdown				Total Installed Cost		Total Estimated Construction Duration (months)
			Direct Construction Cost			Indirect Construction Cost[1] ($ CAD)	Total Installed Cost (excluding Contingency)[2] ($ CAD)	Total Installed Cost (including Contingency)[2] ($ CAD)	
			Reservoir Site Preparation[1] ($ CAD)	Reservoir Construction[1] ($ CAD)	Other Ancillary Infrastructure Construction[1] ($CAD)				
Site A	One Reservoir, unlined	1,180,300	$ 975,000	$ 11,960,500	$ 1,794,000	$ 4,281,000	$ 19,011,000	$ 23,764,000	15
Site B	One Reservoir, unlined	1,291,600	$ 984,000	$ 11,765,000	$ 1,863,000	$ 4,248,000	$ 18,860,000	$ 23,575,000	15
Site C3	One Reservoir, unlined	781,900	$ 889,000	$ 4,684,000	$ -	$ 1,956,000	$ 7,529,000	$ 9,411,000	5
Site C4	One Reservoir, unlined	856,000	$ 751,000	$ 4,399,000	$ -	$ 1,808,000	$ 6,958,000	$ 8,698,000	5

Notes:
1. Excludes GST.
2. Contingency Allowance applied at 25% of the total installed cost.

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee Meeting – February 21, 2019

AUTHOR: Remko Rosenboom, General Manager, Infrastructure Services

SUBJECT: **RAW WATER RESERVOIR(S) FEASIBILITY STUDY PHASE 3**

RECOMMENDATION(S)

THAT the report titled Raw Water Reservoir(s) Feasibility Study Phase 3 be received;

AND THAT a budget proposal for $350,000 to be funded out of Development Cost Charges for the Feasibility Study Phase 3 with respect to the development of a raw water reservoir(s) be brought forward to the 2019 Round 2 Budget.

BACKGROUND

The following recommendation was approved at the February 4, 2019 Special Corporate and Administrative Services Committee Round 1 Budget meeting:

> **Recommendation No. 21** *Regional Water Service [370] – 2019 R1 Budget Proposal*
>
> The Corporate and Administrative Services Committee recommended that the following budget proposal be referred to 2019 Round 2 Budget pending the staff report to the February 21, 2019 Infrastructure Services Committee meeting detailing the results of the feasibility study to develop one or more Raw Water Reservoirs:
>
> - Budget Proposal 4 – Raw Water Reservoir (Phase 3), $TBD at 2019 Round 2 Budget from Reserves.

The purpose of this report is to address the budget implications related to raw water reservoir(s) Feasibility Study Phase 3.

DISCUSSION

Round 2 Budget is scheduled for Monday, March 4, 2019.

A budget proposal for the Feasibility Study Phase 3 will be recommended by staff and the intent is to continue the work on the development of a raw water reservoir(s) to support the Regional Water Service.

Feasibility Study Phase 3 would include several field based assessments to provide more detailed information on the four selected sites. These assessments would focus on aspects such as:

- Suitability of the ground conditions (type and landslide risk)
- Presence and mitigation options for ecological values
- Hydrological impacts
- First Nation interest
- Confirmation of preliminary Dam Safety Classification
- Detailed assessments of the operations benefits and,
- Refinement of conceptual designs and cost estimates

The results from these assessments will be input for a Multi Criteria Analyses to compare the four sites. The outcomes of these assessments and Multi Criteria Analyses would be the subject of a report that would be presented to the Board no later than Q4 2019. This would allow the Board to provide further direction to staff to apply for the required authorizations for one or more raw water reservoirs.

Communication Strategy

Information on this project will be shared broadly through paid advertising, corporate newsletters, social media and the SCRD website.

Financial Implications

The initial project for the feasibility study for the raw water reservoir(s) (Phase 1 & 2) was funded from the Regional Water Service development cost charges (DCC-Bylaw 693). Per the *Local Government Act* (*Part 14; Division 19*), development cost charges are to be collected and used as follows (*partial excerpt below*):

> **559…**
>
> (2) Development cost charges may be imposed under subsection (1) for the purpose of providing funds to assist the local government to pay the capital costs of
>
> (a) providing, constructing, altering or expanding sewage, water…
>
> to service, directly or indirectly, the development for which the charge is being imposed
>
> **558…**
>
> **"capital costs"** includes
>
> (a) planning, engineering and legal costs directly related to the work for which a capital cost may be incurred under this Division..

Since the feasibility phases are currently considered part of the "*planning*" portions of the project which it intended to result in the future construction of a raw water reservoir(s) or capital asset, using DCC's to fund this project is appropriate. If for some reason the construction does not materialize and only the feasibility phases were completed, the funds used from DCC's would need to be returned. This would necessitate using operational funds such as operational reserves our current user rates to repay the DCC's.

STRATEGIC PLAN AND RELATED POLICIES

The raw water reservoir(s) project is intended to supplement the existing water supply and ensure the SCRD can continue to meet its mission of providing quality services to our community through effective and responsive government.

CONCLUSION

Feasibility Study Phase 3 would include several field based assessments to provide more detailed information on the four selected sites. The results from these assessments will be compare the four sites. The outcomes would be the subject of a report that would be presented to the Board no later than Q4 2019. This would allow the Board to provide further direction to staff to apply for the required authorizations for one or more raw water reservoir.

The purpose of this report is to address the budget implications related to raw water reservoir(s) Feasibility Study Phase 3.

Staff recommend that a budget proposal for $350,000 to be funded out of Development Cost Charges for the Feasibility Study Phase 3 with respect to the development of a raw water reservoir(s) be brought forward to the 2019 Round 2 Budget.

Reviewed by:			
Manager		CFO	X – T. Perreault
GM		Legislative	
CAO	X – J. Loveys	GM	

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee – February 21, 2019

AUTHOR: Remko Rosenboom, General Manager, Infrastructure Services

SUBJECT: **TOWN OF GIBSONS GROUNDWATER INVESTIGATION PHASE 2 RESULTS**

RECOMMENDATION(S)

THAT the Report titled Town of Gibsons Groundwater Investigation Phase 2 Results be received for information.

BACKGROUND

On January 30, 2019 the SCRD received a letter from the Town of Gibsons regarding the Groundwater Investigation Phase 2 Results (Attachment A). This letter listed the following four requests:

1. That the SCRD Board abandon its plan to utilize the Mahan well;
2. Allow the Town to assume responsibility for the Mahan well and include it as an additional point in the Gibsons aquifer Monitoring Program;
3. Express support to MFLNRO for the Town's groundwater licence application(s) to supply water to Zone 3 (Upper Gibsons) and the future buildout of the Town; and
4. Resume the Bulkwater Agreement review discussions, which were put in abeyance by the SCRD last fall.

The purpose of this report is to provide a staff response to these requests from the Town of Gibsons.

DISCUSSION

For each of these requests, the following is provided:

1. *That the SCRD Board abandon its plan to utilize the Mahan well*

At its January meeting, the SCRD Board approved the recommendation to not pursue the Mahan well as a production well at this time. Staff suggest that this recommendation addresses this request.

2. *Allow the Town to assume responsibility for the Mahan well and include it as an additional point in the Gibsons aquifer Monitoring Program*

In 2018 the SCRD Board directed staff to develop a framework for a Groundwater Management Zone and plan for the aquifer in the area with the Town of Gibsons and the Sḵwx̱wú7mesh Nation. This recommendation will be the subject of a future report and staff suggest this request should be considered in the development of this plan.

3. *Express support to MFLNRO for the Town's groundwater licence application(s) to supply water to Zone 3 (Upper Gibsons) and the future buildout of the Town.*

As per the standard Provincial process of the MFLNRORD, any Water Licence application by the Town of Gibsons would be referred to the SCRD for a response. Staff suggest that this request be considered at that time.

4. *Resume the Bulkwater Agreement review discussions, which were put in abeyance by the SCRD last fall.*

Staff support resuming these discussions at a staff level when there is more information and suggest any implications of the Town of Gibsons efforts to provide water to their Zone 3 (Upper Gibsons) be included in these discussions.

STRATEGIC PLAN AND RELATED POLICIES

N/A

CONCLUSION

On January 30, 2019 the SCRD received a letter from the Town of Gibsons regarding the Groundwater Investigation Phase 2 Results (Attachment A). This letter listed four requests. The purpose of this report is to provide a staff response to these requests from the Town of Gibsons.

Attachments

A: Letter from the Town of Gibsons dated January 29, 2019

Reviewed by:			
Manager		Finance	
GM		Legislative	
CAO	X – J. Loveys	Other	

TOWN OF GIBSONS
PO Box 340
474 South Fletcher Road
Gibsons BC | V0N 1V0

T 604-886-2274
F 604-886-9735
info@gibsons.ca
www.gibsons.ca

OFFICE OF THE MAYOR | WILLIAM BEAMISH

January 29, 2019

0530-60

Sunshine Coast Regional District
Infrastructure Services Committee
1975 Field Road
Sechelt BC V0N 3A1

Dear Committee Members,

Reference: Groundwater Investigation Phase 2 Results

This letter is in response to the Committee's consideration of the SCRD's Groundwater Investigation Phase 2 Results on January 24, 2019.

The Town of Gibsons wishes to express its strong opposition to the SCRD's incursion into the Gibsons Aquifer and the plan to continue exploring a recently drilled well on Mahan Road. As previously communicated, our belief is that the continued exploration of this well puts the Town's water system at risk; the well on Mahan is not a part of the Town's longstanding Aquifer Monitoring Program, which creates uncertainty about water quality, quantity and growth projections for the community. The Town is in full support of the SCRD's pursuit of the other groundwater sources identified in the recent study, namely Church Road, Dusty Road and Grey Creek.

Our preference is to enter into a Groundwater Management Plan for the Gibsons Aquifer as part of a regional, collaborative governance model that sees the Town of Gibsons continue to manage the Gibsons Aquifer on behalf of the region, while the SCRD focuses its efforts on the Chapman watershed and other groundwater sources as identified.

The Town respectfully requests the following:

1. That the SCRD Board abandon its plans to utilize the Mahan well;
2. Allow the Town to assume responsibility for the Mahan well and include it as an additional point in the Gibsons aquifer Monitoring Program;
3. Express support to MFLNRO for the Town's groundwater license application(s) to supply Zone 3 (Upper Gibsons) and the future build-out of the Town;
4. Resume the Bulkwater Agreement review discussions, which were put in abeyance by the SCRD last fall.

Thank you, in advance, for your consideration of our requests.

Yours truly,

Bill Beamish
Mayor

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee - February 21, 2019

AUTHOR: Raphaël Shay, Water and Energy Projects Coordinator

SUBJECT: **2018 RAINWATER HARVESTING REBATE PROGRAM**

RECOMMENDATION(S)

THAT the report titled 2018 Rainwater Harvesting Rebate Program be received for information.

BACKGROUND

The Rainwater Harvesting (RWH) Rebate Program is for residents supplied by an SCRD water system and supports the water conservation approach outlined in the Comprehensive Regional Water Plan (CRWP) that proposes other water conservation programs be delivered in parallel to universal metering.

The first water conservation program initiated by SCRD was the Toilet Rebate Program. It was amongst the first of its kind when it began in 2001. The program provided a rebate to residents supplied by an SCRD water system to install low flow toilets and for a few years, also replaced shower and sink fixtures.

The Toilet Rebate Program concluded at the end of 2017 because low flow toilets are now part of the building code and more common. At the January 11, 2018 Board meeting, the following resolution was adopted:

004/18 **Recommendation No. 1** *Water Demand Management*

THAT a Rainwater Harvesting Rebate Program be brought to 2018 Round 1 Budget.

The budget proposal was approved in the amount of $25,000 in the Regional Water System, $2,000 in the South Pender Water System, and $1,500 in the North Pender Water System. These funds are now part of the base budgets of these several services to ensure continuation of this program in upcoming years. The RWH Rebate Program was launched on November 1, 2018.

RWH systems can complement infrastructure by reducing demand when water is needed most and is least plentiful. More importantly, it can also lead to behaviour changes and increase the resilience of small scale food producers.

The purpose of this report is to provide a summary of the first year of the RWH Rebate Program.

DISCUSSION

Program Overview

SCRD offers a rebate of up to $500 per property for a rainwater storage cistern that meets the following eligibility criteria:

- A minimum storage volume of 4,500 litres (~1,000 imperial gallons); and
- A roof catchment area of a minimum of 20 square metres.

Interested SCRD water users submit a pre-approval form that includes a system design with photographic documentation of the site and a commitment to the minimum storage size and catchment areas. If the system meets the eligibility criteria and rebate funds are available, then staff approve the application. Once a rebate is secured, applicants have 90 days to complete the installation and submit a claim form, receipts for expenses and photos of the installed system.

2018 Program

The first application period for the RWH Rebate Program was launched November 1, 2018 and closed on December 14, 2018. Since applicants have 90 days from the receipt of an approval letter to complete their projects, some approved rebates are within the installation phase and are not yet complete.

The following table summarizes the status of 2018 rebates.

February 5, 2019	Regional Water System	South Pender Water System	North Pender Water System
Rebates available	50	4	3
Rebates approved (giving applicants 90 days to complete installation)	49	0	0
Approved rebates abandoned by applicants	3	0	0
Rebates awarded	31	0	0
Applicants completing work	15	0	0

There was a wide variety of systems approved and photos of example systems are provided in Attachment A. While most applicants opted for the minimum storage size of 4,500 litres, the largest rebate was for 14,093 litres of storage. Costs also range depending on amount of work done by applicants versus contractors, as well as the quantity of accessory equipment such as irrigation and pumping features.

In total, the 31 rebates awarded resulted in $59,220.66 in private spending, $15,500 of which is rebated by the SCRD. The hours each applicant spent on their system design, construction, and project management is unknown but likely significant.

The 2018 RWH Rebate Program has thus far resulted in 169,929 litres of new storage capacity and more is to come. Assuming these cisterns are filled three times during the summer drought season, this represents 510m^3 of additional storage available for the Regional Water System. For context, the average summer daily demand in the Chapman Water System at Stage 2 is

20,000m^3. The additional water storage from private cisterns may in part be used during later stages when watering restrictions would not allow irrigation of outdoor plants, thus increasing resilience of local food production.

The object of this program is increased awareness of irrigation water needs the rebate recipients gain. The cistern is also a visible public prompt, which acts as a community based social norming for more responsible water management and is known to change behaviour.

Feedback from program recipients has been positive.

Timeline for next steps or estimated completion date

Given the high rebate award ratio during a short application window in the Regional Water System, staff recommend keeping eligible rebates at 50. Staff expect a longer application window from April to December 2019 will provide adequate time for interested applicants.

The North and South Pender Water Systems are not as water scarce as the Regional Water System. Unexpended rebates in these service functions will remain in the respective function budgets. Given the short application window of the 2018 program, the rebates will be offered again in 2019 to better gauge level of interest in these water systems and reevaluation in Q4 2019.

Communications Strategy

The opening of the 2019 application window will be announced with a news release, social media posts, and a booth at outreach events. A notification list of interested community members has been created. Some applicants expressed interest in sharing their experience and hosting tours of their RWH systems. Staff are exploring ways to facilitate this as part of ongoing outreach and education efforts.

STRATEGIC PLAN AND RELATED POLICIES

The CRWP also has a target of 33% reduction in per capita water demand relative to 2010 levels by 2020.

The SCRD Agricultural Area Plan has the strategic goal to secure a sustainable water supply for agriculture.

CONCLUSION

The RWH Rebate Program saw a high adoption rate in the Regional Water System in its first year. Although South and North Pender Water Systems did not see any rebates, staff recommend offering the program again with a longer application window to better gauge level of interest and reevaluation in Q4 2019.

Attachment A: Photos of example systems

Reviewed by:			
Manager	X – S. Walkey	Finance	
GM	X – R. Rosenboom	Legislative	
CAO	X – J. Loveys	Other	

4,546 litre cistern

Two smaller tanks to make 4,728 litres of storage

6,546 litre cistern with pump and yard hydrants

14,093 litre underground cisterns

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee – February 21, 2019

AUTHOR: Remko Rosenboom – General Manager, Infrastructure Services

SUBJECT: **WATER TREATMENT AND DISTRIBUTION SERVICES – REGIONAL WATER**

RECOMMENDATION(S)

THAT the report titled Water Treatment and Distribution Services – Regional Water be received.

BACKGROUND

At the Round 1 Budget meeting on February 4, 2019; the Corporate and Administrative Services Committee approved the following recommendation:

Recommendation No. 22 *Regional Water Service [370] – 2019 R1 Budget Proposals*

The Corporate and Administrative Services Committee recommended that the following budget proposals be referred to the 2019 Round 2 Budget pending a report to the February 21, 2019 Infrastructure Services Committee meeting regarding the existing staffing complement in the water and utility services division including any existing overtime and incremental costs of additional staff:

- Budget Proposal 5 – Senior Utility Technician, additional 0.4 FTE, funded $55,000 (anticipated Q2 2019 start) through User Fees for 2019, and future base budget increase to $93,000;
- Budget Proposal 6 – Utility Engineering Technician, additional 1.0 FTE, funded $43,000 (anticipated Q3 2019 start) through User Fees for 2019, and future base budget increase $86,500;
- Budget Proposal 7 – Utility Operations Assistant, additional 0.4 FTE, funded $40,000 (anticipated Q2 2019 start) through User Fees for 2019, and future base budget increase to $68,500.

The Utility Services Division within the Infrastructure Services department provides water supply services to residents from Egmont to Langdale. This includes the operation and maintenance of two large and three small water treatment plants, five production wells, 17 wastewater treatment plants, and several hundred kilometers of water distribution and waste water collection network, including pumps, valves, hydrants and manholes.

The Utility Services Division has consisted of 30.82 full time employees (FTE) since 2016:

- 10.92 FTE are responsible for the operations and monitoring of the water treatment and distribution infrastructure and the 17 wastewater facilities operated by the SCRD;

- 9.25 FTE are responsible for the maintenance, repairs and installation of the water distribution infrastructure and waste water collection systems; and
- 10.65 FTE are responsible for capital projects, environmental (regularity required monitoring, assessments and reporting), engineering (capital projects and development application referrals), along with any policy development and community outreach and education.

The purpose of this report is to provide further information with respect to the duties, responsibilities and demands on the work which Utilities Services Division is responsible and rationale for the budget proposals which will be presented at the Round 2 Budget meeting on March 4, 2019 for [370] Regional Water Service.

DISCUSSION

Drivers for increased workload

Over the past few years, a number of significant changes have resulted in an increased workload and operational risk to the Unities Services Division and in particular the operations of the SCRD's water treatment and distribution infrastructure.

1. Increased complexity and deferred maintenance of water treatment and distribution operations.

   The introduction of the Environmental Flow Need in 2017 combined with the impacts of increasingly dry summers have changed the day to day operations of the water treatment and distribution infrastructure. Staff responsible for the operations of the infrastructure now requires more technical knowledge and experience. This means different and higher qualifications and more experience is necessary in order to ensure the systems performance and calibration is effectively managed, monitored and dealt with in emergency or noncompliance situations.

   The lack of a senior technical field staff who can provide this technical guidance and/or work direction to junior technical staff has now created a significant amount of demand and stress on the infrastructure and current staff resulting in $41,000 on overtime costs in 2017 and $22,000 in 2018.

   Currently, the SCRD has one staff member in Utility Services Division who is qualified to accept full responsibility for the Chapman Creek and South Pender water treatment plants. This leave the management of the system without any redundancy or business continuity.

   Given the importance of these plants for the water supply to the community, staff considered this gap in staffing to be a risk.

   The SCRD is currently lacking Asset Management plans for all the water treatment and distribution infrastructure (pumps, reservoirs, treatment plants and wells). At current staff levels for day to day operations do not permit time or resources to be committed to the development and implementation of the asset management's plans. To assist in alleviating the day to day operational pressures the field staff are experiencing, the 1 senior operational staff is forced to perform less technical and complex work in order to

perform field work. The combination and compounding results of this misalignment of work duties is causing more asset failures (watermain breaks) which ultimately becomes as domino effect of 'break – fix' scenarios in the field.

