

<p>for Coastal Tailed Frog in Chapman Creek downstream of the Chapman Lake dam. Although not described in this report, we assume that mitigation will be designed and implemented for fish during construction at the dam outlet and immediately downstream (i.e. isolation of construction areas and salvage of fish). These mitigation measures for fish should be adapted to also protect Coastal Tailed Frog (e.g. survey efforts and methods designed to salvage tailed frog tadpoles).</p> <p>.4.4.3 ailed</p>	<p>Lake outlet and tributary streams looking for (CTF) tadpoles. All reconnaissance was thorough searches kept to a maximum of 15 minutes were found. The habitat in the inlet and outlet provide ideal conditions for CTF. Assessment of shallow depositional reaches of the stream probability of productive CTF habitat. It is important in Chapman Creek and tributaries further downstream flows are maintained, streams are higher grade includes less fines. Any channel works being assumed to contain CTF. Affected areas will be to significant dewatering. Experience in outlet habitat where dewatering was planned, CTF worked best as the areas are dewatered.</p> <p>D. Bates</p>	<p>The Construction Environmental Management focus on containing and minimizing sediment contingencies to deal with rain storms resulting the site is isolated (no road access) it will be provide additional material and equipment for event. Note that CEMP will require that equipment stockpiled on site. To be completed in July</p>
<p>Section 6.5.1.1 (p. 76) includes the following statement: "If mitigation measures are not fully effective, elevated sediment levels released into Chapman Creek should have minimal impact on drinking water as there are numerous pools in the creek that will allow sediments to drop out of suspension during the approximately 17 km course from Chapman Lake to the intake at the water treatment plant." This statement does not acknowledge likely impacts of sediment release on aquatic life (fish, invertebrates, Coastal Tailed Frogs) in Chapman Creek. Prevention of any sediment releases should be a priority for environmental management during construction.</p> <p>.5.1.1</p>	<p>B. Ford</p>	<p>Drawing water below -3 will only occur in dry measures to significantly reduce water demand lake drawdown should be implemented. The monitoring program will include collecting data stratification.</p>
<p>Section 6.5.2.1 (p. 78-79) discusses de-stratification of the water column (and associated changes in temperature and dissolved oxygen) as a potential impact of full draw down to -8 m during construction. A slow rate of drawdown is presented as a measure to prevent de-stratification. De-stratification presumably could also occur during operation, especially during large drawdown events or if drawdown occurs quickly. Impacts of drawdown on stratification, temperature, and dissolved oxygen should be closely monitored during construction to help understand potential impacts and design mitigation for operation including measures to prevent rapid drawdown.</p> <p>.5.2.1</p>		

5.2.2	<p>to fish that drop 8 m from dam crest to the channel below. A fisheries biologist from FLNRO consulted during our review made additional suggestions regarding design of the plunge pool:</p> <ul style="list-style-type: none"> • Engineer the pool with the objective that fish enter and exit the pool safely. • Design the pool so that fish are easily directed into the deepest part of the plunge pool and are not bouncing off of the bedrock • Size and locate pool so that it contains refuge areas for fish to recover after their fall. 	B. Ford	configured (Drawing C-101) provided those m long and would be 4 m deep when water weir.
5.2.2	Section 6.5.2.2 (p. 80) states that intakes of the new pipe will be fitted with a trash screen with 25 mm openings, and concludes that there is a low risk of fish being negatively affected by use of this screen. Is it feasible to have a screen with hole sizes smaller than 25 mm to reduce the risk as much as possible? If it is not feasible and a 25 mm screen is used, the passage of fish through the intake pipe should be monitored. If a problem is detected (e.g. too many fish passing through the pipe into the creek below), then adaptive management procedures should be applied.	B. Ford/ B. Dewynter	Will be incorporated into the environmental
0 (p.	Section 7.0 (p. 85-86) describes the Environmental Management Plans (EMPs) that will be developed for the construction and operation phases. These plans will need to be developed in detail in advance of construction/operation, and BC Parks will require review and approval of these plans as part of the Park Use Permit. The construction plan will need to include mitigation measures as listed in Section 7.0, but some additional mitigation not listed in Section 7.0 needs to be added to the plans. This includes prevention and management of invasive plants, fuel and spill management, archaeological resource management, and socio-cultural impact management.	B. Ford	A Construction Environmental Management Program to monitor an Environmental Monitoring Program to monitor conditions in and around the lake after construction drafted and submitted to shishah Nation, E FLNRO in July 2017 for review and comment
0 (p.	Given that the rock sample used for determining the potential for Acid Rock Drainage and Metal Leaching was weathered, the recommendations regarding further testing in Section 7.0 (p. 85-86) should be implemented.		Sample size and condition did not provide indicative with results suggesting the potential rock to be ARD or ML is low. This assessment addressed through additional sampling at site and before any rock work and implementing measures if lab analysis indicates ARD or ML
p. 88)	Under 'Air Quality' in Table 28 (p. 88) 'apply dust suppression' is listed as a mitigation measure. Please provide details on what product would be used and if the proposed product poses any risks to environmental values or water quality.	B. Ford	The cost effective and most practical plan is water.