2. Increase workload associated with developments and projects.

   The workload associated with subdivision and development referrals, review and inspections has increased significantly over the last several years, and is not expected to decrease. It is the same staff who are responsible for engineering referral reviews and also responsible for infrastructure capital projects within the Division. The number and complexity of capital projects has increased and this trend will continue, in part due to major water supply expansion projects. Given the relevance of the water supply capital projects for the SCRD and community, from a work planning perspective, they are prioritized over day to day development referrals. The current service level is now a couple of weeks for any referrals associated with developments.

3. Increased automatization of water and wastewater infrastructure.

   The most essential water distribution infrastructure is increasingly equipped with sensors, alarms and automation to allow for the remote control and monitoring of basic functions of these facilities. Within the current staffing level, there is only one staff member with the certification and experience to maintain and upgrade this important instrumentation.

4. Regulatory Reporting Requirements

   With recent Provincial oversight and regulatory reporting requirement changes, the rigor which all local governments must now monitor and report water quality data associated with the water treatment and distribution systems has significantly increased.

   As the fast majority of the duties of the administrative staff is mandatory and time sensitive, any additional workload will result in other duties to be completed by more senior staff, in particular the Utilities Operations Superintendent, Utility Infrastructure Coordinator and the Utilities Technician Coordinator.

Utility Services Division Round 2 Budget Proposal for Staffing Resources

As requested at Committee, staff have prioritized the requests in order with the understanding, that all the requests are equally important and critical to the health of the overall system.

<u>Senior Utility Technician</u>

To address the above-mentioned increased complexity and deferred maintenance of water treatment and distribution operations, staff recommend an increase of 0.4 to an existing 0.6 Utility Technical II position which result in a 1.0 FTE. This position would report directly to the Utility Technician Coordinator and would support this position in the technical coordination of staff. This would be a new role.

This position would have the following key responsibilities:

- Operate the water treatment and distribution system, especially during drought conditions;
- Lead the development and implementation of preventative management plans for all water treatment and distribution infrastructure and support the development of Asset Management plans for this infrastructure;
- Provide senior technical advice and training to junior staff on the operations of water treatment and distribution facilities to ensure business continuity of the service; and
- Project lead on low and moderate complex infrastructure repair, replacement and improvement projects.

Current FTE	**Incremental FTE**	**Proposed FTE**	**Required skills**
0.6 (Utility Technician II)	0.4	1.0	Certified in the Environmental Operators Certification Program with a minimum of: - Water Treatment Level III - Water Distribution Level III - Chlorine Handler

Utility Engineering and SCADA Technician

The Utility Engineering and SCADA (Supervisory and Control Data Acquisition) Technician would perform an integral role in technical engineering and information technological support to the operation, upgrades and expansions of the Regional District's water distribution and water distribution systems. This role includes a significant amount of field based work to undertake inspections and assessments and to maintain and repair SCADA-systems.

There are currently has 2.0 FTE Utility Engineering Technician and a 1.0 FTE SCADA Technician.

This position would provide necessary capacity in both of these technical fields and would have the following key responsibilities:

- Provide technical engineering direction and expertise with respect to new construction and operational maintenance of water installations. This will include design and approval of new connections and extensions to the water distribution system in compliance with established design/engineering standards, system optimization and regulatory requirements;
- Liaises with user groups, developers, member municipalities, and other utilities to ensure facilities meet their expectations, in accordance with approved budget;
- Provide infrastructure information to field staff and internal customers, general public, other utilities and jurisdictions; and
- Manage, operate and maintain the SCRD's SCADA system and radio network to meet operational needs, and to strive for continuous improvement in functionality, capacity and reliability.

Current FTE	Incremental FTE	Proposed FTE	Required skills
3.0	1.0	4.0	Recognized diploma in civil engineering design and construction. Preferred: - experience or diploma in Instrumentation Technology. - A.Sc.T preferred.

Utility Operations Assistant

The current 1.33 FTE staff are responsible for a number of key duties and tasks which underpin the effectives of the operations of the services provided out in the field. Duties such as inventory management, timesheet management, regulatory compliance data entry/reporting and work order management. Staff recommend an increase of 0.4 to an existing 1.32 Utility Operations Assistance position which would result in a 1.72 FTE.

As the vast majority of this is mandatory and time sensitive in nature, often senior staff are required to work overtime to ensure the duties are completed

This additional capacity would allow the staff to complete the following responsibilities:

- Maintain the inventory management system and ensures parts and supplies are ordered and stocked as required;
- Arrange quotes and other documentation for the purchasing of parts and supplies required for the operations, maintenance and repairs to all water treatment and distribution systems;
- Maintain databases, filing systems and produce reports related to water usage and water quality for management review and regulatory agencies;
- Complete electronic timesheets for the field staff; and
- Respond to service enquiries from the general public, service providers, local government representatives and other agencies.

Current FTE	Incremental FTE	Proposed FTE	Required skills
1.32	0.4	1.72	Completion of Grade twelve or equivalent.

Financial implications

For 2019, it is anticipated the Senior Utility Technician and Utility Operations Assistant positions could not be hired until Q2 2019 and the Utility Engineering Technician not until Q3 2019.

Therefore, only a portion of the estimated cost has been identified as needed in the 2019 budget. The proposed funding allocation for these positions is through User Fees.

The proposed cost allocations and associated funding implications for 2019 and 2020 are as follows:

	# FTE	***2019 (Pro-rated)***	***2020***
Funding Required:			
Senior Utility Technician	*0.4*	*18,895*	*55,675*
Utility Engineering/SCADA Technician	*1.0*	*37,034*	*88,176*
Utility Operations Assistant	*0.4*	*20,907*	*27,875*
User Fees [370] Regional Water		*76,836*	*171,726*

CONCLUSION

The Utility Services Division has consisted of 30.82 full time employees (FTE) since 2016.

The purpose of this report is to provide further information with respect to the duties, responsibilities and demands on the work which Utilities Services Division is responsible and rationale for the budget proposals which will be presented at the Round 2 Budget meeting on March 4, 2019 for [370] Regional Water Service.

A number of significant changes have resulted in an increased workload and operational risk to the Utilities Services Division and in particular the operations of the SCRD's water treatment and distribution infrastructure.

As requested at Committee, staff have prioritized the requests in order with the understanding, that all the requests are equally important and critical to the health of the overall system.

The following are proposed cost allocations and associated funding implications for 2019 2020

	# FTE	***2019 (Pro-rated)***	***2020***
Funding Required:			
Senior Utility Technician	*0.4*	*18,895*	*55,675*
Utility Engineering/SCADA Technician	*1.0*	*37,034*	*88,176*
Utility Operations Assistant	*0.4*	*20,907*	*27,875*
User Fees [370] Regional Water		*76,836*	*171,726*

Reviewed by:			
Manager		CFO/Finance	X – T. Perreault
GM		Legislative	
CAO	X – J. Loveys	Other HR-	

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee – February 21, 2019

AUTHOR: Shane Walkey, Manager, Utility Services

SUBJECT: **ITT 18 368 CONTRACT AWARD CHAPMAN CREEK BRIDGE WATERMAIN REPLACEMENT**

RECOMMENDATION(S)

THAT the report titled ITT 18 368 Contract Award Chapman Creek Bridge Watermain Replacement be received;

AND THAT the Chapman Creek Bridge Watermain Replacement contract be awarded to TGK Irrigation Ltd. in the amount of $196,891.00 (plus GST);

AND THAT the delegated authorities be authorized to execute the contract.

BACKGROUND

The Regional Water Service Area's (RWSA) water distribution network includes over 300 kilometres of watermains that deliver high quality water to residents and businesses on the Sunshine Coast. Ensuring the ongoing functionality of the water distribution assets is an integral part of maintaining reliable service delivery in the region.

In August 2017 a critical asset failure occurred on a section of exposed watermain that crosses Chapman Creek Bridge in Davis Bay. SCRD Utility Services staff repaired a crack in the pipe which has provided a short term solution. However, further work is deemed necessary to avoid future service disruption. An engineered condition assessment of this section has confirmed that the water main has widespread corrosion near the bridge abutments.

The SCRD hired Onsite Engineering Ltd in May 2018 to submit a detailed design for the replacement of the Chapman Creek Bridge watermain. As part of this contract, Onsite Engineering Ltd. prepared tender documents and will provide project management services for the construction phase of this project, in cooperation with SCRD staff.

In accordance with the SCRD's Purchasing Policy, Invitation to Tender (ITT) 18 368 Chapman Creek Bridge Watermain Replacement was issued on December 13, 2018 with a closing date on January 25, 2019. There were 3 addendums issued for the tender. The ITT sought competitive bids for the supply and installation of a replacement watermain, required pipe, fittings, insulation and aerial crossing infrastructure of the Chapman Creek Bridge watermain, as well as removal of the existing watermain. Given that this work is occurring in close proximity to a stream, all work will take place in accordance with the terms and conditions of the Water Sustainability Regulation.

DISCUSSION

The ITT for the Chapman Creek Bridge Watermain Replacement required that interested contractors submit tender pricing to complete all of the construction work required and to complete the work by May, 2019.

Options and Analysis

Following standard advertising of the tender submission for the Chapman Creek Bridge Watermain Replacement, three compliant tender submission were received. The tender bids were reviewed by a cross department three member team and Onsite Engineering Ltd. Staff recommend that a contract for the Chapman Creek Bridge Watermain Replacement be awarded as follows:

Company Name	Total Contract Value (plus GST)
TGK Irrigation Ltd.	$196,891.00

Financial Implications

Incorporated in the RWSA budget is a base capital budget amount of $608,940 that is allocated towards annual watermain replacement projects. Planning and spending of this budget is determined by the Utilities Services Division based on short and long-term capital planning as well as work required to remediate or address asset replacement on an as-needed or reactive basis.

Staff recommend funding this project through the existing RWSA 2019 base capital budget for watermain replacements and as such no new funding requirement is needed to complete this project.

Timeline for next steps

If the award of this contract is approved the contractor has committed to begin work within two weeks after notice is given to proceed and has provided a construction schedule that would commit to a Q2 2019 completion date.

STRATEGIC PLAN AND RELATED POLICIES

This project reflects the set of values identified in the Strategic Plan, including the Priority to Ensure Financial Sustainability that includes maintaining infrastructure in a proper state of repair and to Embed Environmental Leadership through the responsible management of the region's water supply and distribution system.

CONCLUSION

In accordance with the SCRD Purchasing Policy, ITT 18 368 was issued for the Chapman Creek Bridge Watermain Replacement.

Three compliant submissions were received. Staff recommend that the Chapman Creek Bridge Watermain Replacement contract be awarded to TGK Irrigation Ltd. in the amount of $196,891.00 (plus GST).

Reviewed by:			
Manager		CFO/Finance	X – T. Perreault
GM	X – R. Rosenboom	Legislative	
CAO	X – J. Loveys	Other/Purchasing	X - V. Cropp

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee – February 21, 2019

AUTHOR: Shane Walkey, Manager, Utility Services

SUBJECT: **RFQ 18 363 CONTRACT AWARD FOR SUPPLY AND DELIVERY OF BRASS WATER SERVICE FITTINGS**

RECOMMENDATION(S)

THAT the report titled RFQ 18 363 Contract Award for the Supply and Delivery of Brass Water Service Fittings be received;

AND THAT the contract for the Supply and Delivery of Brass Water Service Fittings be awarded to Flocor Inc. in the amount up to $120,631.93 (plus GST);

AND THAT the delegated authorities be authorized to execute the contract.

BACKGROUND

The Utilities Services Division purchases and maintains an inventory of brass water service fittings on an ongoing basis to ensure the water and wastewater systems are suitably maintained, repairs can be effected in a timely manner and supplies are available for new servicing and system renewal.

In accordance with the SCRD's Purchasing Policy, Request for Quotation (RFQ) 18 363 Supply and Delivery of Brass Water Service Fittings was issued on December 12, 2018. The RFQ sought competitive proposals from qualified water and wastewater services supply companies to supply and deliver a variety of brass water service fittings, such as couplings, valves and bushings on a per piece "as and when required basis".

DISCUSSION

The RFQ requested proposals that provided water service supplies to a minimum acceptable standard, delivery to sites acceptable to the SCRD, fixed prices for each of the three years, alternate products accepted and a contract term of three years, which may be extended for an additional two one year periods.

Estimated annual quantities of material were provided in the RFQ for comparison purposes, but the total quantity of items purchased will be determined as and when required by the volume of work approved through the budget process, level of third party servicing requirements, and planned and reactive maintenance.

Options and Analysis

Following standard advertising and active solicitation of proposals for the supply and delivery of brass water service fittings, five proposals were received. Chaired by Purchasing staff, the evaluation team consisted of a cross department three member team. The submissions were reviewed and scored on the criteria that was set out in the RFQ. Staff recommend that a contract for the supply and delivery of brass water service fittings be awarded to Flocor Inc., as they have met the specifications as outlined in the RFQ.

Company Name	Total Contract Value (plus GST) Estimated in the amount up to
Flocor Inc.	$120,631.93

Financial Implications

It is estimated that the average costs of all materials will be similar to the prior two years and therefore, it is projected these costs can be sustained within the existing budgets.

The purchase of brass water service fittings will be funded through annual operations and capital budgets as approved through the annual budgeting process. When fittings are used, the costs will be allocated to the service function that the work is being carried out with.

STRATEGIC PLAN AND RELATED POLICIES

The RFQ process is aligned with the SCRD Purchasing Policy and reflects the set of values identified in the Strategic Plan, including the Priority to Ensure Financial Sustainability.

CONCLUSION

In accordance with the SCRD Purchasing Policy, RFQ 18 363 was issued for the supply and delivery of brass water service fittings on an as and when required basis. The term of the contract is three years with fixed prices for each of the three years.

Five qualified proposals were received. Staff recommend awarding a three year contract, which may be extended for an additional two one year periods, to Flocor Inc. for a total three year contract value up to $120,631.93 (plus GST).

Reviewed by:			
Manager		CFO/Finance	X – T. Perreault
GM	X – R. Rosenboom	Legislative	
CAO	X – J. Loveys	Other/Purchasing	X - V-Cropp

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee, February 21, 2019

AUTHOR: Tracey Hincks, Executive Assistant

SUBJECT: **AIR QUALITY MONITORING STATION – REQUEST FOR SUPPORT**

RECOMMENDATION(S)

THAT the report titled Air Quality Monitoring Station – Request for Support be received;

AND THAT the SCRD provide a letter of support to Vancouver Coastal Health for the full-time continuous air quality monitoring station within the District of Sechelt.

BACKGROUND

On January 16, 2019, the SCRD received a request to provide a letter of support from Vancouver Coastal Health (VCH) for full-time continuous air quality monitoring station within the District of Sechelt (Attachment A). A draft letter has been shared for information.

DISCUSSION

There is a greater urgency to develop air quality capacity for enhanced air quality monitoring due to the increased frequency of forest fires and concerns with air pollution from wood stoves and backyard burning.

Currently, there are air quality monitoring stations at Langdale Elementary and Gibsons Municipal Hall. These stations are limited in their capacity to produce an Air Quality Health Index measure.

A centrally located air quality monitoring station with full capabilities would benefit the entire Sunshine Coast. Staff recommend supporting a centrally located air quality monitoring station.

A similar request was sent to the District of Sechelt.

STRATEGIC PLAN AND RELATED POLICIES

The Sunshine Coast Regional District strategic priority of Embed Environmental Leadership is aligned with this request.

CONCLUSION

The SCRD received a request for a letter of support from VCH for a centrally located full-time continuous air quality monitoring station. The entire Sunshine Coast would benefit from a centrally located air quality monitoring station with full capabilities. Staff recommend providing a letter of support to VCH.

Attachment:

Attachment A – email and letter from Geoff McKee, MD/MPH, Medical Health Officer, Vancouver Coastal Health regarding a request to Ministry of Environment for an air quality monitoring station within the District of Sechelt.

Reviewed by:			
Manager		Finance	
GM	X – R. Rosenboom	Legislative	
CAO	X – J. Loveys	Other	

Tracey Hincks

From: McKee, Geoff [NS] <Geoff.McKee@vch.ca>
Sent: Tuesday, January 22, 2019 12:29 PM
To: Andrew Yeates; Janette Loveys
Cc: Molder, Darren [SC]; Tracey Hincks
Subject: RE: Air quality monitoring in Sechelt
Attachments: MOE letter DoS Station Jan 16, 2019.pdf

Hi Janette and Andrew,

Thank you for offering to seek council support. We do not currently have a strict timeline; however, it would be optimal to put in the request sooner rather than later so that we could perhaps have the station ready for the wildfire season (although this may be a bit ambitious).

I have attached the letter we hope to send to the MoE.

Thanks,

Geoff

Geoff McKee, MD/MPH
Medical Health Officer
Vancouver Coastal Health
5th Floor 132 West Esplanade
North Vancouver BC V7M 1A2
Phone: 604-983-6701 | Email: Geoff.McKee@vch.ca

From: Andrew Yeates [AYeates@sechelt.ca]
Sent: January 21, 2019 2:42 PM
To: Janette Loveys; McKee, Geoff [NS]
Cc: Molder, Darren [SC]; Tracey Hincks
Subject: RE: Air quality monitoring in Sechelt

Hi Geoff, Likewise for the District of Sechelt.

Thanks, Andrew

-----Original Message-----
From: Janette Loveys [mailto:Janette.Loveys@scrd.ca]
Sent: Monday, January 21, 2019 2:40 PM
To: McKee, Geoff [NS]
Cc: Molder, Darren [SC]; Tracey Hincks; Andrew Yeates
Subject: Re: Air quality monitoring in Sechelt

Hello Geoff,

Thank you for your email.

SCRD support would require Board approval, which I am happy to seek. Can you share you timelines and a draft letter and staff will bring it forward.

Thank you, Janette

Janette Loveys
Chief Administrative Officer
Sunshine Coast Regional District
Original Message
From: McKee, Geoff [NS]
Sent: Monday, January 21, 2019 2:24 PM
To: Janette Loveys; AYeates@sechelt.ca
Cc: Molder, Darren [SC]
Subject: Air quality monitoring in Sechelt

Hello Andrew and Janette,

In response to the increased frequency of air quality events on the Sunshine Coast from wildfires and lack of monitoring outside of Gibsons, I am currently preparing a letter to the Ministry of Environment to request an air quality monitoring station within the District of Sechelt. This follows an unsuccessful attempt a couple years ago; however, the lack of air quality data for the majority of the Sunshine Coast continues to pose a problem and I feel it is time to reach out to the MoE again.

In order to strengthen our request, I was wondering if the District of Sechelt and Sunshine Coast Regional District would be interested in providing letters of support? I believe this station would provide useful data that could benefit the health of people living in both jurisdictions. I have also reached out to the Clean Air Society who will be providing a letter of support.

I would be happy to provide the draft of our letter or any other information you may require.

Regards,

Geoff McKee, MD/MPH
Medical Health Officer
Vancouver Coastal Health
5th Floor 132 West Esplanade
North Vancouver BC V7M 1A2
Phone: 604-983-6701 | Email: Geoff.McKee@vch.ca

Vancouver CoastalHealth
Promoting wellness. Ensuring care.

Office of the Medical Health Officer
Vancouver Coastal Health
821 Gibsons Way
Gibsons, BC V0N, 1V8
Telephone: 604-983-6701
Facsimile: 604-983-6839

Mr. Tarek Ayache
Ministry of Environment

Via email: Tarek.Ayache@gov.bc.ca

Re: Upgrade to air quality monitoring capacity on the Sunshine Coast

Dear Mr. Tarek Ayache,

Please accept this letter requesting a full-time continuous air quality monitoring station within the District of Sechelt.

With the increased frequency of forest fires and continued concern regarding other sources of air pollution, such as wood stoves and backyard burning, there is greater urgency to develop the capacity on the Sunshine Coast for enhanced air quality monitoring. A monitoring station in Sechelt would be extremely helpful to ensure timely, data driven decisions related to air quality advisories.

We currently depend on the air quality monitoring stations at Langdale Elementary and Gibsons Municipal Hall; however, these stations are limited in their capacity to produce an Air Quality Health Index measure and adequately reflect the health risks experienced by communities elsewhere on the Sunshine Coast. For example, wildfires in August 2018 caused widespread elevations in particulate matter on the Sunshine Coast; however, the absence of geographically relevant air quality data complicated the response.

A centrally located full-time continuous air quality monitoring station with full capabilities would benefit the entire Sunshine Coast. A Sechelt location would be ideal as it is centrally located between Langdale and the community of Pender Harbour and in a densely populated area. Our office would have interest in reviewing and recommending specific location options if a station in Sechelt were to be approved.

As the Medical Health Officer for the Sunshine Coast, I believe that it is in the best interests of the public's health that we upgrade our ability to collect, analyze, and post air quality data for the Sunshine Coast.

We would appreciate your support by applying to the Ministry of Environment for a full-time continuous air quality monitoring station within the District of Sechelt.

Please feel free to contact me directly if you have any questions.

Sincerely,

Geoff McKee, MD, MPH, FRCPC
Medical Health Officer
Vancouver Coastal Health

Darren Molder
Senior Environmental Health Officer
Vancouver Coastal Health

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Infrastructure Services Committee – February 21, 2019

AUTHOR: Ian Hall, General Manager, Planning and Community Development

SUBJECT: **ARENA FLOOR SURFACE SCHEDULING**

RECOMMENDATION(S)

THAT the report titled Arena Floor Surface Scheduling be received;

AND THAT the current administrative procedure that ice be provided only when variable costs are equal to or less than revenue generated from user group bookings be continued and affirmed;

AND THAT for the ice period of March 18 – April 30 2019, ice be provided at SCA;

AND THAT for May 2019, ice not be offered on the basis of impact on capital projects, financial implications and on the balance of social impacts;

AND THAT for May 2020 and beyond, ice be offered at SCA;

AND THAT August ice be offered at GACC;

AND THAT a decision on June ice in future years be deferred;

AND THAT staff undertake process improvement around arena floor scheduling with all user groups;

AND FURTHER THAT staff report back to the October 2019, Q3 variance on any financial implications related to extending the ice schedule.

BACKGROUND

At the Regular Board meeting of January 31, 2019, the following resolution was adopted:

016/19 *Arena Floor Surface Scheduling*

THAT the decision to extend the arena ice season be deferred pending a staff report to a February Committee meeting with an analysis of the feasibility, financial implications and schedule;

AND THAT ice be maintained in one facility until April 30, 2019 as per current policy.

The purpose of this report is to provide information in addition to and following from the Staff Report provided to the Corporate and Administrative Services Committee on January 31, 2019

(Attachment A), the ensuing Committee discussion and correspondence received from user groups.

The report considers both spring 2019, which requires decision, and options for the 2019-2020 ice season.

DISCUSSION

Executive Summary

The Board directed staff to provide analysis of feasibility, financial implications and schedule for an extended ice season.

The specific requests from Sunshine Coast Skating Club and Sunshine Coast Minor Hockey for 2019 and future years have been clarified. The extension requested would represent a 20% increase in ice days delivered compared to the historical average.

Capital projects and refrigeration capacity influence the timing and location of when ice can be offered. The decision of when ice is provided dictates where it is provided. The decision of when and where ice is provided has impacts on special events, SCRD programs and the activities of recreation user groups.

For 2019 April ice is recommended to be at SCA and May ice is not recommended as it constrains the chiller replacement project. In future years, May ice may be offered at SCA, noting some risk around ice loss. A decision on offering June ice is recommended to be deferred. August ice must be at GACC.

The approach described above considers a balance of positive and negative impacts to user groups. Negative impacts can be mitigated through pre-planning, leveraging the Joint Use Agreement and the development of new programming.

Based on bookings currently requested, May 2019 variable costs for ice have not been covered. August bookings have not been gathered at the current time. Staff expect the variable cost gap will be closed as groups plan events and grow/develop programs. Continuing and affirming SCRD's procedure of only providing ice when variable costs are met will minimize financial implications. Staff will monitor impacts and report during Q3 variance.

To improve planning, ensure transparency, and mitigate negative consequences of change, it is recommended that staff continue on the current path and work with user groups on process improvement, aligned with the 2011 Indoor Space Allocation Policy. These improvements, to be refined with input from user groups, could involve all users together in a single allocation meeting with a 12-month planning horizon.

Specific Requests Regarding Ice Scheduling

The January 31, 2019 report provided analysis, following Board direction, on maintaining year-round ice in one facility. The report noted that user group requests had not specifically been for year-round ice.

Subsequent to the January 31 Committee meeting and with respect to the ice season extension:

- The Sunshine Coast Skating Club affirmed (email dated February 4, Attachment B) one of the specific asks noted in delegation materials provided previously: "The SCSC is requesting an extended ice season that would leave ice in one arena from March until the end of June. Ice would then be reinstalled in one arena at the beginning of August. We are requesting that this change commence in March 2019." In the same letter, the Sunshine Coast Skating Club states: "Despite figure skating being a year round sport, the SCSC are aware that we cannot afford the variable costs for year round ice ourselves and so the request of ice until the end of June was to mitigate skaters missing out on their education and other activities due to having to travel to train. With the SCMHA not requiring ice in June 2019, the SCSC would like to confirm our request of ice remaining in the Sechelt Arena from the third week of September until the end of May and for ice to be reinstalled at GACC at the beginning of August until March."

- Sunshine Coast Minor Hockey Association has confirmed the requested ice seasons as "Sechelt Ice Arena: Ice Allocation- Third Week of September until the End of May; Gibsons Ice Arena: Ice Allocation- Beginning of August until Mid March" (email dated February 4, Attachment C)

These clarifications enable focusing of analysis on the impacts of the specific dates at specific facilities. The request subjected to further analysis in this report is therefore:

- SCA Ice Dates: September 21 – May 31 (254 days)
- GACC Ice Dates: August 1 – March 15 (228 days)
- Total Ice Days Delivered: 482

Extended ice seasons in both facilities as requested require a 20% increase in ice days as compared the historical average.

The month of June in years beyond 2019 is given additional consideration.

The change from possible year-round ice, or ice ending June 30 impacts technical, logistical and operational factors that were profiled in the January 31 report. Analysis is provided below.

Technical Constraints

Capital Projects

A one-time capital project consideration in 2019 is the planned replacement of the chiller and compressor at SCA. The project is required for compliance with Technical Safety BC orders. SCRD's contracted refrigeration engineer states that at least 12-week plant shutdown is required for the work. Allowing sufficient time for plant commissioning, inspection and plant start up to make ice for the third week of September (usual schedule) required construction completion by September 6, 2019. A 12-week window prior to September 6 begins on June 14.

Considering that equipment lead time is also estimated at about 12 weeks from pre-order (anticipated to be made prior to end of February), the only progress that could occur on this project in April would be demolition. Construction could potentially start as early as the first week of May.

Construction has not yet been tendered (pending final design). The more restrictive the construction window is made the fewer vendors are likely to bid, the less competitive the bids may be, and the higher the risk that project delays impact the project completion date and fall ice installation.

Consequently, staff do not recommend that ice be installed in SCA past April 30, 2019.

Providing spring ice at SCA in 2019, even in April, is a constraint on this significant capital project.

Refrigeration Capacity

GACC has a 50% greater refrigeration capacity than SCA, with more sophisticated controls and a more efficient building envelope. Overloading ice plants reduces cooling efficiency, creates the possibility of diminished plant life and could result in unsafe (lumpy) ice conditions due to excess humidity. GACC is more suitable for warm weather plant operation.

Based on local average monthly temperatures (Figure 1 below), staff do not have concerns about operating SCA's ice plant in April.

A hot May would challenge plant operations (see comments below about summer months). Any mechanical breakdown or hydro outages would immediately impact users and pose a significant risk of losing ice (during cool weather ice can be sustained for several hours without electricity if needed). These risks create concerns about fulfilling rental commitments and meeting user expectations.

June, July and August ice should be delivered at GACC. In 2001 or 2002, as part of filming for the Beachcombers movie, ice was installed in August at SCA. Staff recall that plant operations were challenged and ice quality was poor. Condensation puddled onto bleachers from steel beams, floors in the cold area were never dry, the plywood walls were saturated with water, boards and glass were always wet and glass could not be seen through. Ice had to be dry scraped to remove lumps to achieve a safe surface. Dehumidification improvements completed since 2002 may reduce condensation issues, but do not resolve refrigeration capacity limits.

Temperature (°C) Get more temperature related statistics »

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average high	6.3	7.5	9.3	12.1	15.8	18.5	21	21.1	17.8	12.8	8.8	6.6
Average low	2.9	3.5	4.5	6.5	9.6	12.3	14.5	14.8	12.1	8.6	5.3	3.3
Average	4.6	5.5	6.9	9.3	12.7	15.4	17.8	18	15	10.7	7.1	5
Record daily high	13.2	14.3	15.6	20.7	28.4	29.9	29.4	32.2	26.6	21.1	15.6	13.3
Date	Jan 30 1989	Feb 27 1986	Mar 11 1965	Apr 27 1987	May 29 1983	Jun 01 1978	Jul 12 1961	Aug 04 1961	Sep 03 1988	Oct 01 1975	Nov 11 1991	Dec 14 1962
Record daily low	-7.2	-10.1	-3.3	-1.1	3.3	5.6	9	8.9	3.9	-0.4	-7.3	-11.7
Date	Jan 29 1969	Feb 13 1990	Mar 03 1976	Apr 03 1975	May 01 1970	Jun 01 1966	Jul 01 1979	Aug 18 1973	Sep 27 1972	Oct 31 1984	Nov 27 1985	Dec 28 1968

Figure 1: Sechelt Average Monthly Climate Date

Regional climate change projections suggest warmer summers, more hot days and hotter extreme hot days will be the new normal for the Sunshine Coast. The chiller replacement project at SCA takes these projections into account.

Effect of Technical Constraints on Arena Floor Schedule

For spring 2019, taking into consideration the chiller replacement project and refrigeration capacity, staff recommend that if ice is to be provided beyond April 30, that the spring ice location be GACC. If spring ice is only provided until April 30, either facility is technically acceptable.

For future years, ice into May could be tested at SCA with acknowledgement of risks associated with warm weather ice in a facility with limited refrigeration capacity and insulation.

August ice, if provided, should only be installed at GACC.

In summary, these factors suggest that an ice schedule as requested for spring/summer 2019 is technically feasible in years without significant capital projects impacting plant operation:

- SCA Ice Dates: September 21 – May 31 (254 days)
- GACC Ice Dates: August 1 – March 15 (228 days)
- Total Ice Days Delivered: 482

However, if June ice is provided, it should be at GACC, which yields a schedule of:

- SCA Ice Dates: September 21 – March 15 (177 days)
- GACC Ice Dates: August 1 – June 30 (335 days)
- Total Ice Days Delivered: 482 + 30 = 512

The decision of when ice is provided dictates where it is provided.

Technical constraints and advice should be considered in the context of community needs and desires, detailed in sections below. The decision of where ice is provided has impacts on special events, SCRD programs and the activities of recreation user groups.

Policy Context - Summary

A comprehensive review of policy was included in the January 31 staff report.

Allocation policy and procedure clauses that have specific application to the consideration of both spring 2019 ice and future year ice season extensions are:

Indoor Space Allocation Policy (Board Policy, adopted March 2011)

- States facilities are publicly funded and are to be scheduled "in the best interest of users and the communities they serve."
- Allocation should "reflect local needs, registration factors, utilization and participation patterns…"
- Establishes an order for allocation, "however, no single user or category of use should unduly inhibit use by others."
- Order of priority: special events, SCRD Programs, ongoing rentals, casual or one-time indoor space users.

Recreation and Parks Allocation Policy (administrative procedure, version April 2015)

- States facilities are publicly funded and are to be scheduled "in the best interest of taxpayers, users and the communities they serve in the most cost effective, efficient matter."
- States "arenas are operated based on demand of facility user groups. Arenas will be operated when variable costs of operation are equal to or less than the revenue generated from user group bookings."

Staff suggest that the requirement that variable costs be addressed is helpful to achieving the goals of cost-effective operation and reflecting "local needs, registration factors, utilization and participation patterns." Recent comments received from user groups, including the Sunshine Coast Skating Club as presented earlier in this report reflect this understanding as well. Practically, this guideline enables annual scheduling and service budgeting to proceed without the need for annual changes to subsidization rates.

Recommendation #1: Staff recommend that the current administrative procedure that ice be provided only when variable costs are equal to or less than revenue generated from user group bookings be continued and affirmed.

User Group Impacts

Taking into consideration the chiller project, refrigeration capacity and the possibility of Board-direction to extend spring ice beyond April 30, staff provided a draft schedule to user groups on January 31 based on April ice at GACC. The analysis below includes feedback received.

Spring 2019

March 17 to April 30 (dry floor available May 7 +/-), based on booking requests received	
Category	Impacts
Special Events	Open Door Career Fair (April 5): Relocated to multipurpose rooms at GACC if dry floor not available. Hitmen Hockey Tournament (April 26-28): Will not proceed if ice is at GACC due to inability to secure parking lot overnight (so cars can be left if participants/spectators require a safe ride home) and organizer travel distance to venue. Staff note this event has historically been held at SCA and was previously held in March.
SCRD Programs	Can be configured to operate in the available facility.
Dry floor rentals	Lacrosse would prefer dry floor at GACC as it works better for travelling teams. Roller Girls and Pickleball comfortable with draft schedule. Pickleball has previously stated a preference for SCA due to participant catchment.
Ice rentals	Minor Hockey: prefers spring ice be at SCA Skating Club: no specific response regarding location, have expressed support for Hitmen tournament (and ice) being at SCA. Co-ed: no interest in April ice if it is in GACC Senior and adult leagues: various responses, generally acceptable to have ice at GACC

Based on user impacts and feedback received, it is anticipated that proceeding with spring 2019 ice (March 18-April 30) at GACC instead of SCA is not in the overall best interests of users and the communities they serve, and does not reflect local needs. While each location has its strengths and weaknesses, providing ice (or a dry floor) in either location does not have the effect of unduly inhibiting use of any groups. Past arena floor scheduling practice which provided spring dry floor at GACC is a key factor for 2019, as short planning timelines for special events could be complicated by a change in venue.

The organizer's stated intention not to proceed with the Hitmen tournament if ice is at GACC and reduction in co-ed hockey bookings would leave an approximately $4,000 variable operating cost gap in April. Any foregone dry floor revenue would be on top of this amount.

If ice is provided at SCA, variable costs for ice are anticipated to be covered through rental revenue.

Recommendation #2: For the ice period of March 18 – April 30 2019, staff recommend ice be provided at SCA.

May 1 to 30 (dry floor available June 10 +/-), based on booking requests received	
Category	Impacts
Special Events	Quilt Show (May 9-11): Very strong preference for GACC, due to size, location and accessibility. Home & Garden Show (June 7-8): Seeking confirmation of location as soon as possible, stated requirement for GACC (Attachment D). Staff note May ice should conclude 10 days prior to first dry floor rental day (i.e. May 26) Boxing (June 1, tentatively): Prefers GACC
SCRD Programs	Can be configured to operate in the available facility.
Dry floor rentals	Lacrosse would prefer dry floor at GACC as it works better for travelling teams. Roller Girls and Pickleball comfortable with draft schedule. Pickleball has previously stated a preference for SCA due to participant catchment.
Ice rentals	Minor Hockey: prefers spring ice be at SCA Skating Club: no specific response regarding location, have expressed support for Hitmen tournament (and ice) being at SCA. Co-ed: no May bookings requested Senior and adult leagues: no May bookings requested

For 2019, based on the chiller replacement project timelines, staff recommend that the SCA plant not be in operation in May.

Based on user feedback and requested bookings, for 2019:

- Providing ice at SCA in May would be a significant constraint on timely completion of the chiller replacement. Late ice installation in September could result.
- Providing ice at GACC in May would have a significant impact on dry floor special events.
- Providing ice at SCA in May would have a significant impact on Pickleball and, as discussed in the January 31 staff report, a moderate impact on lacrosse and roller girls.
- Ice bookings as currently requested would address only about 40% of variable costs (see table on page 11 of January 31 staff report), resulting in an operating gap of approximately $18,400. This may be reduced slightly if ice concludes approximately May 26.

Recommendation #3 a): For May 2019, staff do not recommend ice be offered on the basis of impact on capital projects, financial implications and on the balance of social impacts.

Recommendation #3 b): For May 2020 and beyond, staff recommend that May ice be offered at SCA.

For June 2019, as noted earlier in this report, the Sunshine Coast Skating Club's request for June ice has been retracted for 2019. For June of future years, the major special event is the Chatelech and Elphinstone Dry Grad events (held jointly on two evenings, typically at GACC); the location would need to be confirmed pending ice location.

Beyond Spring 2019

August 1-30 (last day of dry floor July 25 +/-)	
Category	Impacts
Special Events	No significant impacts. Camps or events that attract off-coast participants may be better placed at GACC.
SCRD Programs	Can be configured to operate in the available facility.
Dry floor rentals	No significant impacts.
Ice rentals	Minor Hockey: has requested GACC Skating Club: has requested GACC Co-ed, Senior and adult leagues typically do not rent during the full month of August but may participate around the last week of August

Recommendation #4: If August ice is offered, it must be at GACC due to technical constraints.

Looking forward, for spring of 2020 and years beyond it is technically feasible to deliver spring ice at SCA until the end of May, with some increased risk of ice loss due to mechanical breakdown as compared to GACC.

On balance, SCA for spring ice appears to have more benefits and fewer negative impacts for users. Dry floor program bookings could be configured to fit in one facility with minor impacts to time provided and moderate impacts to consistency of schedule (due to interplay between special events and recreation rentals). Using lead time and pre-planning staff and user groups can work together to mitigate negative impacts through, for example, joint use agreement bookings, new programming at GACC, etc.

Process changes to enable this type of planning are recommended later in this report.

June is a challenging month for arena floor scheduling:

- Refrigeration capacity directs that June ice be provided at GACC.
- Continuing ice from end of regular season through June at GACC has significant negative impacts for special events (Quilt Show, Home and Garden Show) some dry floor groups (lacrosse) and is not preferred by ice users.
- Based on ice user dialogue feedback and May requests, June rental bookings are not anticipated to address variable operating costs, though this could change over time as groups build their programs.
- Peer communities such as Powell River and Squamish do not provide ice in June.

Changes to scheduling processes, expanded partnerships with new facilities, potential development of new venues by SCRD or others, and collaborative work with user groups to "see the possibilities" of new arena floor schedules all bear on spring planning, especially for June.

Recommendation #5: Staff recommend that a decision on future-year June ice be deferred.

FINANCIAL IMPLICATIONS

As detailed in the January 31 staff report the current (2019) incremental cost of maintaining year round ice is estimated at $7,185 per week, which includes staffing, operating expenses and capital replacement costs.

Based on booking requests received, variable operating costs, current fees and charges (which could be reviewed), variable cost gaps are shown below.

Month	Ice Location	Anticipated Variable Cost Gap
March 18- April 30	SCA	$0
	GACC	$7,000
May	Either	$18,400*
June	GACC	$18,400* or more
August	GACC	Not researched, currently*

*Likely to shrink over time as groups build programs, have advertising lead time, etc.

The cost of forgone revenue is also a financial consideration. Staff are not able to provide an estimate for this, as user groups and special event organizers have been understandably reticent to confirm acceptance of their less-preferred venue (or to cancel) pending a decision on scheduling.

By continuing the administrative procedure of only providing ice when variable costs are covered by rentals, the financial implications of an extended ice season can be reduced or eliminated.

Since at this time it is unknown of the financial implications related to the change in facility scheduling to extending ice, Staff are not recommending making any changes to the 2019-2023 Financial Plan at this time. Staff will report back to the October 2019 Quarter (Q3) variance on any financial implications.

Organizational Implications

To support expanded ice operation additional staff time will be required to support ice operations. If dry floor programs and bookings increase at the other facility, additional staffing may be required. If additional staff with Ice Facility Operator tickets are required, time for recruitment, training and certification may be required.

As noted in the January 31 staff report, ice operation has a greater demand for energy (especially electricity) and water and produces more emissions. Late July ice installation in Gibsons could be conducted with water from outside of the Chapman community water system at additional time and cost using temporary storage and pumps and trucked water, if desired. Once ice is installed plant operation and ice cleaning is relatively low-demand for water (as is now also the case at Sunshine Coast Arena).