<p>Monitoring for effects on key values during construction and operation is proposed several times in the Chapman Lake EA. We support these recommendations. A detailed monitoring plan will need to be developed prior to construction, and BC Parks will require review and approval of these plans as part of the Park Use Permit. As stated previously in these comments, the future frequency, extent and duration of drawdowns are uncertain, which means residual effects are also uncertain. Monitoring will allow for testing of assumptions regarding residual effects, detection of negative impacts, and implementation of mitigation and adaptive management to reduce negative impacts. Key effects and values to be monitored include:</p> <ul style="list-style-type: none"> • Dolly Varden: spawning timing and access; population condition; tissue sampling; changes to habitat quality and quantity • Effects of drawdown on the water table and wetlands, including wetland vegetation (Sitka sedge/peat mosses [Fen]) and amphibians • Water and sediment quality, including monitoring for sloughing of exposed sediments • Aquatic vegetation 	B. Ford	
<p>Also related to monitoring, it is not clear that the data collected in 2016 is suitable and sufficient to allow for future comparative monitoring relative to pre-construction conditions. For example, sampling of aquatic vegetation as described in Section 5.3.5 (p. 55-56) is qualitative. Qualitative assessments tend to be hard to repeat and detect only major changes. Monitoring must be designed to be quantitative and repeatable to allow for detection of changes during operation. Using the aquatic vegetation example, long-term monitoring of cover and species composition on transects or plots would provide quantitative data. Monitoring during the construction year must be designed to provide data that can be used for the long-term monitoring plan.</p>	B. Ford	See response to Comment #21.
6.5.2.4 and ition 61)		
3.5 (p.		