An overall increase in programming and rental bookings supports recreation service (and PRMP) goals, but will require the total effort of SCRD's staff complement for operations. Additional staffing support for annual maintenance activities and capital projects may be required.

Implementation Considerations

The following considerations were identified in the January 31 staff report about year-round ice, and remain valid:

1. Lead time for planning is beneficial for user groups and for staff. Significant changes to how facilities are operating (such as changing to year-round ice) may require several months for recruitment and training.
2. Some but likely not all impacts of change to dry floor user groups can be mitigated. If a change to dry floor availability is made, staff would need to work with dry floor user groups to identify ways to meet PRMP goals and user needs. Again, lead time for planning is beneficial.
3. GACC is more suited to offering ice in warm weather. Staff are not confident that SCA can be operated in peak summer heat.
4. Facility operating schedules are constrained by capital maintenance projects that require, in some cases, plant shutdown. Generally these are planned one year in advance. Staff are working with Technical Safety BC to confirm requirements related to internal chiller inspection at GACC in 2019 (would require plant shutdown) – this is a regulatory requirement following the tragedy in Fernie. There are currently no capital projects requiring plant shutdown at GACC in 2020.
5. Feedback from all arena user groups and the community (including SCRD program patrons and special event visitors) on any proposed direction may provide additional information for consideration or identify improvement opportunities.
6. Looking forward: under the current policy of variable cost recovery, conducting a regular review of variable operating costs and reporting it to users in a timely way at the beginning of the Main Regular Season (i.e. September) could assist groups (and staff) with planning.

Taken together with the analysis presented in this report, these points lead staff to recommend process changes. These changes could include:

1. Conduct an annual review of variable operating costs.
2. Conduct an annual scan of major capital projects that could impact arena floor scheduling.
3. Collaborate with all event organizers and user groups (together) on a single allocation meeting (tentatively contemplated for late summer) that presents variable cost analysis, capital project information, and has a planning horizon of 12 months in order to provide time for program planning. Pending Board direction, ice requests would be considered for the months of August through May. A preview of the following year (months 12-24) could also occur.
4. Confirm a deadline for payment of booking contracts (e.g. fall), and confirm if variable costs are addressed early, so that facility schedules in the following spring can be confirmed.

The above examples of process improvements could be refined with input from users and synchronized with corporate processes such as capital plan updates, annual budgeting, review of fees and charges, etc.

These process improvements are aligned with the overall goals of the Parks and Recreation Master Plan and the Board-approved Indoor Space Allocation Policy (2011), which includes a Schedule A timeline that follows the process described above. The subsequently-developed 2015 administrative procedure “Recreation and Parks Allocation Policy” is not Board-endorsed and may only serve to complicate and fragment effective allocation planning. Accordingly Board direction to pursue process improvement as described may not be specifically required, nonetheless, for clarity:

Recommendation #6: Staff recommend that process improvement around arena floor scheduling be undertaken with all user groups.

If policy changes are identified as being required, staff will provide further recommendations to a future Committee.

STRATEGIC PLAN AND RELATED POLICIES

The subject matter of this report relates to the Parks and Recreation Master Plan, Indoor Space Allocation Policy (2011) and Recreation and Parks Allocation Policy (administrative procedure) (2015).

CONCLUSION

Following the request for an extended ice season and Board direction, staff gathered information and completed analysis to present costs and benefits understand the impacts to implementing the request. This report details the findings and based on analysis recommends:

1. The current administrative procedure that ice be provided only when variable costs are equal to or less than revenue generated from user group bookings be continued.
2. For the ice period of March 18 – April 30 2019, ice be provided at SCA.
3. A) For May 2019, ice not be offered on the basis of impact on capital projects, financial implications and on the balance of social impacts.
   B) For May 2020 and beyond, staff recommend that May ice be offered at SCA.
4. August ice be offered at GACC.
5. A decision on future-year June ice be deferred.
6. Staff undertake process improvement around arena floor scheduling with all user groups.

Reviewed by:			
Manager	X - K. Preston X - K. Robinson	CFO/Finance	X-T. Perreault
GM		Legislative	
CAO	X – J. Loveys	Arena/Sports Coordinator	X- T. Poulton

ATTACHMENTS

A: Staff Report – “Year Round Ice Cost Benefit Analysis”, January 31, 2019

B. Letter from Andrea Watson, Sunshine Coast Skating Club re: Clarification on Extended Ice Season (February 4, 2019)

C. Letter from Kate Turner, Sunshine Coast Minor Hockey Association / Sunshine Coast Skating Club re: Arena Allocation Decision (February 4, 2019)

D. Letter from Bill Stockwell, Coast Community Builders Association President re: Sunshine Coast Home and Garden Show (February 7, 2019)

SUNSHINE COAST REGIONAL DISTRICT STAFF REPORT

TO: Corporate and Administrative Services Committee – January 31, 2019

AUTHOR: Ian Hall, General Manager, Planning and Community Development

SUBJECT: **COST-BENEFIT ANALYSIS FOR YEAR ROUND ICE**

RECOMMENDATION(S)

THAT the report titled Cost-Benefit Analysis for Year Round Ice Request Report be received.

BACKGROUND

At the Regular Board meeting of December 13, 2018, the following resolution was adopted:

339/18 *Cost Benefit Analysis for Year Round Ice*

THAT staff report prior to Round One budget deliberations on the implications of maintaining year-round ice in one facility, including a cost benefit analysis and impact of water and energy usage.

The purpose of this report and supporting attachments is to provide the Committee with background information, financial implications (cost-benefit analysis) and user groups' interest and comments with respect to extending the ice season at the Sunshine Coast Regional District (SCRD) arenas.

DISCUSSION

Facility Overview

SCRD operates two arenas: Gibsons and Area Community Centre (GACC) (built 2007) and Sunshine Coast Arena (SCA) (built 1973, and operated initially by District of Sechelt).

Both arenas have single 200 x 85 feet (NHL-sized) ice surfaces that can be operated with a dry floor or have ice installed. Each arena includes a single ice plant.

Arenas are available for rent by sports, recreation and community groups and for special events. The arenas are programmed by the SCRD with public drop-in and registration-based programs.

Policy Context

In addition to the SCRD Strategic Plan, the primary policy document guiding SCRD recreation service delivery is the Parks and Recreation Master Plan (PRMP), adopted by the Board in January 2014. The PRMP is online at: http://www.scrd.ca/Recreation.

The PRMP articulates a mission for SCRD to play "a variety of roles – planner, protector, provider and community-building in collaboration with volunteers, other service providers, community and partners to provide a systems of high-quality and accessible…facilities, recreation services…special events in a manner that is integrated, thoughtfully planned, responsible, well maintained and fiscally responsible to benefit the health and vitality of all individuals, families, community and the region as a whole."

Recreation goals identified in the PRMP are to:

- Strengthen the community fabric throughout the region
- Motivate individuals and families to be healthy and active
- Be stewards of the environment; and
- Contribute to a diverse and sustainable economy.

The planning context of the PRMP notes a slightly growing population that is aging (largest age group is 45-64 years, and this segment is growing) and a lower number of preschool, school-aged children and youth then the general BC population. Recommendations in PRMP include both continuing support for children/youth programs and programs focused on older adults.

The 2016 Census identified that of the Coast's 29,970 residents, 16% are 0-19 years of age and 50% are 55 years of age and over (30% being 65 years of age and over).

Specific to arenas, the PRMP recommends:

Recommendation	Current Status
18. Proceed in a timely fashion with the capital expenditure programs as noted in the capital plan for the GACC and the Sechelt Aquatic Centre.	Actioned and ongoing.
19. Assign sufficient resources to program the two ice rinks for five years. Set measurable outcomes that are reviewed annually.	Actioned and ongoing.
- At the conclusion of a five-year period, review the operations of the two arenas before determining the future of the Sechelt Arena.	Staff contemplate this as a project for 2020. Further Board direction will be required.
- At the conclusion of the proposed ice-rink operations trial, consider calling for expressions of interest to operate the second-floor lounge at the Sechelt Arena as a commercial operation.	Contemplated in conjunction with review noted above. Further Board direction will be required.
- Review the ice-allocation policy in consultation with ice users and prepare amendments conducive to creating additional ice usage while maintaining the local service focus.	Initiated, resulted in administrative procedure. Discussed further below.
20. Maintain the Sechelt Arena so that it's safe and functional, and do this through minimal and prudent capital works over the next five years.	Actioned and ongoing.

Two allocation policy documents are used to guide facility scheduling:

Indoor Space Allocation Policy (Board Policy, adopted March 2011) – Attachment A

- States facilities are publicly funded and are to be scheduled "in the best interest of users and the communities they serve."
- Allocation should "reflect local needs, registration factors, utilization and participation patterns…"
- Establishes an order for allocation, "however, no single user or category of use should unduly inhibit use by others."
- Order of priority: special events, SCRD Programs, ongoing rentals, casual or one-time indoor space users.
- Sets an annual timeline for allocation (September 1 to August 31 schedule year), with planning done in July.

Recreation and Parks Allocation Policy (administrative procedure, version April 2015) – Attachment B

- States facilities are publicly funded and are to be scheduled "in the best interest of taxpayers, users and the communities they serve in the most cost effective, efficient manner."
- "The social, cultural, community development benefits and the current financial plan of the SCRD are to be considered in the allocation of SCRD facilities. The needs of existing users are to be balanced with a proactive consideration of emerging trends in programs and services for residents and visitors to the Sunshine Coast."
- Sets an annual allocation timeline and process.
- Establishes an order for allocation, "however, no single user or category of use should unduly inhibit use by others."
- Order of priority: special events, SCRD public programs, youth groups open to the public, adult leagues, independent users, schools, commercial events. Note that the Master Joint Use Agreement with SD46 has the effect of amending this order to place schools as a higher priority.
- States "arenas are operated based on demand of facility user groups. Arenas will be operated when variable costs of operation are equal to or less than the revenue generated from user group bookings."
- "Ice surfaces (up to 2) are only guaranteed during the Main Regular Season (first week of October to the last weekend of February). All other seasons' ice is based on demand of user groups and their ability to generate revenue equal to or greater than variable costs of operation."
- During all seasons the SCRD has the right to restrict ice availability based on demand and does not guarantee ice year around."

There are points of conflict and ambiguity in and between the policies. In administering the policies, staff have worked to balance overarching goals of PRMP and within the policies against the specifics of the timeline(s) and priorities.

The specific process for evaluating and confirming variable costs and the operational ability of the Regional District to supply ice outside of Main Regular Season are not well-defined. As a matter of practice Board direction has been sought when specific requests that do not appear to meet the test of variable cost recovery have been made.

Review/renewal of allocation policy and procedure, especially the timing of allocation decisions, is an opportunity that could benefit all users, improving the ability for users and SCRD to plan ahead.

User Group Perspectives

Staff have received a variety of feedback on arena scheduling, arena allocation policy and process and on ice and dry floor seasons. With the goal of hearing and understanding the perspectives of all arena user groups, staff invited all user groups (ice, dry floor and special event organizers) to a dialogue session on November 6, 2018.

Representatives from nine groups covering all activity types participated and written comments were received from a tenth group. The notes from this dialogue are included as Attachment C.

Messages heard during the dialogue:

- All groups value and feel they benefit from access to SCRD recreation facilities.
- All groups exert significant volunteer time and effort to organize their activities.
- Activities taking place in SCRD recreation facilities have social and economic benefits; these benefits extend beyond those taking part in the activity.
- Some groups noted appreciation for SCRD staff efforts to facilitate and support their efforts.
- Many groups would like to see changes to scheduling processes to better meet their needs (as noted previously in this report) – predictability, lead times, clarity.
- Some groups (both ice and dry floor) spoke positively about current schedules and how ice and dry floor time is shared.
- Some but not all ice groups would like an extended ice season.
- Some groups have a specific preference for one arena over another based on their membership catchment, ease of access to ferry/visiting teams, or ancillary services available in the facility. Other groups expressed a willingness to travel to where space was available.
- All groups indicated a willingness to contribute or partner with SCRD to meet shared objectives.
- Many participants expressed appreciation for the opportunity to share perspectives, to listen and to be heard. Staff appreciated the participants' time and sharing.

Technical Constraints

There are certain technical requirements and limitations that impact how services are delivered in arenas.

- **Time required for ice installation and removal.** Arenas are unavailable for use by any groups twice a year, the first is as the ice is being installed (average 10 days) and the second time is during the ice removal process (average 5 -7 days). The ice installation process consumes significant volumes of water (about 100,000L) and is very labour intensive.

- **Annual maintenance and planned capital projects.** In accordance with several WorkSafeBC and Technical Safety BC regulations, ice plants receive major maintenance and inspection annually. Current SCRD practice is to complete this maintenance during a shutdown period, although it is possible for maintenance to be done with the plant in operation. Currently, capital projects that relate to the ice plants that are planned through the 20-year Recreation Facilities Capital Plan are completed during shutdown. Generally, project construction timelines range from 4 to 8 weeks. This time may be extended to accommodate more significant capital projects, or if inspections reveal the need for further work. A one-time capital project consideration in 2019 is the planned replacement of the chiller and compressors at SCA. As currently planned, this project will entail an approximately 12-week plant shutdown. The ability to provide year-round ice, or extended ice seasons is constrained by the need for facility capital maintenance. Generally these needs are planned, and thus known at least 1 year before delivery. Exceptions include regulatory changes (as in 2018-2019) and breakdown scenarios.

- **Refrigeration capacity.** The ability of a facility to sustain temperature and humidity necessary for an ice surface is a product of building insulation and the capacity of plant equipment. SCA was designed as a 2-3-season facility with limited insulation and a refrigeration capacity of 80 tonnes supplied through 2 x 60hp compressors. GACC was designed for the possibility of ice in warmer months, and has more insulation and 120 tonnes of refrigeration with larger compressors. Lifecycle replacement of the chiller and compressors at SCA is currently in the planning stage and is for similar refrigeration capacity (~85 tonnes), taking into account the changing climate. Overloading ice plants reduces cooling efficiency, creates the possibility of diminished plant life and could result in unsafe (lumpy) ice conditions due to excess humidity.

- **Local technical precedent.** Neither of the SCRD arenas has been operated on a regular basis in peak summer heat. Staff are expert, certified plant operators and have the skills and expertise to deliver year-round ice, however the possible effects of this operation on the plant and other parts of the facilities is unknown. Possible effects would be changes in indoor air quality, impacts to ice quality, etc.

Based on these considerations, GACC is generally more suitable for warm-weather operation as it is better insulated, has a larger capacity ice plant, and has more sophisticated plant and building controls that will enable staff finer control over performance and more ability to respond to unanticipated building or ice conditions.

Facility Operation Considerations

SCRD's two arenas are operated differently based on the format of each building.

- GACC offers an arena floor, 2 racquetball courts, fitness centre, youth centre, child minding space, skate shop services and 2 multipurpose rooms with kitchens and public internet services. The community lobby space offers ping pong, air hockey, foosball and a pool table. GACC also offers public showers, public restrooms and arena spectator seating with overhead natural gas heating.

- SCA offers and arena floor, skate shop services, second-storey community and banquet rooms, arena change rooms, and public internet. Cold area spectator seating is available (no bleachers).

At GACC, because the building is also a community centre with gym, courts, activity rooms, etc. the facility is staffed by an ice facility operator regardless of whether the ice surface is programmed or rented. This is in accordance with Technical Safety BC requirements for ice plant oversight in buildings open to the public.

As the core business of SCA is the arena (no/very limited community centre function), the facility is generally only open to the public and hence overseen by an ice facility operator when the arena is programmed or rented. The exception to this approach is when the community or banquet rooms are rented separately from the arena floor.

Facility staffing is driven by regulatory requirements (including pre-opening plant inspection), facility program and user demands and approved operating budget.

Annual Facility Schedules - Scenario

As mapping impacts and associated costs and benefits requires understanding the annual facility schedule, staff modelled different scenarios.

Considering the time, cost and water required for ice installation (and time and cost for removal), and taking into consideration refrigeration capacity, the most practical scenario is to maintain year-round (12-month) ice at GACC.

Staff note that the request from the Sunshine Coast Skating Club as articulated in the delegation handout provided to the Committee on November 22, 2018 requested ice in one arena from August 1 to June 30 (11 months) (page 2) and elsewhere states a minimum of 10 months of ice is required for athlete success (page 3). This is considered in demand/revenue analysis.

For the purpose of comparing service levels, this scenario could look like:

- SCA Ice Dates: October 1 – March 1 (151 days)
- GACC Ice Dates: Year round (365 days)
- Total Ice Days Delivered: 516

The 2013-2018 average total number of ice days provided was 403 (see Attachment D for historical schedules and utilization information).

516 (+/- to account for holidays, leap years, etc.) is the number of ice days required to provide year-round ice in one facility and ice in during the Main Regular Season in the other arena.

Removal of the requirement to provide ice in both facilities during the Main Regular Season would enable year round ice to be provided at the current service level of 403 ice days. As this is not likely to be acceptable to ice users and is in conflict with goals stated in the Parks and Recreation Master Plan, it was not analyzed.

Year-round ice with two ice sheets provided in the Main Regular Season requires a 28% increase in ice days.

Cost-Benefit Analysis

The following costs and benefits of year-round ice have been considered:

A. Social impacts
B. Revenue loss/impacts
C. Operating – including materials/services, utilities, staffing
D. Capital impacts

Impacts, whether positive or negative, relating to long-term program growth or decline are beyond the scope of analysis conducted for this report.

A. Social Impacts

Benefits to Users

A longer ice season would benefit sport development and recreation opportunities for residents and visiting players participating in or spectating at ice activities. Benefits include both increased local access and reduced travel time to off-Coast activities (and associated travel cost reduction which further increase access).

Based on information shared by user groups, those likely to see the most benefit from an extended ice season are Sunshine Coast Skating Club, Sunshine Coast Minor Hockey and Men's League. Co-Ed Hockey and Rusty Cranks (older adult hockey) indicated that the current season is generally adequate. Participation in SCRD programs and public skate opportunities declines in warmer weather and as outdoor activities increase.

In information provided to staff and the Board, the Sunshine Coast Skating Club has noted gender equity benefits associated with the growth of participation in figure skating. A number of dry floor activities also present this opportunity including quilting and roller derby. Staff have not conducted an analysis of gender/participation in arena activities but are aware that a number of sport bodies have strategies to improve equity.

There are local economic multiplier benefits associated with visiting teams and spectators (equally true for both ice and dry floor events).

Two coaches employed by the Skating Club would benefit at least indirectly from a longer ice season; the retention and employment security of coaches has been raised by the Skate Club as a benefit of a longer ice season.

Costs/Disbenefits to Users

A reduction in available dry floor time could have impacts on arena users. The specific impacts depend on which facility schedule is changed and at what time of year. Just as some ice users would enjoy sport development benefits from additional access to ice, dry floor users could be negatively impacted with reduced access to sport development, social and health opportunities.

Users and programs impacted include:

- Roller Girls – season from late March through August
- Sunshine Coast Lacrosse Association – season from late March through mid-July
- Pickleball programs – season from April through September

Pickleball is appealing to older adults however younger adults are starting to show interest. The older adults are sharing their passion with their adult children. Local secondary school classes from Elphinstone have rented the dry floor to introduce the sport to teenagers.

- Home & Garden Show – June 7 and 8, 2019

  The Home & Garden Show has been held every June going back to 2010. This event normally hosts up to 2,000 visitors.

- Quilt Show – May 9 to 11 2019

  The Quilt Show was originally presented in 2011 and was held every second year up to 2015. The event is similar in scale to the Home & Garden Show.

- Boxing – Dates unconfirmed

  The Sunshine Coast Boxing Club has indicated interest in holding the event again this Spring (2019) however dates have not been confirmed. The Boxing event is normally held in late April and every year (skipped 2018) going back to 2014. This event normally attracts 300 spectators.

- Elphinstone Dry Grad – June 25, 2019

  Elphinstone Dry Grad has been held at the Gibson Community Centre every June (skipping 2016) going back to 2012.

- Chatelech Dry Grad – June 26, 2019

  Chatelech Dry Grad has requested to hold their event for the first time at the GACC back-to-back with the Elphinstone Dry Grad to save on equipment rentals.

These community events are well attended and provide social benefits and entertainment to Sunshine Coast residents and visitors.

Demand for dry floor space is highest in April, May and June. Less demand exists for July, and less again for August.

Space utilization analysis suggests that many current dry floor programs and rentals can fit into one facility but that based on the current data, special events such as the Quilt Shows, Home and Garden Expo, Boxing, and Roller Girl Bouts would disrupt regular practices and league play for other users. Some user groups would be required to accept more non-prime rental time. Users may not be provided space in their preferred location; for example, pickleball players generally prefer SCA and the Quilt Show, Home Show, etc. prefer (or even require) the larger space available at GACC.

According to current SCRD allocation policies, Special Events such as the Quilt Shows, Home and Garden Expo, etc. would pre-empt ongoing sport and recreation rentals.

The chart below summarizes just the ongoing rentals and programs as delivered in 2018, not one-off show/event rentals.

2018 Dry-Floor Usage

Group	GACC	SCA	Total
Lacrosse	6.25	3	9.25
Roller Girls	2	2.5	4.5
		Group totals per week	**13.75**

SCRD Programs	GACC	SCA	Total
Pickle Ball (SCA)	4	10	14
SCRD Programs (GACC)	12		12
		SCRD Program totals per week	**26**

Some ice groups have commented that ice activities can only occur on ice and that dry floor activities can occur in venues other than arenas. Through dialogue with dry floor users groups, sport facility research and other Sunshine Coast facility owners, including School District 46 (SD46), staff can advise that currently:

- Lacrosse can only be played in arenas due to field size and the need for damage-resistant finishes (such as hockey boards/glass).
- Roller derby can only be played in arenas due to need for a very smooth floor and the size of the track.
- There are limited opportunities to play pickeball in other facilities due to the size of the court and ceiling height requirements. Some school gyms provide acceptable but lower quality playing opportunities, and the social element of the game with a large number of courts/rotating teams is lost'
- Shows/larger events: there are a very limited number of facilities offering the size and amenity that SCRD facilities provide (perhaps none at the largest end of the event scale).

There are some opportunities to shift dry floor programs to SD46 facilities (through the Joint Use Agreement) such as introductory pickleball, as was delivered in 2018. These opportunities are constrained as noted above and are generally limited to the school year when SD46 buildings are staffed/open and not undergoing annual maintenance.

Additional opportunities to maintain dry floor offerings/programs could include:

- Development of outdoor pickleball courts;
- Development of an outdoor lacrosse box;
- Offering a temporary dry floor that could be installed over the ice surface (previously considered by the Board in 2014 and not proceeded with due to cost);
- Development of a new large-format indoor recreation facility.

Staff have not researched these opportunities in detail to confirm feasibility or costs.

B. Revenue Impacts

Current rental rates are set in Community Recreation Facility Fees and Charges Bylaw No. 599.7. Fees were last amended in 2015.

Program and Rental Analysis

The chart below summarizes the spring ice requests (April and May 2019) known by SCRD staff to date. The hours as presented represent the requests received from group/league conveners and schedulers.

At the time this report was prepared, no booking permits have been paid/processed for spring 2019. Requests made during allocation do not always translate into the equivalent use/revenue as users may not proceed with permits. This scenario presents a risk for SCRD as operational decisions to provide ice are made on overall commitments from all groups; the failure of one group to fully commit to requested bookings leaves SCRD in a position of not covering variable costs. The timing of the allocation process (January decisions about April and May ice, for example) does not assist groups or SCRD with planning. As noted previously in this report, staff see an opportunity to review allocation processes and timing.

April 2019 Ice Bookings (Requested)

Group (Adult)	Hours (per week)	Rate (net of GST)	Total (per week)
Coed - * *will commit for April if at SCA*	1.25	$195.24	$244.05
Panthers	1.25	$195.24	$244.05
Adult League	4.5	$195.24	$878.58
Brew Crew - **will commit for April if at GACC*	1.75	$195.24	$341.67
Pigs	1.25	$195.24	$244.05
Adult - Total per week	**10 hours**		**$1854.78**
Group (Youth)	**Hours (per week)**	**Rate (net of GST)**	**Total (per week)**
Skate club - non prime time	2	$66.66	$133.32
Skate club – prime time	12.75	$89.52	$1141.38
Minor Hockey	32	$89.52	$2864.64
Youth - Total per week	**46.75 hours**		**$4139.34**
Grand Total	**56.75 hours**		**$5994.12**
Hitmen Tournament April 26th to 28, 2019 (hours based on 2018)	**28.5 hours** (one time event – not weekly)	$171.43	**$4885.76**

April weekly average: $7,136

Although unconfirmed there could potentially be an additional 3.75 hours of Adult League usage in April with another $732.15 of weekly revenue.

May 2019 Ice Bookings (Requested)

Group (Adult)	Hours (per week)	Rate (net of GST)	Total (per week)
Adult - Total per week	**0 hours**	$195.24	**0**
Group (Youth)	**Hours (per week)**	**Rate (net of GST)**	**Total (per week)**
Skate club - non prime time	2	$66.66	$133.32
Skate club – prime time	13.25	$89.52	$1186.14
Minor Hockey	20.25	$89.52	$1812.78
Youth - Total per week	**35.50**		**$3132.24**
Grand Total	**35.50**		**$3132.24**

The specific demand in terms of prime/non-prime hours, youth versus adult, etc. and corresponding revenue for ice in June, July and August has not been captured at this time.

Staff have heard from user groups that lead time of multiple months for planning, promotion and recruitment is beneficial. Thus, summer 2019 demand, if enumerated now, may not fully reflect the potential that could be achieved in future years.

C. Operating – including materials, utilities, staffing

Materials/Services: Additional materials and services such as plant supplies, skate shop supplies, janitorial supplies and waste disposal services may be required. The level and type of arena use (including spectator attendance) will determine to a great extent that incremental needs of materials and services. An allowance of $250 per week should be made.

Utilities: Electricity costs are the most significant operating expense associated with maintaining ice. The estimated incremental cost of operating expenses is $2,300 per week, the majority of which is attributable to electricity. The following summarizes monthly electricity and natural gas use in kilowatt hour equivalents (kWhe) as well as greenhouse gas emissions in carbon dioxide equivalent (CO_2e)

Monthly	Average with Ice		Average Without ice		Difference	
	kWhe	CO_2e	kWhe	CO_2e	kWhe	CO_2e
GACC	151,843	9,513	53,574	3,259	98,269	6,254
SCA	91,755	7,502	19,031	961	72,724	6,541

Water demand related to plant cooling and ice cleaning would increase. Water use for ice cleaning would depend on the level of ice use. Water use for showers is also likely to increase. If ice is maintained year-round (not re-installed annually, as is currently done), the overall result would likely be an increase in consumption (perhaps 25-50%). Currently GACC consumes approximately 3,000m^3 of water annually. Historical SCA water consumption data is not relevant due to recent water efficiency upgrades.

Staffing: Additional staffing hours would be required to support ice operations. If dry floor programs and bookings increase at the other facility, additional staffing may be required. If additional staff with Ice Facility Operator tickets are required, time for recruitment, training and certification may be required.

An overall increase in programming and rental bookings supports recreation service (and PRMP) goals, but will require the total effort of SCRD's staff complement for operations. Additional staffing support for annual maintenance activities and capital projects may be required.

When a plant is in operation, a minimum 7 hour shift per day is required. This 7 hour shift would allow for approximately 5.5 hours of rental per day at the SCA but would allow for close to 6.5 hours of rental at the GACC per day since the building would likely already be open and staff are already there to do the clean-up at the end of the night.

An additional 49 staffing hours per week equates to $1,880 in wages and benefits at 2019 rates. Allowing for increased recruitment, training and backfill coverage, a cost of $2,000 per week is used for this analysis. This translated into an FTE increase of approximately 0.5, based on a 28% increase in ice days.

The above figure relates only to direct facility operation. With an increase in service level, additional staff resources may also be required to support facility administration, annual maintenance shutdown and capital projects. These needs have not been specifically assessed as they are highly dependent on the specific scheduling scenario; should a decision to increase ice offering, staff will monitor impacts in these areas.

Benefits of year-round ice, from a staffing perspective, would be that plant operators would be engaged consistently through the year and thus maintain consistent knowledge and application of practices and regulations. Additional local employment opportunities would be created.

D. Capital Impacts

The most significant factor in assessing the cost of maintaining ice is capital replacement costs.

Projections of useful life as considered in the 20-year recreation facilities capital plan were based on a 6-month ice season. An increase in service hours on ice plant equipment will have a consequential effect on (chronological) estimated useful life remaining.

The lifespan of major capital assets such as the ice plant, condenser and Zamboni are all directly related to hours of use.

The existing capital plan assumes an estimated useful life (e.g. 20-years) for building components/assets based on a six month ice season. A Class D estimated of replacement costs for those assets is $1,500,000 in 2019 dollars which equates a $75,000 annual funding requirement. This is equivalent to $2,885 per week based on 26 weeks of operation.

FINANCIAL IMPLICATIONS

The incremental cost of maintaining year round ice is estimated at $7,185 per week. This can be broken down into staffing, operating expenses and capital replacement costs.

Incremental cost summary

Cost Driver	**Weekly Incremental Cost**
Staffing	$2,000
Operating expenses	2,550
Capital replacement	2,885
Total	**$7,435**

The cost of forgone revenue is also a financial consideration. Assuming that ice bookings do not generate revenue over and above the incremental cost of maintaining ice, any decrease in dry floor bookings will result in lost revenue. The table below summarizes both ice and dry floor revenue for the 2017 and 2018 fiscal years.

	2017	**2018**
Ice	$ 361,239	$ 346,818
Dry Floor	19,106	15,296
Total	**$ 380,345**	**$ 362,114**

Staff observe based on feedback shared by dry floor user groups in November 2018 that at least one-third of the dry floor revenue can be retained or recreated through new programming by offering a single facility, through creative scheduling and through delivery of some programs

at SD46 facilities. As it is variable and unknown, foregone revenue is not included in weekly incremental cost.

Considering spring 2019:

- The April weekly booking requests expressed by user groups during January 2019 total $5,994, with a one-time event generating revenue of $4,886. If the one-time event is amortized over the month, the weekly revenue totals $7,136.
- Based on variable operating costs, a gap of $1,280 in April exists.
- Recognizing some additional unconfirmed bookings have been proposed which, if confirmed, could significantly reduce or eliminate this gap, staff will engage ice groups about final scheduling of ice in April 2019 in one facility.

Based on feedback received from some ice user groups in November 2018 that indicated no desire for summer ice (or late spring ice), and noting that the Sunshine Coast Skating Club, a significant user of ice time, did not request July ice it can be assumed that summer ice demand will be less than in spring, creating an operating requirement gap that could be $45,000-$65,000 for May, June, July and early August.

The above is financial analysis only, and does not reflect social costs or benefits.

Implementation Considerations

1. Lead time for planning is beneficial for user groups and for staff. Significant changes to how facilities are operating (such as changing to year-round ice) may require several months for recruitment and training.
2. Some but likely not all impacts of change to dry floor user groups can be mitigated. If a change to dry floor availability is made, staff would need to work with dry floor user groups to identify ways to meet PRMP goals and user needs. Again, lead time for planning is beneficial.
3. GACC is more suited to offering ice in warm weather. Staff are not confident that SCA can be operated in peak summer heat.
4. Facility operating schedules are constrained by capital maintenance projects that require, in some cases, plant shutdown. Generally these are planned one year in advance. Staff are working with Technical Safety BC to confirm requirements related to internal chiller inspection at GACC in 2019 (would require plant shutdown) – this is a regulatory requirement following the tragedy in Fernie. There are currently no capital projects requiring plant shutdown at GACC in 2020.
5. Feedback from all arena user groups and the community (including SCRD program patrons and special event visitors) on any proposed direction may provide additional information for consideration or identify improvement opportunities.
6. Looking forward: under the current policy of variable cost recovery, conducting a regular review of variable operating costs and reporting it to users in a timely way at the beginning of the Main Regular Season (i.e. September) could assist groups (and staff) with planning.

Practically, considering the lead required for preparation, a new ice season scenario could begin as early as August 1, 2019 with ice installed at GACC. Ice installation for Main Regular Season (first week of October) could follow at SCA, following completion of the chiller capital project.

STRATEGIC PLAN AND RELATED POLICIES

The subject matter of this report relates to the Parks and Recreation Master Plan, Indoor Space Allocation Policy (2011) and Recreation and Parks Allocation Policy (administrative procedure) (2015).

CONCLUSION

Following the request for an extended ice season and Board direction, staff gathered information and completed analysis to present costs and benefits understand the impacts to implementing the request. This report details the findings.

It is technically feasible to provide year-round ice. GACC is currently much more capable of providing ice in warm weather. The ability to operate SCRD arenas with ice is constrained by shutdown requirements related to capital maintenance. These projects and shutdown requirements are generally known well in advance.

A change to facility ice/dry floor operating schedules to deliver year round ice would require a 28% increase in ice days as compared to recent annual average (from 403 to 516) if ice is maintained in both facilities during the Main Regular Season.

This increase in ice days, as well as the inability to access dry floor space in their preferred venue, is likely to have a negative effect on dry floor users.

The weekly variable cost for ice delivery is currently $7,435.

Demand as currently known from ice groups does not, at current rental rates, cover this cost in May 2019 and is assumed, based on feedback from ice user groups, cover the cost in June, July or early August. An annual total variable cost gap of $47,000-67,000 is estimated.

Preparatory work related to staffing and scheduling is required prior to a significant change to operating schedules. Fall 2019 is the earliest that a change could be implemented.

Under the current policy of variable cost recovery, conducting a regular review of variable operating costs and reporting it to users in a timely way at the beginning of the Main Regular Season (i.e. September) could assist groups (and staff) with planning.

Reviewed by:			
Manager	X- K. Preston X- K. Robinson	CFO Finance	X-T. Perreault X-B. Wing
GM		Legislative	
CAO	X- J. Loveys	Other	
		Facility Coord. Water/Energy Project Coord. Asset Mgmt Coord.	X-T. Poulton X-R. Shay X-B. Smale

ATTACHMENTS

A: Allocation policy
B: Allocation policy (admin guideline)
C: November 6 meeting notes
D: Historical schedule and utilization information
E: Interjurisdictional Comparison

Sunshine Coast Regional District
INDOOR SPACE ALLOCATION POLICY

Statement of Intent

The SCRD indoor facilities are publicly funded and are to be scheduled in the best interest of the users and the communities they serve. The SCRD has the responsibility to manage the allocation of indoor space on a yearly basis to reflect local needs, registration factors, utilization and participation patterns, as set out in this policy document. Both social and economic benefits are to be considered in allocating indoor space.

The needs of Existing Users are to be balanced with a proactive consideration of emerging trends while maintaining a balance of general users and special events.

Definitions

Ongoing User Group means

"Any User Group utilizing five or more hours of regularly scheduled time monthly or a user that has weekly or biweekly use of indoor space on a regular basis."

Existing Users means

"Users who have maintained regular use for the previous season and have maintained on-time payment of fees and appropriate general conduct"

Season of Use means

"Regular indoor space use between Sept 1st to August 31st"

Good Standing means

"All account owed have been paid and there are no unresolved conflicts over use"

Appropriate Uses / Priorities in Allocation

Effective and efficient utilization of time and space will be considered. Existing use of indoor space will form the base from which allocation occurs. Changes instituted by the SCRD to re-allocate space should only be the result of careful consideration of the existing schedule and the policies for allocation. Priority for booking is as follows:

Generally, priority in allocation shall follow the order established below. However, no single user or category of use should unduly inhibit use by others. Users of higher priority will also be encouraged to use some less desirable times and may not receive the total hours of use requested.

(1) Special Events

The SCRD recognizes the significant social and economic contributions special events provide to the community. Priority consideration in scheduling and/or pre-empting use to allow special events may be required.

(2) SCRD Programs

SCRD Programs and services that foster social, mental and physical benefits are recognized as an important part of indoor space use, and are considered a high priority.

(3) On Going Rentals

(4) Casual or One Time Indoor Space Users

Code of Conduct for All Users

Patrons using SCRD indoor space are required to adhere to the SCRD Recreation Facility Code of Conduct:

PATRON CODE OF CONDUCT
FOR ALL SCRD FACILITIES
"We strive to ensure that all persons are treated with
DIGNITY, RESPECT, HONESTY & FAIRNESS"
It is everyone's responsibility to report witnessed misconduct.
Behavior will not be tolerated, ignored or condoned if it is: Aggressive, offensive, abusive or harassing or interferes with another person's enjoyment of the recreation facilities or impede Staff's ability to conduct business.
Together We Make All Recreation Safe

Proposed events and bookings that may contravene the facility code of conduct may be denied access to facilities based on the discretion of a facility Manager and subject to Board established bylaws and policy.

User Fees/Rates

User fees will be reviewed annually and any changes will be recommended to the Recreation and Parks Services Advisory committee and the SCRD Board. Rates are set by Bylaw 599 - Community Recreation Facilities fees and Charges and Bylaw 356- Parks Regulations and Fees.

Annual Allocation Timeline / Process

The specific timeline of the allocation process will be determined on an annual basis by the SCRD administration. Users are responsible to meet application deadlines and

failure to do so will result in indoor space not being available. General timeline for each season is described in Schedule A.

A starting place for allocation discussions will be the space booked from previous years. Requests for changes/increases etc. will be discussed with the ongoing users during the annual indoor space users meeting.

Application Requirements

In order to be considered, applications for use must include the following information on the application forms:

- Numbers of users
- Contact information for organization"s agent
- Levels of use (past year and projected for upcoming year)
- Other information that may be reasonably required

All users applying for indoor space must be current for accounts owed and paid to the SCRD and be in good standing.

General Conditions

Priority of Existing Users / Consideration of New Use

As new regular user groups come forward, their requests will be considered for rental in the overall schedule.

Efforts will be made so Existing Users to maintain total hours of use and, if possible, similar times of use.

Public Common Space (i.e. Lobby, Waiting Rooms and Grounds etc)

Use of Public Common Space is not included in the facility rental and will not be permitted without prior arrangements. These public spaces are to remain public gathering spaces free from third party influence.

Conditions Regarding Use

Indoor Space Requests

Booking requests for additional indoor space must be received in writing using the prescribed forms seven days in advance. Verbal requests will not be taken.

Pre-Empting Use

The SCRD reserves the right to alter / pre-empt use to accommodate Special Events. The SCRD will attempt to include the Special Event schedule in the regular allocation process. For events planned after the allocation process, the SCRD will attempt to give 30 days notification for events affecting regular season use and 60 days notice for

events affecting Tournaments or Events. Efforts will be made to accommodate pre-empted users with alternate use times and/or facilities.

Cancellation of Use by the User
If a group books indoor space during the „Annual Season" they are required to pay all related fees without refund. Times booked and not used will be charged the regular rental rate. Cancellations and refunds may be considered for a medical reason, if a letter from the doctor is provided. Cancellations may also be considered due to unforeseen emergency situations.

No Shows/Absenteeism
Indoor space bookings are tracked by SCRD on an on-going basis. If groups book an indoor space and do not attend their sessions the SCRD Program Coordinator will be informed and asked to review the situation. Persistent no-showing may result in cancellation or adjusted allocation of future bookings to ensure maximum community use and participation.

Further Booking information

Payment Schedule

Deposit / Damage Deposit
Damage deposits for regular on-going user groups are not required. Damage incurred by user groups will be charged to their Activenet account. The minimum charge applied to remedy a vandalism incident will be $200, regardless of the extent of the vandalism. Should the cost of repair exceed $200, the User will pay that amount within thirty (30) days of assessment, and may lose of the indoor space at the SCRD"s discretion.

Payment Options for on going users

- Users may pre pay
- Users may be invoiced and pay upon the fifteenth day of the following month.
- Users may set up a payment plan using their credit card.
- User may also set up a suitable payment plan monthly, or bi-monthly.

Insurance Requirements

- Users of the indoor space must obtain Comprehensive General Liability Insurance protecting the Sunshine Coast Regional District and the User against liability for bodily injury, death or property damage, arising out of the activity. The minimum limits shall be $2,000,000 inclusive per occurrence, maximum deductable $500 per occurrence, with a cross liability clause.
- Acceptable proof of insurance must be received by the SCRD prior to the use of any facilities covered under the rental agreement.
- Staff may use their discretion to waive insurance requirements for small scale low risk activities.