Comments	Assigned to:	Response
<p>Section 2.1 (page 7) indicates that: "The current operating procedure is to maintain east 0.3 m3/s in the creek below the water intake for the water treatment plant under normal conditions, and 0.2 m3/s under low flow conditions. The amount released from Chapman Lake is determined by the amount of flow measured at the dam flow gauge located downstream of the SCRD water intake." How will low flow releases change (increase) to accommodate adult pink salmon migration and spawning?</p>	<p>D. Bates</p>	<p>The issue is access for Pink salmon through the reach of the section of river dewatered between the hatchery and flows of around 0.20 m3/s was adequate for fish migration above tide line. Bottlenecks can occur at the two reference and the success (based on observations in the past) is annually has a greater influence than water volume or 2017 can not be predicted until August and channel closure 2016 and early 2017 can be observed. It has been proposed monitoring of Pinks, starting in August be implemented of the presence of barriers created by low flows. If the and access through reaches there are a number of points considered. This includes:</p> <ol style="list-style-type: none"> 1) increased pulsed flows to facilitate movement to the hatchery; 2) termination of water diversion into the hatchery for could be problematic if hatchery is rearing; or 3) capture and transport of adults to the reach above <p>Observations in 2015 documented Pink salmon movement these flows and adequate distribution of adults from the The strength of the 2017 Pink return is unknown. Spawning issue at lower flows. The escapement numbers and spawning has not been an issue in the past and is not The challenge will be adult movement to areas above</p>
<p>Section 2.1 (page 7) indicates: "The fish hatchery located downstream of the SCRD like also has a water licence on Chapman Creek, and it typically uses up to 0.1 /s of the instream flow but their water licence allows them to take a maximum of 8 m3/s." If the hatchery demand is increased in the future (i.e., to the fully licensed amount of 0.28 m3/s), how will this potential increase in hatchery demand be counted for?</p>	<p>SCRD/ D. Bates</p>	<p>Suggest that SCRD have a discussion with DFO's St. Biologists to understand the long term enhancement of hatchery water volume in the summer allows for 0.1cr resulted in barrier issues at low flow around the divers sorted out including targets for Chapman at the hatch</p>
<p>Section 2.2 (page 8) states: "Chapman Lake watershed is just 8.6 km2 (13%) of the area watershed captured by Station 08GA060 of 64.5 km2". Estimated flows into Chapman Creek in tables 1 and 2 were based on this Chapman Lake watershed area. However, Section 5.2.1 (page 36) indicates that the catchment area of the lake is 58 km2 which equates to roughly 10% of the watershed captured by Station 08GA060 and would alter the calculations in tables 1 and 2, thereby reducing the available water in Chapman Lake from June 1 to Sept 30. Please explain the difference between the definitions of watershed area and catchment area for</p>	<p>B. Ford</p>	<p>The 8.6 km2 is considered the corrected estimate of volume on our calculation using GIS. The 6.58 km2 was the Whitehead 1999 report.</p>

<p>ditional sources of drinking water were developed." Please define "short term" in case. What additional sources of drinking water are being developed?</p>	<p>tion 2.4 states: "The predicted values used here are not expected to be reached until 2050", indicating that the estimated 19% reduction in rainfall is not expected to be reached until 2050, but what about potential incremental reductions in rainfall in the next 10 to 20 years? How will potential incremental reductions in rainfall in the next 10-20 years reduce the available water during the low flow months?</p>	<p>SCRD</p>	<p>(short term) (i.e. by 2023). This includes groundwater currently underway.</p>
<p>tion 6.5.2.3 (Pages 80, 81), "Summary of Residual Effects" indicate that most effects are expected to be low because lake drawdown is only expected to happen frequently. The confidence in these ratings is only 'Moderate' due to the uncertainty in the frequency of drought conditions that will require a drawdown of 8m. It is also noted that "Any effect on the Dolly Varden population in a drought year would be offset by spawning the following year." Given the aforementioned uncertainty in the frequency of drought conditions, isn't it possible to have consecutive drought years which would indicate that the effects on the DV populations would not be offset? What would be the impacts to the DV population over consecutive drought years?</p>	<p>B. Ford</p>	<p>Recent review of the Plan2Adapt tool on the Pacific Coast website (pacificclimate.org/analysis-tools/plan2adapt) in precipitation on the Sunshine Coast for the period c overall increase in annual precipitation of 4%, however expected to decrease by an average 7%. The predicted summer precipitation using the 10th and 90th percent increase of 9% to a decrease of 17%. The Plan2Adapt annual rate of decrease in summer precipitation will be 2020s and then will increase through to the 2050s to a reduction. The same tool predicts that there will be a decrease in the fall (September - November) and spring (March to climate change. While variability in predicted changes reduction in summer precipitation would suggest that the beginning of June with reduced summer rains increase lake will draw down to -3 or lower but fall rain events in October.</p>	<p>Dolly Varden live up to 8 years in Chapman Lake. It would be back to back droughts and even more unlikely consecutive years of drought. Even after 2 years of predicted sufficient numbers of DV to spawn and mature above, climate models predict increased rainfall in the still provide fish the opportunity to access spawning areas. Monitoring program will be developed to further assess Dolly Varden.</p>
<p>tion 7 (page 85), The Emergency Management Plan (EMP) should also include proposed monitoring and follow-up measures provided in section 6.5.2.4. Are there discrepancies between the 'Geographic Extent' and 'Overall Impact' ratings for Aquatic resources in the table presented in the Executive Summary (page 8 and Table 28 (page 89). Please make the appropriate corrections.</p>	<p>B. Ford</p>	<p>A construction environmental management plan and an environmental monitoring program will be developed.</p>	<p>The version in the executive summary should be used for conservative evaluation</p>

<p>to detect a change in the DV fish population based on the information collected so far? What methods will be used to monitor change in the DV population over time?</p>	<p>plan approved by SCD</p>	<p>lake. The plan is expected to be submitted in July 2017.</p>
<p>Section 6.5.2.4 recommends a study during construction to confirm the findings of Chapman Lake EA and assess fish and fish habitat around the lake and in the tributaries, including fish access as well as follow-up monitoring of the indicators of effects of the project on fish and fish habitat. We agree that further monitoring should be conducted throughout the project to adequately assess and mitigate any potential impacts to fish and fish habitat.</p>		<p>A construction environmental management plan will be submitted to Shishalh Nation, BC Parks in 2017.</p>
<p>We have mentioned in our previous comments of September 16, 2016, that we are concerned about how the lake drawdown will impact the water table. Is it possible that the water table could be permanently lowered as a result of combined impacts from lake drawdown and multiple years of drought conditions? Is there potential for long-term lowering of the water table as a result of this project?</p>	<p>B. Ford with input from Hydrogeologist</p>	<p>We don't consider this to be a likely scenario as climate change scenarios predict that summer months will be drier and fall, winter and spring months will be wetter. Therefore there will be more water to recharge the lake and the water table will be higher so there will be less snow and less ice. There will be fewer days when the ground is frozen and the water will infiltrate the soils and recharge the water table. The monitoring program will include monitoring of water levels in wetlands.</p>

Comments	Assigned to:	Response
<p>Regarding the proposed Water Supply Expansion Project in Chapman Lake, we require written assurances about when the drawdown will be deployed, and how ongoing monitoring and protections of cultural and environmental resources will be ensured. Specifically:</p>		
<p>s.16</p>	<p>SCRD</p>	<p>SCRD Policy Decision - staff to bring forward report.</p>
<p>Timing: We are concerned about the safety of the upstream migration of the 2017 Pink salmon return. In the event proposed works would result in low flow during the Pink salmon spawning and migration, we require the SCRD to have a plan and procedures in place to mitigate the situation or ensure any stranded fish are transported upstream of area previously identified as high risk of stranding or present barriers to migration at low flows. We require the SCRD to work in collaboration with fisheries personnel in our Resource Management Department to develop a response and mitigation plan in the event upstream adult pink salmon movement and spawning becomes an issue.</p>	<p>SCRD/D. Bates</p>	<p>Partial response provided in response to comment #1 (Stewardship). There does need to be a contingency plan for the 2017 pink salmon return if construction takes place in 2017. A flow of 0.2 cms is required for access. This could change if morphology changes caused by high flows. It would be required for SCRD work with the FN and DFO to develop a plan. In discussion with FN that it might make more sense to have additional eggs in 2017 at Puntledge or Qualicum and Chapman. These island hatcheries are the source of the eggs. Then if volume must be lowered to facilitate construction, the loss could conceivably be compensated for by a transplant. In discussion with FN.</p>
<p>Ongoing Planning: We require continued discussions and specific actions to reduce water demand for residential use, and improve water supply. This includes continuing to research alternate sources of water, and engaging in Growth Management Planning. We need to work together for safety and quality of the potable water supply and in jointly assuming the responsibility and authority for the attaining and maintaining of the highest possible safety and quality standards for the potable water supply.</p>	<p>SCRD</p>	<p>SCRD Policy Decision - staff to bring forward report.</p>