Note: the information above satisfies the SCRD"s minimum insurance requirements- the SCRD does not warrant that this insurance is adequate for the rental group"s needs. The SCRD has the ability to sell special event insurance through All Sport.

Schedule A

Time line for Annual Indoor Space Allocation

- Annual Season scheduled from Sept 1st to August 31st
- Invitations to ongoing users mailed out in May along with Newspaper Advertisement requesting proposed new users.
- User group meetings in July
- Final allocation/permits sent out before the end of July

Sunshine Coast Regional District

Recreation and Parks Allocation Policy

4/30/2015

Statement of Intent

Sunshine Coast Regional District (SCRD) facilities are publicly funded. The SCRD strives to schedule facilities in the best interest of the taxpayers, users and the communities they serve in the most cost effective, efficient manner.

SCRD Recreation Services is responsible for managing the allocation of SCRD recreation and parks facilities annually to reflect population, registration, utilization and participation patterns, as set out in this policy and under the guiding principles of the Parks and Recreation Master Plan, SCRD Board Bylaws and Operational Requirements.

Identified in the 2014 SCRD Parks and Recreation Master Plan recreation programs, services and facilities are essential to quality of life. The social, cultural, community development benefits and the current financial plan of the SCRD are to be considered in the allocation of SCRD facilities.

The needs of existing users are to be balanced with a proactive consideration of emerging trends in programs and services for residents and visitors to the Sunshine Coast.

Code of Conduct for all SCRD Recreation Facilities

Users of SCRD facilities must adhere to the SCRD Recreation Facility Code of Conduct.

PATRON CODE OF CONDUCT
FOR ALL SCRD FACILITIES
"We strive to ensure that all persons are treated with
DIGNITY, RESPECT, HONESTY & FAIRNESS"
It is everyone's responsibility to report witnessed misconduct.
Behavior will not be tolerated, ignored or condoned if it is:
Aggressive, offensive, abusive or harassing or interferes with another person's enjoyment of recreation facilities or impedes Staff's ability to conduct business.
Together We Make All Recreation Safe

Proposed events and bookings that may contravene the facility code of conduct may be denied access to facilities based on the discretion of the Recreation Services Manager or designate.

Role of the SCRD

The SCRD working within a community development philosophy, is a provider, protector, planner and community builder. Within these roles the SCRD accepts responsibility to work with community members, services providers, teams and individuals to foster growth and participation.

Community development within these roles could change over time depending on many circumstances.

The SCRD could be the *provider* of a program today or act as a *facilitator* in the future. The SCRD could support a community group in a variety of ways to deliver programs and services. The key is the needs of the community being met through a variety of means that could change over time.

General Conditions

Application Requirements

Groups, Teams, Community Groups or individuals interested in booking SCRD Recreation Facilities, Hall and Fields on a regular basis may contact SCRD Recreation Services for information @604-885-PLAY (7946)

Use requested on a regular basis should indicate past participation numbers and forecasts for the upcoming season/year in keeping with the format provided by the SCRD.

In order to be considered, applications for use must include the following information in the format requested on application forms:

- Numbers of users
- Type of booking; Type of activity
- Residency of individual users
- Levels of use (past year and projected for upcoming year)
- Other information that may be reasonably be required

Priority of Existing Users / Consideration of New Use

New regular user groups should forward their requests to be considered into the development of facility schedules.

Existing User Groups will be considered to maintain total hours of use and, where possible, similar times of use.

Priority of Leagues (*Relates to Ice - Adult groups*)

Expansion of existing Leagues will be considered before new users serving the same general purpose, whether Leagues or independent Groups.

In order to be given the status afforded Leagues, all Leagues must verify the provision for public access to new membership opportunities.

Any Group applying for expanded use will considered more favorably if provisions are made for public access to membership.

Conditions Regarding Use

Facility Requests

Requests for additional facility time must be received in writing using approved documentation a minimum of 30 days in advance. This includes adjusting, adding or transforming from season to season. This also applies to application for special events. Shorter notice may include additional administration fees. Verbal conversations will not be considered as a request.

Pre-Empting Use

The SCRD reserves the right to alter / pre-empt use in order to accommodate special events.

The SCRD will attempt to include the special event schedule in the regular allocation process.

For events planned after the allocation process, the SCRD will make every effort to notify the groups affected with 30 days notification for events affecting regular season use.

The SCRD will attempt to provide 60 days notification for events affecting tournaments or events. Efforts will be made to accommodate pre-empted users with alternate times of use.

Cancellation of Use by the User

Once facility bookings are complete and issued, a permit payment is required.

Users will be charged for facility time as booked unless a replacement renter is found. The SCRD reserves the right to move groups in to unused time without refund to the original renter until a replacement is found.

No Shows/Absenteeism

Bookings are tracked by SCRD staff on an on-going basis. Persistent no-shows may result in cancellation of all booking alternate allocation of facilities in the future.

Insurance Requirements

Users of the SCRD facilities must obtain and maintain a current account during the time of all facility bookings, Comprehensive General Liability Insurance protecting the Sunshine Coast Regional District, Facilities used and the Leaser against liability for bodily injury, death or property damage, arising out of the activity.

The minimum limits shall be $2,000,000 inclusive per occurrence, maximum deductive $500 per occurrence, with a cross liability clause. Acceptable proof of insurance must be received by the SCRD prior to the use of any facilities covered under the rental agreement.

Please note: The information above satisfies the SCRD's minimum insurance requirements- the SCRD does not warrant that this insurance is adequate for the rental group's needs.

Please note: The SCRD facilitates a per activity liability insurance through an independent provider. The purchased insurance protects the facility user for any Property Damage and bodily Injury caused to 3rd parties arising from the facility user's activities for up to $2,000,000 inclusive per occurrence and carries a $500 deductible per occurrence.

User Fees/Rates

In keeping with the SCRD Financial Sustainability Policy User fees will be reviewed annually and any changes will be recommended to the Recreation and Parks Services Advisory Committee prior to the SCRD Board for adoption. Rates are contained within Bylaw 599-Community Facilities fees and charges and Bylaw 356-Parks Regulations and fees.

SCRD staff work with groups to assist in developing programs at SCRD recreation sites. Assisting the development of new programs and increasing community capacity is a vital role in the SCRD plays as detailed in the Parks and Recreation Master Plan.

New groups looking to start up or existing groups looking to begin a new type of program should discuss program options with SCRD staff. Program development assistance may be available for the purpose of implementing valid and viable programs to grow into a self-sustaining group.

Accounts

Before allocation requests can be considered all users applying for facility time accounts must be paid in full, and must maintain their account current with no arrears status on a monthly basis throughout the year in order to be considered an existing user. Failure to do so could impact the ability of the user to continue renting SCRD facilities.

Deposit / Damage Deposit

Damage deposits for regular on-going user groups will not be taken. Damage incurred by user groups will be charged to your SCRD Facility account.

The minimum charges applied to remedy a vandalism incident are:

Ice/Indoor Spaces:	$200.00
Halls	$150.00

An administrative fee of $30.00 will be charged regardless of the extent of the vandalism.

Should the cost of repair exceed the listed amount, the User will pay that amount within thirty (30) days of assessment, or face loss of facility time to cover costs at the SCRD's discretion.

Communication

Communication between those booking facilities and staff is vital to ensuring the smooth flow of information.

Each organization or individual booking facilities must have one official designate for the purpose of facility booking and contact.

Users must have an agent who is the main contact in regards to contracts, scheduling, permits, and responsible for payment(s). The SCRD will also accept up to three contacts for Major users including leagues or large youth groups. These contacts are normally in-charge of scheduling, tournaments or special room bookings.

Allocation Process

The **process of allocation** is designed to assist all parties' respectful, fair and equitable access and use of SCRD facilities.

The SCRD recognizes:

- The needs of groups to have knowledge of what is generally available in order to plan upcoming use
- The responsibility of groups to make commitments, enabling others to build their plans

Annual Allocation Timeline / Process

The specific timeline of the process will be determined on an annual basis by the SCRD. Users are responsible to meet timelines outlined each year, failure to do so will result in no time being available. Timeline for current seasons are listed in sections below:

A Ice Facilities
B Dry floor
C Indoor Spaces/Halls
D Fields

Bookings will stay the same each year as a starting place for allocation discussions. Requests for changes/increases etc will be discussed at the user meetings with SCRD staff and appointed committees.

Appropriate Uses / Priorities in Allocation

Effective and efficient utilization of time and space are essential to the operation of facilities in accordance with the SCRD financial plan.

Existing use of the facilities is considered to be the base from which allocation occurs, changes instituted by the SCRD to re-allocate according to community priorities should only be the result of careful consideration of the existing schedule.

User groups should reference the schedules from the previous season as the starting point for the new season.

The SCRD reserves the right to adjudicate allocation priority levels when the facilities are booked to full capacity or when re-allocation benefits multiple groups.

Priority in allocation shall follow the order established below. However, no single User or category of use should unduly inhibit use by others. Users of higher priority will also use some less desirable times and may not receive the total hours of use requested. The SCRD may review weekly days allocated if in fact growth within a certain group(s) is inhibited.

Allocation Priority for Ice/Dry Floor (A) and (B)

(1) Special Events

The SCRD recognizes the significant social, cultural and economic contributions Special Events provide to the community. Due to the 'special' nature of Special Events, priority consideration in scheduling and / or pre-empting use may be required.

(2) SCRD Public Programs

Public Programs **(Registered or Drop In)** and community access are recognized essential to quality of life. They are an important part of facilities use, and are considered a high priority.

(3) Youth Groups

It is recognized that youth use is, in balance, a high priority on a regular basis.

Youth Sport Associations have a responsibility to offer membership equally to the general public who meet the mandate of that organization (skill level, age, gender, etc.).

(4) Adult Leagues

Leagues are a group of teams with proposed rosters that could reach 20 or more members. It is recognized the need for a League to follow a balanced schedule. There is value in providing an opportunity for community members to participate in an organized activity. A League holds an opportunity/openness for new members to join.

Leagues are the highest priority of adult use in **consideration of new available time and / or growth opportunities**. Priority is given to existing leagues ahead of new leagues competing to serve a similar function. The minimum number of teams required to constitute a league is four.

Leagues must have an executive committee structure and appointing a representative to communicate with the SCRD. Adult Leagues with four or more teams also become a Major User (Any User Group utilizing five or more hours of regularly scheduled ice per week.)

(5) Independent Users

There is community recreational value in individual sport groups, as not all sport users desire the competitive or structured environment of a league. Independent Users run a self supervised activity with less structure and rules of a League. Independent Users normally fall under a closed club activity with less vacancy for new members and normally have a set number of members taking part in each session normally maxing out at 20. An independent user normally may be considered of a Major User depending on the amount of regularly scheduled ice per week.

(6) Schools

Schools within the Sunshine Coast School Districts are recognized as users with interest in recreational, instructional and special event programming. This priority may be adjusted with a Joint Use Agreement with SD # 46.

(7) Commercial Event
Large scale commercial events such as: trade shows, sales, ticketed events

Allocation Priority Halls and Indoor spaces (C)

(1) Special Events

(2) SCRD Public Programs

(3) On Going Rentals

(4) Casual or One Time Indoor Space Users, *including Weddings, Meetings, Birthday Parties*

Allocation of space will follow the priority list if a facility use has been canceled by other groups.

Allocation Priority Fields (D)

(1) SCRD Recreation Division public and group programs

(2) Youth programs (youth league)

(3) Adult programs (adult leagues)

(4) Community groups

(5) Commercial groups

Section A - Ice Facilities

It is recognized that use of the SCRD facilities in some cases have traditionally been predominately male. The SCRD accepts strives to attain gender equity in facility allocation and use.

Arenas are operated based on demand of facility user groups. Arenas will be operated when variable costs of operation are equal to or less than the revenue generated from user group bookings.

To support an efficient operation and allocation the following seasons have been identified.

Seasons of Use

- **Shoulder Fall** First weekend of September to the last weekend of September.
- **Main Regular** First week of October to the last weekend of February *
- **Shoulder Winter** Last weekend of February to the first weekend of March
- **Spring** The second week of March to the last weekend of May.
- **Summer** The first week of June to the end of August

* Ice surfaces (up to 2) are only guaranteed during the Main Regular Season. All other seasons ice is based on demand of user groups and their ability to generate revenue equal to or greater than variable costs of operation.

During all seasons the SCRD has the right to restrict ice availability based on demand and does not guarantee ice year around. Ice restrictions to one arena will be made with 45 days written notice of changes to facilities.

Main Regular Season allocation is based on schedules from the previous year. During all other seasons the schedule from the previous year may be considered.

***During holidays and/or the shoulder seasons the SCRD after timely communication (minimum of 14 days) has the ability to adjust user schedules to fill schedule gaps.* User needs will be considered in advance.**

Time line for ice allocation process

User Groups will be sent an email invite four weeks prior to the scheduled meetings

- **Shoulder Fall** First week of June
- **Main Regular** Second week of June
- **Shoulder Winter** Last week of November previous year
- **Spring** Second week of January
- **Summer** First week of April

Hours Determining Prime Time vs Non-Prime

Monday – Friday	5:00am-3:30pm	= Non Prime Time
Monday – Thursday	3:30pm 12:00am	= Prime Time
Friday	3:30pm-1:00am	= Prime Time
Saturday	5:00am-12:00am	= Prime Time/Non Prime Time after midnight
Sunday	5:00am -12:00am	= Prime Time/Non Prime Time after midnight

Arenas are scheduled to be <u>ONLY OPEN 30 MINUTES</u> prior to the start of all on ice rentals.

Groups requiring facility access more than 30 minute prior to the ice rental, will incur any applicable fees.

Ice Cleans

<u>Safety</u>

Safety is of utmost importance. If it determined by staff to the ice is not in a safe condition for immediate use. User Groups will not be charged for the time required for 'Safety' cleans.

<u>Courtesy</u>

If a cleaning of the ice at the User's request, but not immediately required for the safe use of the ice, as determined by the SCRD. The time required for 'Courtesy' cleans will be charged to the User Group requesting the clean as part of their regular ice time.

<u>Scheduling</u>

Ice clean schedules will be determined by SCRD staff taking into consideration the impact each group puts on the ice, therefore SCRD staff will review the ice clean schedules to ensure industry standards are met for the safety of the Users.

<u>New in 2014/15 season for youth groups</u>

The ice will be cleaned at the start of each block of ice however youth groups will be charged for the full block including ice cleans. Please see new ice rates in Bylaw 599. Youth groups will be asked to provide a regular ice clean schedule. Changes to the regular schedule must be communicated to Arena staff in a timely manner.

Ice Clean Rational

Men's and Women's Adult Hockey either League or Individual

Ice cleans for Adult Groups including Women's Hockey, Men's Hockey either League or individual will be decided by SCRD staff. Industry standards allow groups to play a maximum of 1.25 hours without an safety Ice clean. If groups prefer a midsession clean they will be responsible to pay for the time.

Youth Groups – Minor Hockey/Skate Club/Speed Skate

Ice cleans for youth are scheduled by the Group Schedulers in agreement with SCRD staff.

High Impact
Men's Adult Hockey
Minor Hockey Midget Rep & Midget House *
Skate Club with jumping sessions

*Ice cleans for Midget Hockey Groups (post second period) have been set as a mutual agreement between the user and the SCRD. The ice cleans are paid for by the user. The ice cleans are not mandatory however they do provide a higher quality of ice.

Medium Impact
Minor Hockey - Peewee Rep – Bantam - Bantam Rep

Low Impact
Skate Club
Speed Skate
Women's Hockey
Minor Hockey Peewee House and lower

Low Demand Ice

Use of early morning ice time

In the event that demand on prime time ice exceeds the availability of same, user groups requesting five hours or more per week may be required to take up to 20% of less desired ice time. Less desired /early morning time could include ice before 9:00am on school days and before 8:00am on weekends.

Use of late night ice time (adult groups)
In the event that demands on prime time ice exceeds the availability of same, user groups requesting five hours or more per week may be required to take up to 20% of less desired evening ice. Less desired evening ice could include ice after 10:00pm on weekdays and weekends. This relates to the philosophy regarding fairness and growth. All adult groups booking *5 hours per week or less* may be asked to use an equivalent percentage of less desired ice time.

Payment Schedule for Ice Facilities

Bookings are requested and a permit is prepared confirming dates and times booked. These are sent to users on a per month basis. Payment plans are set to be due at the end of each month.

Permits are the contracts and invoices are automatically reflected from the permits. If groups ask for additional ice or floor time it will be noted in the original permit and reflected in the invoice.

Invoice payments are due when received unless otherwise noted.

All accounts must be maintained in a current status (without arrears) to continue access to SCRD facilities.

Section B - Dry floor

Seasons of Use

- **Spring/Summer** – The first week of April to the first weekend of September

During the Spring Summer Seasons two dry floor surfaces may be available dependent on the demand set forward by the ice users.

The SCRD has the right to restrict dry floor availability to one arena. If doing so, the SCRD will provide 45 days written notice.

Please note: GACC ice install normally takes place in early August. Sechelt ice install normally takes place mid September.

Spring/Summer Season allocation is based on the previous scheduled year.

Time line for allocation process

User Groups will be sent an email invite four weeks prior to the scheduled meeting.

- Dry Floor Allocation Spring and Summer Season – Third week of January

Arenas are scheduled to open 30 minutes prior to the start of all floor rentals.

Groups requiring facility access more than 30 minute prior to the floor rental, will incur any applicable fees.

Floor sweeping & cleaning

Floor sweeping is done after each day of use. Floor scrubbing is done every three weeks or unless deemed necessary.

Food or Beverages

Food or beverages are not permitted on the dry floor.

Payment Schedule Dry Floor

Bookings are requested and a permit is prepared confirming dates and times booked. These are sent to users on a per month basis. Payment plans are set to be due at the end of each month.

Permits are the contracts and invoices are automatically reflected from the permits. If groups ask for additional floor time it will be noted in the original permit and reflected in the invoice.

Invoice payments are due when received unless otherwise noted.

All accounts must be maintained in a current status (without arrears) to continue access to SCRD facilities.

Section C - Halls/ Indoor Spaces

This section refers specifically to SCRD Community Halls and Indoor Spaces at SCRD Recreation Facilities.

Seasons of Use

Annual Season scheduled from September 1st to August 31st

The starting point for allocation is based on the schedules from the previous year.

Time line for Hall and Indoor Space allocation

- Invitations to ongoing users mailed out in May along with Newspaper advertisement requesting proposed new users.
- User group meetings to be held in June
- Final allocation/permits sent out by Mid August prior to the beginning of the new annual season

Payment Schedule

Users may pre pay or payment plans are available to those who attend allocation meeting and/or are designated as ongoing users.

Bookings are requested and a permit is prepared confirming dates and times booked.
Payment plans are set to be due at the end of each month.

Once payment plans are created, cancellation of time will not be permitted except in extenuating circumstances.

Permits are contracts and invoices reflect the permits.

Permits are a record of booking. It is asked that groups attending halls carry a copy of signed permit with them when using halls.

If groups ask for additional hall bookings will be noted in the original permit and reflected in the invoice.

Invoice payments are due when received unless otherwise noted.

All accounts must be maintained in a current status (without arrears) to continue access to SCRD facilities.

Hall bookings will have a 15 minute buffer built in between bookings as to allow for a caretaker check between bookings.

Section D - Fields

Seasons of Use

Fall/Winter	September 1 to March 31
Spring/Summer	April 1 to August 31

The starting point for the Fall/Winter and the Spring/Summer seasons during allocation are based on the schedules from the previous year.

Time line for Field allocation process

- E-mails are sent to previous users in mid January and mid July requesting their submission of field requirements for the upcoming season, including regular use and special event requirements. Groups are notified of the upcoming field use allocation meeting,
- One ad is placed in the local paper advising the general public.
- User groups arrive at the meeting with field booking requests, and compare to previous year's schedule. Schedules are set up as follows:
- Field Allocation for Fall/Winter Season - Second Wednesday of July
- Field Allocation for Spring/Summer Season – Second Wednesday of February

Field Condition updates

An email is sent to all ongoing field users every Monday and Friday. Conditions are also updated on the SCRD website.