<p>assessment data, in order to better understand the current health of the lake and the surrounding environment. This baseline data will assist in understanding the impacts, benefits, and possible mitigation from the intensification of use of Chapman Lake as a water source. Information might include, for example, limnology, bathymetric, and hydrographic data, as well as updated surveys for vegetation, fish and wildlife. We would also like to work collaboratively between technical staffs to develop a plan and process for ongoing environmental and archaeological monitoring. An environmental monitoring plan should be developed in order to understand what the long-term effects of increased seasonal/drought condition drawdown might be. Monitoring should include key fish, vegetation, and amphibian populations.</p>	<p>SCRD</p>	
<p>Specific Plans: We understand in this preliminary stage detailed plans have not yet been developed. Please provide copies of environmental protection plans for the construction activities, camp management plans, etc. when available. In addition, please provide a draft of the Restoration/Re-vegetation Plan for the construction area and exposed shoreline, when it is developed. Salvage and replanting of existing native species should be considered as part of the re-vegetation planning.</p>		<p>SCRD staff will provide Environmental Protection Plans:</p>

RE: Trip into Edwards Lake and Chapman Lake

Friday, October 13, 2017

2:09 PM

Subject	RE: Trip into Edwards Lake and Chapman Lake
From	Dalziel, Rod ENV:EX
To	'Dale Sapach'
Cc	'Dave Crosby'; 'Shane Walkey'
Sent	Monday, June 12, 2017 9:11 AM

Hello Dale,

Thank you for the update.

Rod Dalziel

Sunshine Coast Area Supervisor

BC Parks - South Coast Region - Ministry of Environment

✉: PO Box 950, 6451 Sechelt Inlet Road, Sechelt, BC V0N 3A0

☎: Desk (604) 885-6755 Mobile (604) 741-1967 Fax (604) 885-2445

✉: Rod.Dalziel@gov.bc.ca

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From: Dale Sapach [<mailto:Dale.Sapach@scrd.ca>]

Sent: Monday, June 12, 2017 8:12 AM

To: Dalziel, Rod ENV:EX

Cc: Dave Crosby; Shane Walkey

Subject: Trip into Edwards Lake and Chapman Lake

Rod,

I will be make a trip into Edwards Lake and Chapman Lake this Wednesday (June 14) to set up our lake monitoring equipment. I will be at Edwards lake for about an hour and Champan Lake for about 2-3 hours.

Thanks,

Dale R. Sapach

SCADA Technician

Sunshine Coast Regional District

1975 Field Road, Sechelt, BC V0N 3A1

Office: 604-885-6800 x6315

Cell: 604-740-2379

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RE: Trip into Edwards Lake and Chapman Lake

Friday, October 13, 2017

2:09 PM

Subject	RE: Trip into Edwards Lake and Chapman Lake
From	Dalziel, Rod ENV:EX
To	'Dale Sapach'
Cc	'Dave Crosby'; 'Shane Walkey'
Sent	Wednesday, July 5, 2017 10:00 AM

Thanks for the notice, Dale.

Rod Dalziel

Sunshine Coast Area Supervisor

BC Parks - South Coast Region - Ministry of Environment

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From: Dale Sapach [<mailto:Dale.Sapach@scrd.ca>]

Sent: Wednesday, July 5, 2017 9:37 AM

To: Dalziel, Rod ENV:EX

Cc: Dave Crosby; Shane Walkey

Subject: Trip into Edwards Lake and Chapman Lake

Rod,

We will be making a trip into Edwards Lake and Chapman Lake this Thursday (July 6) to set up our lake monitoring equipment. I will be at each site for about 30-45 minutes.

Thanks,

Dale R. Sapach

SCADA Technician

Sunshine Coast Regional District

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Park Use Permit application (temporary amendment) – Sunshine Coast Regional District – Siphon at Chapman Lake

Part 3:

Section A – Proposed Activity

a. Purpose of Land use or occupancy

The purpose of this amendment to Park Use Permit 102714 (PUP) held by the Sunshine Coast Regional District (SCRD) is to increase the available late summer water supply from Chapman Creek through the installation of a temporary siphon system in Chapman Lake, which is located in the Tetrahedron Provincial Park.