Field Courtesy

During the Fall/Winter and in regards to soccer, practicing must take place off the pitch.

Field Maintenance

All fields are cut once to twice per week. Field maintenance including fertilizing, slicing, top dressing and over seeding is set to be done without interference to user groups. If a maintenance job is going to interfere the SCRD would notify the users in a timely manner.

Payment Schedule

Invoice payments are due when received unless otherwise noted.

All accounts must be maintained in a current status (without arrears) to continue access to SCRD facilities.

Definitions

Major User Group: Any User Group utilizing five or more hours of regularly scheduled bookings per week.

Ongoing User Group: Any User Group utilizing five or more hours of regularly scheduled time monthly or a user that has weekly or biweekly use of indoor space on a regular basis.

Non-Prime Ice Time: Times designated by the SCRD as less desirable. To facilitate less demand on more popular times NON-Prime times are to be rented at a lower cost.

Prime Ice Time: Popular Times as determined by the public and designated by the SCRD to be rented regular rates.

Tournament Use: A rate established specifically for all rentals applied for and used for community tournaments, shows and competitions, and similar special events. Individual Event Games do not qualify as Tournament Use.

Event Games: One-time games or groups of games, such as an all-star game, exhibition game with significant public appeal, and / or games that bring 'off Coast' participants. Event Games must create an economic and entertainment value to the community.

Special Events: Tournaments, tradeshows, entertainment events, sports exhibitions, etc. Event Games are considered Special Events at the Arena's discretion.

Leagues: Specific recognized Groups of teams representing traditional or recognized sport use. The minimum number of teams required to constitute a league is four. The SCRD may accept exceptions to the four-team minimum for a specified period of time, to enhance the development of new leagues.

Leagues must have an executive committee structure and appoint a representative to communicate with the SCRD.

Independent Users: Individual sport teams and recreational groups.

Existing Users: Users who have maintained regular bookings for the previous season and have maintained on-time payment of fees and appropriate general conduct.

Permits: Permits are the confirmation of a booking and agreement between the renter and the SCRD. Permits state dates, times and facilities that have been reserved and outline specific checklist items that the renter must provide prior to the rental date, including fees to be paid and facility information. It must be signed agreeing to terms and conditions and should be reviewed to ensure correct information.

Active Net: Active Net is SCRD facility and registration software. Active Net is used to book facilities, create permits and invoices and process financial transactions.

SCRD Introductory Notes:

Welcome, thank you, acknowledgement that the meeting is being held in the swiya of the *shíshálh* Nation.

SCRD's provision of recreation services is guided by:

- A strategic plan –
    - vision: community for all generations connected by our unique coastal culture, diverse economy and treasured natural environment
    - mission: leadership, quality services, responsive
    - priorities to ensure fiscal sustainability, support sustainable economic development and facility community development
    - values of collaboration, equity, respect and equality and transparency
- Parks & Rec Master plan (2014)
    - Strengthen fabric of community
    - Motivate individuals and families to be healthy and active by facilitating a variety of rec opportunities
    - Be a good environmental steward
    - Contribute to diverse and sustainable economy – support local businesses, through employment, volunteerism

Difference in ice vs. dry operation

Exploring the key differences between dry floor and ice: costs with staffing levels and utilities, wear and tear of building, and the work that can be accomplished during each season.

STAFFING LEVELS:

Dry Floor

- When there is no booking or public entering the arena, there are no staffing requirements
- Staffing is only required for the time of a rental
- Plant checks take place when there are patrons in the building

Ice

- We are regulated by Technical Safety BC to have:
    - staff in the building for 7 hours if patrons are in the building
    - 3 plant checks completed on days the arena is closed (which equals to 7 hours of call outs
- Arena Workers – support rentals and programming

UTILITIES:

Dry Floor

- Less use of water (ice resurfacing, plant cooling water, hydro and gas – facility is not heated during summer months)

OPERATIONAL TIME:

- Dry floor allows for some additional time to complete preventative and necessary maintenance

WEAR AND TEAR OF BUILDING:

- Depending on what activities are happening there could be less wear and tear during dry floor

- **Some of the new opportunities (joint use)**
    - In 2018, the SCRD and the SD 46 operationalized a joint use agreement support both organizations' priorities of healthy lifestyles and efficient use of our publicly-owned facilities.
    - The agreement recognizes that it is in the interest of the community to make the best use of public resources by avoiding duplication of facilities, land, services and equipment.
    - SCRD is making use of SD spaces for some programs, which offers up new opportunities for other uses in our facilities (including, for example, new programs or expanded rentals).
    - SD is coming in and using our facilities – ice and dry floor.
    - SD46 is a priority user, but goal with this agreement is to not disrupt existing users. So far this is working (on both sides).

- **Sharing some thoughts about the lead time involved in making change**
    - Depending on the change or type of change a user group is seeking, there are some key milestones to keep in mind:
        - Queries – may require research & planning time to answer questions (insurance, technical regulations, staff scheduling, etc.) so 2-3 weeks lead time is helpful for us to respond
        - Small projects – depending on the project a minimum of 2-3 weeks would be beneficial and helpful and we work as a team so we look for time for internal communications

- Depending on the risk, costs, and complexity, the project may require Board approval. This would require a scoping discussion and planning at least a few months ahead of time

- Depending on the size of the project – work plans are being discussed and approved with budget cycles

- Budget implications – discussions and planning begins in early fall for approval in Mid-March and implementation in April of the following year

- Allocation policy and procedures have some lead time requirements and timelines for requests, but staff try to accommodate as much as possible.

Four questions raised for dialogue and user groups individual responses:

1. **What is working well?**

Pickle Ball:

- Value the assistance from the SCRD
- Pickle Ball can administer the program without the extra use of staff
- All arena users have a designated schedule for use

Rusty Cranks:

- There is lots of recreational activity on the coast
- That there are two arenas on the coast
- Availability of ice times is good; drop in; some self-management
- They look after themselves

Skate Club:

- There have been moments where there has been movement in a positive direction- such as extended ice in August 2017 and April 2018.
- The SCSC has doubled its membership over the past 5 years. The families and skaters and dedicated and tenacious and require the same opportunities for training and advancement for their children that every other community in B.C provides for their youth.
- Predictable schedule
- Increased revenue that is brought in from their rentals
- Youth are supported in skating
- The skate clubs offer free events – community involvement and contributions
- Retention of families and youth
- We appreciate this meeting being held and the chance for dialogue. We hope that this leads to increased understanding/acknowledgement of what the SCSC is requesting and why Spring and Summer ice is so important to the Club as a whole, the individual skater

(figure skating being an early specialization sport as well as a year round sport) and the community at large (the positive trickle effect of healthy productive youth, keeping money in our community, having youth train in other areas by being on the Coast- assisting their school sports teams because they are not travelling to other communities etc.).

- In order to answer what is working well, strides need to be made in increasing the number of months ice is made available and it has to be done in a timely fashion.

Co Ed Hockey:

- Niche – new players, all activities schedule fits and cost fits
- Season is adequate
- 40 people on wait list
- Getting schedules done early
- Good fees that make it possible for people to play

Men's League:

- Brenda Rowe noted that she is phasing out of role, but attended as lead point of contact not available for meeting
- Early scheduling with Tom
- Fees are really reasonable

Minor Hockey:

- Popular – expansion/growing
- Great attendance at games
- Tournaments, training, certifications
- Two camps delivered
- Enjoy recognition from both provincial and national level

Sunshine Coast Quilters Guild:

- Gibsons and Area Community Centre best event venue; only venue large enough on the Coat
- Facilities are large and are adequate size for their needs
- Communications with the SCRD and cooperation
- Their needs are met

Roller Girls:

- Facility is great
- Offer free skate program recruiting/training
- Bout season – May through August
- Games throughout the summer
- Like the current dry floor schedule
- Able to complete early-season training required to satisfy insurance requirements for bouts

- Do not have any other options to host games, practices or tournaments, since the winter space they have is too small for a track, or an audience

Lacrosse:

- April to June season
- Can only have on dry floor
- Current commitment to the dry floor schedule
- Dry floor schedule fits with box schedule

2. What does the future look like?

Pickle Ball:

- Continued and fair sharing of dry floor and ice usage
- Confirmed schedules
- A year-round dry floor only facility

Rusty Cranks:

- A growth in demographics = more players

Skate Club:

- Increased ice - (ice remaining in one rink from March- June and put back in at the beginning of August) means that our Club continues to grow.
- We will be able to follow the Skate Canada legislation requirements of 48 weeks of training. Our skaters can progress at the same rate as other skaters elsewhere and have the same chance at competitions.
- We can offer Spring and Summer programming, hold seminars and workshops, we would be booking more ice (more revenue to the SCRD), we are keeping money in our community instead of spending money elsewhere for ice, meals etc.
- The youth in this community feel supported and valued. They are spending their time being engaged in healthy activities. We are creating productive citizens who will make our community that much greater.
- Children can attend school from April-June (which they are currently not able to do) and other extra -curricular activities because they can train in their own community and not have to travel 12 hours for 2 hours of ice. Our skaters are well rounded athletes- they participate in ballet, gymnastics, track, basketball etc. but they miss out on being able to participate when they have to travel to other communities.
- The Club continues to offer community events such as the Elvis Stojko ice show offering a rich cultural component. The Club offers many FREE events throughout the year to the community- Halloween skate, Christmas Skate, Bring a friend, Try- It-Free. We give back to the community- last year sponsoring a local family in need at Christmas Time, collecting food bank donations and so on.
- The Sunshine Coast will continue to grow and attract young families based on the recreational opportunities we are able to offer. Families have moved off Coast and

families have been deterred from moving here due to lack of opportunity for their children.

Co-Ed Hockey:

- Growth – an additional ice slot required
- Potential for a second group of co-ed hockey players

Men's League:

- Want longer ice season (spring)
- The leaque has potential to grow if players' behaviour and need for officials is resolved

Minor Hockey:

- 38 weeks ice season was successful 2017/18
- 36 weeks this year, next year 46 week season mid-July to the end of May
- Appetite for sports on ice surface
- Looking at all female team on the coast – lots of interest
- Cultural exchange
- Multi-sport registration
- All recreation groups on the coast have the facilities that they need to function

Sunshine Coast Quilters Guild:

- Growth and opportunity

Rollers Girls:

- Seeking to grow 2nd team, perhaps a coed or junior team

Lacrosse:

- Have ongoing commitment to the diversity of sports/dry floor and ops that are local
- Additional dry floor
- Outdoor box question: used for practices
- Variable schedules = loss of people
- If there is increased ice time awarded in Gibsons that would mean increasing traveling time for visiting teams. To compete in divisional play they would need to add the drive to Sechelt to the existing ferry time to come to the coast and compete with our athletes. Lower mainland teams already find it difficult coming to the Sunshine Coast.
- Young athletes would need to travel further on a regular basis from both ends of the Sunshine Coast for regular practices and games. For example a family with two players under the age of 12 driving from Madeira Park to Gibsons three times a week to participate in a sport they love. This is the potential single scenario if floor time is not available in Sechelt during box lacrosse season.

- Decreases floor time means decreased geographic catchment for new player to register and try lacrosse. This would be due to increased travel time. Decreased registration would be detrimental to the viability of Lacrosse on the Coast. Any decision that supports this end demonstrates a lack of commitment to diversity in sport. Supporting healthy athletes with multi sport registration you would think would be a priority.
- If registration numbers decrease lacrosse players would need to play for teams on the lower mainland. I can tell you from experience those late ferry rides midweek are very challenging for a teenager who has high school early the next morning.

Garden Club:

- Need ability to schedule further in advance - booking at least a year in advance for one major event is critical to planning

3. What can SCRD contribute?

Pickle Ball:

- Continue to develop programs to meet the needs of all users
- Multiuse facilities
- Promote as multisport
- Encourage SCRD to continue to pursue other activities for dry floor

Rusty Cranks:

- Scheduling that works with ferry crossing times
- Staffing at SCA – currently limited

Skate Club:

- SCRD can support the youth involved in ice sports by keeping ice in one arena 10 months of the year.
- SCRD can provide the non -profit youth sports with a predictable schedule that will allow the volunteers and Professional Coaches the ability to focus on programming and our athletes.
- SCRD can provide the non -profit youth sports with a predictable schedule that will allow the volunteers and Professional Coaches the ability to focus on programming and our athletes.
- SCRD can work with ice user groups in a timely efficient way taking into consideration ice user groups time frames
- SCRD can contribute by learning about the needs of its user groups such as:
    1. Figure skating being an early specialization sport- skills needing to be learned prior to maturation.

2. Figure skating is a year round sport, following LTAD model, National rules and regulations, Provincial Body BC Section Rules and Regulations, Societies Act, Gaming Control Act. We have paid professional coaches-so Employment Standards Act. Skate Canada Legislation)

- SCRD can follow policies already in place re: ice allocation such as youth groups before adults and ice in arenas if demand is there. Other communities put youth needs above adult needs- youth are training for future success, university scholarships, Olympics etc. They also have to attend school.
- SCRD may need to look at providing dry floor users with a space that suits their needs freeing up the ice arenas for ice sports.
- Shared from notes provided: "SCSC canvassed all candidates running for council re: their views on ice sports and ice user group's needs. 98% were shocked that needs were not being met. We had candidates who are now Mayor and council stating "they are 100% supportive of increasing access to ice sports for the youth on the SSC". Many saw the need for an extra dry floor multi use facility and saw the space at Sechelt Arena being able to accommodate this."

Co Ed Hockey:

- Expression of Interest to see if there could be another coach for co ed hockey

Men's League:

- Have a clear allocation policy and live by in a way that does not put the users against each other (has been bad historically) – don't go backwards
- Collaborate with all user groups
- Share interest in dry floor

Minor Hockey:

- Install drop boxes and equipment storage in both arenas
- Advertising in the recreation guide
- Building of a referee room at SCA (collaboration)
- Clearly identify/communicate the threshold for ice use to have ice in
- SCRD requirements for programming
- Facilitate schedule to allow for varied ages
- Scheduling conflicts with city (detail)

Sunshine Coast Quilters Guild:

- Need dry floor biannually for big shows in May

Roller Girls:

- Same or more of dry floor availability
- New facility

Lacrosse:

- It would be damaging to registration numbers if do not have access to both facilities

4. What can your group contribute?

Pickle Ball:

- Management and continued expansion of program
- Increase SCRD revenue with no impact to staff
- Ongoing commitment to promote Pickle Ball on the coast

Rusty Cranks:

- Grow the group of participants
- Willing to partner

Skate Club:

- Our group will continue to run successful programs and will continue to increase our membership.
- Ice sports are thriving on the SSC. We have first Class Professional Coaches, a functioning board, and dedicated skaters who with community support can go onto be Provincial/International medalists.
- We have proven our ability to pay for the ice we request and have proven our ability to work with other ice user groups.
- Our group will be contributing to the community as a whole in ways described in answer number 2- cultural enrichment, providing free community events, keeping money on the SSC, holding seminars and summer camps increasing tourism on the SSC and the trickle effect this has on restaurants, coffee shops, retail stores etc.
- We will continue to serve the needs of 6 different programs with members from age 3 to 50 plus.

Co-Ed Hockey:

- Continue to fill a niche and grow the program
- Sports development

Mens League:

- Collaborate for the betterment of all users – resources in the group to help with community project (dry floor) that can be resourced by the community members
- A large tournament for community that produces revenue for all
- Tired of arguing about ice
- Young coaches – minor hockey

Minor Hockey:

- Meet the threshold usage
- Program development
- Offer volunteer program

Sunshine Coast Quilters Guild:

- Aesthetic contribution to community
- Draw to community – regional and beyond
- Creative outlet for 120 members, draw beyond the community
- Training knowledge, socialization, community donations: raffle quilts
- Two day shows in the community every other year
- Learning opportunity for women especially

Roller Girls:

- Looking at more tournaments and training camps
- Alternative sport – unique audience

Lacrosse:

- Potential for youth to play different sports
- Lacrosse is growing in other area and has potential to grow on the coast
- Lacrosse is a national sport alongside of hockey
- In order to continue, it is important to remember that the users (teams) travel to the coast
- What we envision is ongoing commitment to diversity supporting a health community capturing both the majority and the minority. Shifting resources to a majority group diminishes us as community. It plays to allowing domination by those who have only their own interests at heart, not the interests of the entire community.
- We respect the desire for growth and improvement but not at the expense of others. We would like to see and feel supported by the SCRD in helping us promote the sport of lacrosse. Advertising our events, offering the time and space for lacrosse in their programs. We can offer equipment and the personnel, coaching to do so.
- We need increased signage regarding abusive behavior from fans and parents in the stands. This remains a cultural epidemic throughout sport in the arena.
- We offer affiliation with BCLA, LMMLC and the NLL these organizations are deeply invested in promoting the sport of lacrosse supporting the health and development of communities and individuals of all ages through recreation and sport. Canada stands out internationally in Lacrosse. We would like to be able to contribute to the base of programs that makes this happen.

Parking lot information:

- Another dry floor option (was mentioned several times from different groups)
- Lacrosse can only be held in arenas on the coast (not permitted elsewhere or space not adequate)
- Lacrosse boxes are used for practice only – not games
- Roller Girls – limited other places to practice when the ice is in… had to cancel a bout when ice was extended
- Skate Club: There is only one surface for our sport. We don't have the options of booking school gyms, halls etc. When ice is taken out of BOTH arenas at the same time for months at a time every year, our youth are displaced. They have no other option but to miss school and spend 12 hour days commuting for 2 hours of ice. Dry floor users have other options. It makes no sense to take ice out of both arenas to provide 2 additional dry floor spaces on top of what is already available. Especially when it is the youth of this community paying such a high price when this happens.

Attachment D

Historical Facility Scheduling/Utilization

Prior to presenting cost-benefit analysis, some historical and baseline information is provided.

Sunshine Coast Arena Ice Availability

On average, 98% of days are utilized during the season over years listed and an average 2602 hours per year are used for a combination of programming and rentals resulting in an average of 53% utilization of available hours.

Seasons	SCA Ice	Days Avail.	Days Used	Available Hours	Total Hours Used	Program Hours	Hours rented
2011/2012	Sept 26 - Apr 14	202	198	3636	1909.75	487.25	1422.50
2012/2013	Apr 15 - Sept 19	Floor Repair					
2013/2014	Sept 20 - Mar 30	192	189	3456	1779.75	390.50	1389.25
2014/2015	Sept 23 - Mar 29	188	183	3384	1763.75	352.25	1411.50
2015/2016	Sept 27 - Apr 3	190	185	3420	1738.53	358.50	1380.03
2016/2017	Sept 26 - Apr 2	189	186	3402	1848.25	328.75	1519.50
2017/2018	Oct 27 - Apr 27	183	180	3294	1895.33	232.00	1663.33
2018/2019	Oct 1	Late start due to the SCA condenser project					

Gibsons and Area Community Centre Ice Utilization

Seasons	GACC - Ice	Days Avail.	Days Used	Available Hours	Total Hours Used	Program Hours	Hours rented
2011/2012	Aug 15 - Mar 31	230	229	4140	2641.25	738.75	1902.50
2012/2013	Aug 13 - Apr 13	244	243	4392	3158.50	748.50	2410.00
2013/2014	Aug 12 - Mar 28	229	228	4122	2580.50	673.25	1907.25
2014/2015	Aug 18 - Mar 16	211	209	3798	2378.95	599.25	1779.70
2015/2016	Aug 21 - Mar 17	210	208	3780	2516.25	536.00	1980.25
2016/2017	Aug 22 - Mar 12	203	201	3654	2385.75	531.50	1854.25
2017/2018	Aug 5 - Mar 11	219	217	3942	2558.25	519.00	2039.25
	Early install due to user request / Elvis Stojko event						
2018/2019	Aug 20						

On average, 99.27 % of days are utilized during the season over years listed and an average 2602 hours per year are used for a combination of programming and rentals resulting in an average of 65% utilization of available hours.