Chapman Creek is the primary water supply to the Regional Water System on the Sunshine Coast and supplies water to approximately 23,000 people. In two out of the last five years, this water supply has become nearly depleted due to prolonged periods of drought and increased water demand during the summer season. To alleviate potential acute water shortage in 2017 and 2018, the SCRD is seeking approval from BC Parks (and the Ministry of Forests, Lands and Natural Resource Operations), to access an additional five meters of water storage (1 million cubic meters) in Chapman Lake should doing so become necessary.

In the immediate term, the SCRD is proposing to have the necessary permits in place to allow the temporary installation of a siphon in the event that the region experiences another water shortage from a prolonged period of drought. The main drivers behind this request for a temporary amendment to the SCRD's PUP are:

- Meeting increased environmental flow targets for Chapman Creek established by the Ministry of Forests Lands and Natural Resource Operations (FLNRO) to facilitate fish migration as per recommendations from a fisheries biologist and requirements under the *Water Sustainability Act*;
- Uncertainties in short term weather projections: recent climate studies suggest that prolonged periods of drought in the South Coast could occur more frequently but shorter term weather forecasts of precipitation are highly unreliable; and
- Meeting increased summer season water demand (water use nearly doubles in the summer season from irrigation and tourism).

In order to both reduce demand and increase water supply from sources other than Chapman Creek, the SCRD is implementing demand and supply management in accordance with the Comprehensive Regional Water Plan (CRWP), including such measures as water metering, well protection measures, and groundwater resource investigation.

Also in accordance with the CRWP and outside of the scope of this amendment application, the SCRD is also in the process of obtaining approvals to deepen the channel in Chapman Lake which will permanently enhance redundancy in the water system. This is an essential measure in the medium term prior to the construction of long term source development projects specified in the SCRD's CRWP are constructed.

b. Details of existing uses, vegetation cover, wildlife present, water resources, geology, and historical and cultural significance

Existing uses

The existing uses for the proposed area within this PUP amendment application are for water impoundment and a helicopter pad.

Studies

The SCRD has undertaken various studies which indirectly or directly impact the siphon installation project. Previous studies submitted to BC Parks are included in Appendix A & B.

Vegetation Cover

Vegetation Overview

Forest cover around Chapman Lake and the upper Chapman Creek watershed consists of Mountain Hemlock (*Tsuga mertensiana*), Yellow Cedar (*Chamaecyparis nootkatensis*) and Pacific Silver (Amabilis) fir (*Abies amabilis*), while lower elevations in Tetrahedron Provincial Park contain Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*; Triton 2006). The canopy formed by the tree cover varies from relatively open to dense. Throughout the park, semi-open meadows, marsh complexes, and areas of dense shrub [e.g., blueberry (*Vaccinium sp.*)] are also found.

The mid and lower reaches of the Chapman Creek watershed, outside the park boundaries, fall within the Coastal Western Hemlock biogeoclimatic zone (CWHm), and are characterized by forests dominated by Douglas fir (*Pseudotsuga menziesii var. menziesii*), Western Hemlock, Western Red Cedar and a variety of understory shrub species. Widespread logging and associated disturbance and revegetation have resulted in a change in forest composition from old-growth conifer forests to communities with a higher proportion of broadleaved trees. Much of the riparian zone in the mid and lower reaches of Chapman Creek now consists of alder stands. The park is situated within the Southern Pacific Ranges ecosection and Coastal Western Hemlock/Mountain Hemlock biogeoclimatic zones. The park contains one of the oldest undisturbed forests in Canada with stands containing trees over 1,000 years. Semi-open meadows, marsh complexes and dense understory (e.g. blueberry) are characteristic of the park, which also contains ten lakes.