Sunshine Coast Arena Dry Floor Utilization

Year	SCA Dry Floor	Days Avail.	Days Used	Available Hours	Total Hours Used	Program Hours	Hours rented
2013	April 8 - Sept 7	153	49	2754	577.08	13.00	564.08
2014	April 8 - Sept 13	159	87	2862	310.00	0.00	310.00
2015	April 7 - Sept 12	159	105	2862	425.50	212.00	213.50
2016	April 9 -Sept 11	156	103	2808	464.75	300.00	164.75
2017	April 10 - Sept 12	156	106	2808	441.75	254.00	187.75
2018	May 3 - Sept 19	140	80	2520	323.00	197.00	126.00

On average, 57% of days are utilized during the season over years listed and an average 424 hours per year are used for a combination of programming and rentals resulting in an average of 15.29% utilization of available hours.

Gibsons and Area Community Centre Dry Floor Utilization

Year	GACC Dry Floor	Days Avail.	Days Used	Available Hours	Total Hours Used	Program Hours	Hours rented
2013	April 19 - July 31	104	100	1872	549.00	211.00	338.00
2014	April 3 - Aug 6	126	116	2268	625.25	211.00	414.25
2015	March 23 - Aug 6	137	127	2466	725.50	320.00	405.50
2016	March 24 - Aug 9	139	116	2502	582.25	267.50	314.75
2017	March 18 - July 31	126	124	2268	551.25	276.00	275.25
2018	March 17 - Aug 7	144	114	2592	561.00	290.75	270.25

On average, 90% of days are utilized during the season over years listed and on average 599 hours per year are used for a combination of programming and rentals resulting in an average of 25% utilization of available hours.

Prime Time verses Non-Prime Time Rentals

This chart shows the differences for facility rentals being charged a prime and nonprime time rates:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Prime Time	3:30 pm - Midnight	3:30 pm - Midnight	3:30 pm - Midnight	3:30 pm - Midnight	3:30 pm – 1 am	5:00am- Midnight	5:00am- Midnight
Non-Prime Time	5:00am- 3:30pm	5:00am- 3:30pm	5:00am- 3:30pm	5:00am- 3:30pm	5:00am- 3:30pm	After Midnight	After Midnight

On average, rentals for ice and dry floor are relatively consistent through each year. A one week period during the same time from (2013-2018) was used to determine the average amount of prime time rental verses non prime time usage.

With the ice season, Gibsons and Area Community Centre showed an average of 74% of prime time rentals and 26% for nonprime time while at the Sunshine Coast Arena showed an average of 85% of prime time rental verses 15% nonprime time.

With the dry floor season, Gibsons and Area Community Centre showed an average of 81% of prime time rentals and 19% for nonprime time while at the Sunshine Coast Arena showed an average of 100% of prime time rental verses 0% nonprime time.

Attachment E

Interjurisdictional Comparison with Other Communities

A review of ice facilities in Powell River and Squamish (considered peer communities for recreation services) shows that these communities do not offer ice year-round.

Season	Organization	Facility	Ice	Dry Floor
2016-2017	SCRD	Sunshine Coast Arena	Sept 22- April 3	April 10 –Sept 12
	SCRD	Gibsons and Area Community Centre	Aug 22 - March 12	March 18 – Jul 25
	City of Powell River	Powell River Complex – Arena	Aug 9 – April 18	April 24 – July 30
	City of Powell River	Powell River Complex – Rink	Sept 23 – May 26	June 1 – Sept 13
	District of Squamish	Brennan Park Rec Centre	Aug 21- Apr 30	May 11 – Aug 7
2017-2018	SCRD	Sunshine Coast Arena	Oct 27 - April 27	May 3 – Sept 19
	SCRD	Gibsons and Area Community Centre	Aug 5 - March 11	Mar 17 - Aug 7
	City of Powell River	Powell River Complex – Arena	Aug 15 – April 15	April 20 – July 27
	City of Powell River	Powell River Complex – Rink	Sept 15 – May 15	June 1 – Sept 7
	District of Squamish	Brennan Park Rec Centre	Aug 21 - May 31	June 8 –Aug 12
2018-2019	SCRD	Sunshine Coast Arena	Oct 1 – Mar 31	April 6 – Sept 10
	SCRD	Gibsons and Area Community Centre	Aug 20 – Mar 17	Mar 23 - Aug 8
	City of Powell River	Powell River Complex – Arena	Aug 4 – April 23	April 26- July 19
	City of Powell River	Powell River Complex – Rink	Sept 21 – May 30	June 5 – Sept 9
	District of Squamish	Brennan Park Rec Centre	Aug 27- May 31	June 10 – Aug 5

Ian Hall

From:	Andrea Watson [redacted]
Sent:	Monday, February 04, 2019 7:48 PM
To:	Board Chair; Ian Hall; Janette Loveys
Cc:	Kate Turner; lesleigh farr
Subject:	Clarification on Extended Ice Season
Attachments:	SCRD Delegation Notes.doc
Follow Up Flag:	Flag for follow up
Flag Status:	Flagged

Good evening SCRD Board of Directors and Staff,

I am writing to clarify and apologize for any confusion my delegation may have caused.

In my delegation presentation at the bottom of page 2 underlined (I have attached a copy to this email for easy reference) The Sunshine Coast Skating Club, requested an extended ice season, which would have ice remain in one arena from March until the end of June and then have ice reinstalled at the beginning of August.

Despite figure skating being a year round sport, the SCSC are aware that we cannot afford the variable costs for year round ice ourselves and so the request of ice until the end of June was to mitigate skaters missing out on their education and other activities due to having to travel to train.

With the SCMHA not requiring ice in June 2019, the SCSC would like to confirm our request of ice remaining in the Sechelt Arena from the third week of September until the end of May and for ice to be reinstalled at GACC at the beginning of August until March.

This is the same schedule that SCMHA is also requesting. SCSC and SCMHA are committed to working together to give our combined 500 youth the opportunities necessary for growth and development.

We are supporting Minor Hockey's request of ice remaining in the Sechelt arena so that Hitman 7- A-side hockey tournament can go ahead with this tournament, which greatly assists youth organizations reach their variable costs.

Our hope is that we can rely on having a predictable schedule and continue working with the SCRD in a positive collaborative way. With predictability, both organizations can continue to strengthen and grow and ideally continue to extend our ice season on the SSC.

Thank you very much for taking this request into consideration. Your time and deliberation is greatly appreciated

Sincerely,
Andrea Watson.

SKATECANADA
SUNSHINE COAST SKATING CLUB

SCSC Delegation Handout

Andrea Watson (President of the Sunshine Coast Skating Club) appearing as delegate.

The Sunshine Coast Skating Club is a non-profit organization that has been instructing skating on the Sunshine Coast for over 30 years.
The SCSC offers 6 different programs- CanSkate (learn to Skate); Junior Academy (transition program between CanSkate and StarSkate); StarSkate (Learn to Train); Competitive Skate, and Adult Skate. We provide programs to members from age 3 to 50 plus.

The SCSC gives back to this community in many ways. We fundraise tirelessly to keep fees affordable, we provide free community events such as "Try it Free", "Bring A Friend", Halloween Skate, and Christmas Skate. We provide donations to the Food Bank and last year we sponsored a local family in need for Christmas.
The SCSC also provides the community with a Cultural component with shows such as Elvis Stojko and our upcoming Patrick Chan show. We have had International and Olympic Skaters such as Beres Clements and Larkyn Austman.

Over the years, we have worked tenaciously to increase our Membership. We have doubled our membership over the past 5 years to where we were 10 years ago when we had year- round ice. Ice sports are thriving on the Sunshine Coast. We have first class coaches, a functioning board, and a dedicated and talented group of Skaters who with community support (in the form of year-round ice) can go on to be Provincial/International medalists.

I wanted to bring to everyone's attention that Representatives from the SCSC have been appearing before the SCRD Board of Directors for the past 10 years asking for year -round ice to be re-instated.

Why is this necessary? Figure Skating is an early specialization Sport. This means that certain skills need to be acquired prior to maturation. Figure Skating is also a year-round sport. The SCSC is governed by legislative bodies such as Skate Canada, The Coaching Association of Canada, who sets out the Long-Term Athlete Development Model, and our Provincial Body BC Section Rules and Regulations to name but a few.
We have 2 paid Professional Coaches who have employment contracts. We are extremely fortunate to have two high level coaches on the SSC who have the qualifications to teach up to Olympic Level. At the time our coaches agreed to relocate here and teach at this Club we had year- round ice.
Since 2008, ice has been taken out of both arenas at approximately the same time. In Gibsons, it is typically the second weekend in March and Sechelt by the end of March/beginning of April.

Because of both sheets of ice being lost at the same time we are not able to follow the LTAD model and are not following guidelines set by Skate Canada of 46-52 weeks of training each year.
We are doing our youth a great dis-service by not affording them the same opportunities for training and progression as other communities. Every community in B.C has access to year-round ice except for the Sunshine Coast. When skaters reach the competitive level (which takes approximately 5 years from when they first begin to skate, so they have shown their dedication and intent at this point) they are not able to keep up with the youth who have year -round ice as they are training only half the time. Muscle memory is lost after only 2 weeks so when skaters are without ice for months they find themselves having to re-learn what they spent the previous year learning.

The only option available to our youth is to travel to communities with ice. This places a huge hardship on these young skaters and a great financial hardship on their families. Youth are missing school from April-June as they are spending over 8 hours travelling for 2 hours of ice. Skaters missed 108 hours of instruction in May and June of this year. They are also missing family time and the chance to participate in other extra curricular activities. They don't have the chance to be part of the school track team or volleyball and basketball team.

Increased ice is of huge benefit to the community. We are supporting our youth's participation in healthy activities. Athletes are learning leadership, motivation, resiliency, communication, growth, tenacity, commitment, and determination. All these attributes will serve them well as functioning members of society and will add to the enrichment of our community.
Year-Round Ice brings financial benefits to the community. Revenue from ice sports in 2017 was approximately $960,000 as opposed to dry floor revenue of approximately $44,000. Increasing ice allows us to keep our money on the SSC as opposed to travelling to other communities to purchase ice. It would allow us to hold summer camps and development camps and increase tourism on the SSC which benefits our restaurants, retail stores and so on.

<u>The SCSC is requesting an extended ice season that would leave ice in one arena from March until the end of June. Ice would then be reinstalled in one arena at the beginning of August.</u> We are requesting that this change commence in March 2019. We would like this to be the regular schedule moving forward. Having a regular predictable schedule will allow the volunteers and coaches to focus on scheduling, coaching, and the day to day running of the organization.

Having the current policy around ice allocation followed also provides certainty and predictability to our Coaches and Board of Directors.
Within the SCRD Recreation and Parks Allocation Policy of 2015, Allocation Priority is outlined in the following order-Special Events, SCRD Public Programs, Youth Groups, Adult Leagues, Independent Users, schools, and Commercial Events.
Other pieces of the Policy that is relevant here and not being followed is quoted below and can also be found on page 10 of the afore mentioned policy.

- "The SCRD strives to attain gender equity in facility allocation and use". Figure Skating being a predominantly female and year-round sport
- "Arenas are operated on demand of facility user groups". It has been communicated verbally and through email that spring/year-round ice is required by ice user groups
- "All other seasons, ice is based on demand of user groups and their ability to generate revenue equal to or greater than variable costs of operation". Ice user groups were

successful in working collaboratively and gaining and paying for extended ice in August 2017 and April 2018.

- The time line for the ice allocation process is outlined on page 10 and is also not followed.

We are requesting that our youth who go to competitions and represent the SSC are in turn supported by their community and are provided with equal opportunity for training, development, and advancement. Supporting our children means they are not forced to make a choice between missing school and training. They can benefit from being on school teams and participate in the school spirit.

What is crucial for you to understand is that our Skaters require a minimum of 10 months of ice to succeed. They should not have to miss school to train. Community support is vital in allowing them to participate in their everyday life of school and other activities while working towards their goals and dreams. We are investing in our youth. We have no other option when ice is taken out of both arenas at the same time. By taking 2 ice surfaces out to provide dry floor user groups with 2 additional options leaving our youth with no other option is not acceptable.
Providing one arena with ice still leaves dry floor users with one facility. The ice users do not have a preference to which arena would keep ice. As mentioned before, the extended ice season also benefits the community as it allows an increase in tourism by providing camps through the Spring and Summer.

Thank you for your interest in my request for extended ice. It is my hope that my time today increased your understanding of why Spring and Summer ice is so important to the Club, the individual skater, and the community at large. I would also like to acknowledge the work that has been done already with the SCRD partnering with SD46 to provide other options to the dry floor users as well as the water efficiency upgrade to the Sunshine Coast Arena cutting water to operate the plant by approximately 85%. It is my hope that these changes are a step in the right direction. I would like to extend an invitation to contact me by phone [redacted] or email [redacted] should you have any questions about any information I have shared today.

Ian Hall

From:	Kate Turner [redacted]
Sent:	Monday, February 04, 2019 5:24 PM
To:	Ian Hall
Cc:	Tom Poulton; Janette Loveys; Board Chair; Stu Frizzell; andrea watson; lesleigh farr; nicole hagedorn; Atom
Subject:	Arena Allocation Decision
Follow Up Flag:	Flag for follow up
Flag Status:	Flagged

Hi Ian,

Thank you for taking the time today to help clarify a few questions I had regarding an email that went out following the Thursday SCRD Board meeting. I can appreciate that we are all working together to come up with a viable, positive solution that will suit the needs of the multiple user groups. I wanted to confirm with you in writing, so there will be no further confusion on this matter, the schedule that Youth Ice Sports is requesting.

We would like to see the allocation of ice at the Sechelt Ice Arena until the end of May 2019 and then ice re-established at the Gibsons Ice Arena the beginning of August 2019. Moving forward we would greatly appreciate a secure ice schedule with similar dates:

Sechelt Ice Arena: Ice Allocation- Third Week of September until the End of May
Gibsons Ice Arena: Ice Allocation- Beginning of August until Mid March

I apologize for any confusion that may have arisen from requests- it is our hope that the near future would allow for growth of those dates- progressing to year round ice between the two facilities. We do understand that facility growth would be a big part of this progression- ie: An exclusive dry-floor facility in our community.

The Hitmen 7 A-Side Hockey Tournament would like to support Youth Ice Sports to the best of our ability by ensuring the variable cost is met for the month of April (especially this season). This will not be possible if the Sechelt Ice is removed this March. If enough notice is given next season, I would be happy to schedule the tournament at an earlier date, this year it is out of the question due to previous commitments and schedules. However, I believe that until an exclusive Dry-Floor Facility is in place, it is in everyone's best interest to keep the ice at Sechelt and remove the ice in Gibsons to allow for dry-floor allocation. I hope these other users have also expressed their best interests.

The chiller replacement at the Sechelt Ice Arena is an important upgrade to the facility and we understand the importance of this upgrade. I recall from last season the upgrades at the Gibsons Ice Arena were very time consuming in preparation and some parts took months to arrive. I anticipate a similar outcome with the chiller replacement and am hopeful that this time will allow for the Sechelt Ice to remain in place whilst these preparations are in progress.

I can appreciate that several factors are considered and I am hopeful that together we can overcome any obstacles that may arise from maintaining the ice at the Sechelt Ice Arena (Sunshine Coast Arena).

Together we are helping to build a better community for everyone.

Thank you for your time and consideration.

Cheers,

Kate Turner

Sunshine Coast Minor Hockey Association Registrar
scmharegistrar@yahoo.ca

Sunshine Coast Skating Club Registrar
registrar@sunshinecoastskatingclub.ca

Hitmen 7 A-Side Tournament Coordinator
hitmen7aside@gmail.com

Attachment D

Dear Mr. Ian Hall,

It is my understanding that the SCRD has plans in place for an extended ice season at the Gibsons Ice Arena this Spring. As President of the Sunshine Coast Home and Garden Show I was disappointed to receive information that we would be losing the Gibsons Dry Floor for our Event Venue with no consultation from the SCRD. When asked, our input was for the ice to remain at the Sechelt Ice Arena and be removed from GACC.

The Sunshine Coast Home and Garden Show has been a successful Dry-Floor User of GACC for 10 years now. The event attracts approximately 2,500 - 3,000 people throughout the weekend.

The Sechelt Ice Arena is unsuitable for our event due to power requirements and parking, amongst many other items such as location & accessibility by highway traffic.

As an avid supporter for Ice Sports in our community I commend the work from Sunshine Coast Minor Hockey Association and The Sunshine Coast Skating Club in their pursuit for an extended ice season. I also am aware that the Hitmen 7 A-Side Hockey Tournament will not run out of the Gibsons Ice Arena, another community loss if ice is removed from the Sechelt Ice arena.

I hope you will reconsider the decision to remove the ice from the Sechelt Ice Arena and proceed with the removal of ice at GACC as in years past.

Thank you for your time and consideration.

Bill Stockwell
CCBA (Coast Community Builders Association), President
Central Coast Concrete, Owner

BRITISH COLUMBIA

Reference: 339837

February 7, 2019

Lori Pratt, Board Chair
Sunshine Coast Regional District
1975 Field Road
Sechelt BC V0N 3A1
Sent via email: Lori.Pratt@scrd.ca

Dear Ms. Pratt:

I am writing to you in response to the request of the Sunshine Coast Regional District (SCRD) for authorization to improve the existing Chapman Lake waterworks. As this request would necessitate a boundary amendment it has been put before me for decision, and after careful consideration, I have made the decision to maintain the current park boundary in Tetrahedron Provincial Park at this time. As a result, the SCRD's proposed expansion of the community water supply system infrastructure in the park cannot proceed.

Based on the materials gathered and feedback received through engagement with First Nations and during the public consultation process, as well as an consideration of the necessity of the Chapman Lake expansion project, I do not feel there is enough evidence to support a boundary amendment. It is my view that more work is required by the SCRD to revise the Comprehensive Reginal Water Plan (CRWP) to significantly reduce or eliminate the dependence on Chapman Lake as a source for additional water supply before considering a boundary amendment. I encourage the SCRD to continue researching alternate solutions to provide a sustainable community water supply that focuses on options other than Chapman Lake and the water systems within Tetrahedron Provincial Park.

In the case of Stage 4 drought conditions, the SCRD will still be able to apply for temporary emergency amendments to their permit to employ the siphon system as they have done in recent years.

I thank the Board for your patience as I have given this important decision careful consideration.

Sincerely,

George Heyman
Minister

Ministry of Environment and Climate Change Strategy | Office of the Minister | Mailing Address: Parliament Buildings Victoria BC V8V 1X4 | Telephone: 250 387 1187 Facsimile: 250 387 1356 Website: www.gov.bc.ca/env

To: Director McMahon

CC: Director Beamish
Director Pratt
Director Seigers
Al Jenkins

Dear Director McMahon

I write this letter as a concerned citizen of Sechelt.

I attended the January 24 Infrastructure meeting where the next step of our water infrastructure plan was discussed and voted on.

During the discussion I noted that Director Seigers was looking for any way to shorten the well application process and Director Pratt asked Director Beamish if he had any issues with the plan of developing the Mahan Road site, and his response was, "No". It was the first hint that I've had that the aquifers were actually considered a Sunshine Coast resource, not just a Gibsons resource.

After the unanimous vote to allow staff to proceed with the Mahan Road well system I commented to Director Pratt how refreshing it was to attend an SCRD Board meeting that was handled in such a cooperative and efficient manner.

My mood has significantly changed after reading the Sophie Woodrooffe/Coast Reporter article on February 1, 2019, "Directors Pull Back on Mahan Road Site and Opt for Dusty Road".

I respectfully submit the following for your review.

1. Kudos to you, Director McMahon for "resisting the feasibility swap". Taking 45 minutes to debate a multi-month recommendation by experts and then change a decision that was unanimously made a week ago does not sit well with me.

2. Changing the focus to the Dusty Road site suggests to me delays in the permit applications if the Dusty Road site proves to be unsuitable.

3. Since the study of the Dusty Road site has found substantially poorer water quality than Mahan Road, that indicates to me that it will cost much more for equipment maintenance and purification processes.

4. If the Board wishes to pursue Dusty Road first then I would suggest doing it in tandem with Mahan Road in order to prevent a delay in the permit application target submission date of January 2020 that the SCRD staff committed to on January 24, 2019.

5. I would ask that the SCRD Board press the Town of Gibsons to complete the work on their water supply system to allow them to remove the Upper Gibsons area from the SCRD water supply so that it can be diverted to other areas of the coast that are in desperate need during the summer months.

Please allow my comments to be submitted as correspondence at the next infrastructure meeting.

Respectfully

Fred McIntosh
Sechelt