Riparian Vegetation

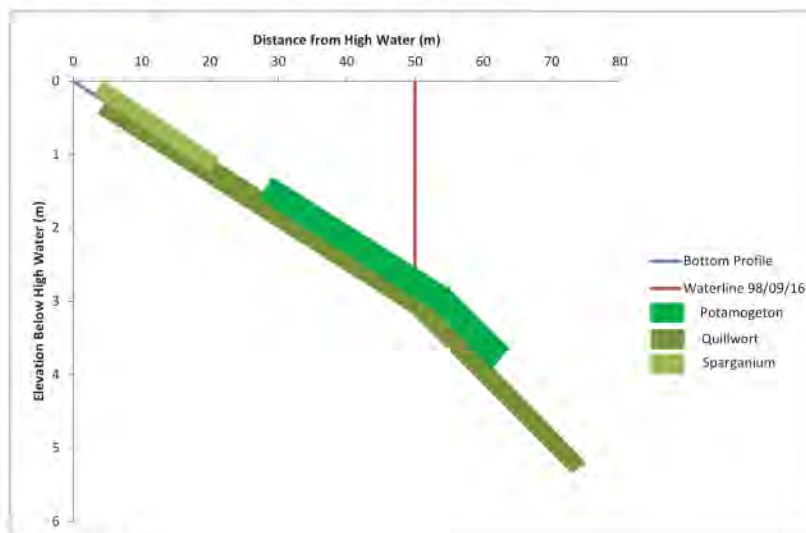
Riparian vegetation surveys were completed in 1998 as part of impact assessment from the 5 m lake depth to 5 m above the high water level. The riparian area is largely forested to the high water level with several smaller areas where shrubs and/or herbaceous species predominate. The four habitat types identified include forest, shrub land, wet meadow and wetland/aquatic. Forest vegetation consisted of Mountain Hemlock and Amabilis Fir with some Yellow Cedar. The shrub layer was dominated by Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*) with the herb layer consisting of moss. Meadow and wetland areas contained a graduation from one to the other with an increase in soil moisture. Meadow areas tended to be moist due to subsurface drainage from hillslope areas. Vegetation growth within the lake that was less than 2 m in depth was considered part of the wetland habitat.

Aquatic Vegetation

Aquatic vegetation transects were conducted in Chapman Lake during late summer of 1998. Aquatic plants surveyed were limited to submergent species; however, water levels in the lake were below normal high water levels. The dominant species inventoried consisted of bristle-like quillwort (*Isoetes echinospora*) and was observed growing on suitable substrates throughout the lake. Dominant plant species typically occur between the 1 m and 4 m below the high water level. Narrow-leaved bur-reed (*Sparganium sp.*) and pondweed (*Potamogeton sp.*) were observed on the exposed or shallow lake areas, particularly at the east end of the lake. Figure 1 illustrates the zonation of aquatic vegetation in Chapman Lake from the survey transects for the study completed in 1998.

The main disturbance to aquatic vegetation during operations was identified as desiccation due to drying; however, it was noted that drying stress is already present seasonally in the littoral zone where most of the aquatic vegetation occurs and the dominant plant (quillwort) appeared to be very tolerant to desiccation under existing water level fluctuations in the reservoir. It is likely that the reduced growing season caused by existing drawdown leads to increased thermal drying stress on bur-reed and pondweed and abundance levels were low.

Figure 1. Zonation of Aquatic Vegetation in Chapman Lake



Source: Whitehead 1999

Sensitive Species

A list of plant species potentially within the study area was compiled using the BC Conservation Data Centre database. The same search categories as above were used to compile the information. Table 1 provides a summary of the resulting species, including the BC designation and Species at Risk statuses. A total of seven sensitive BC species were identified, with no SARA listed species results.

Table 1. Sensitive Plant Species in the Sunshine Coast Forest District

Common Name	Scientific Name	Species Type	BC Status	SARA Status
elegant Jacob's-ladder	<i>Polemonium elegans</i>	Dicot	Blue	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Monocot	Blue	
poison oak	<i>Toxicodendron diversilobum</i>	Dicot	Blue	
Roell's brotherella	<i>Brotherella roellii</i>	Nonvascular plant	Red	
slimleaf onion	<i>Allium amplexans</i>	Monocot	Blue	
small spike-rush	<i>Eleocharis parvula</i>	Monocot	Blue	
snow bramble	<i>Rubus nivalis</i>	Dicot	Blue	

A search was also conducted in the BC Conservation Data Centre database for terrestrial ecological communities in the area surrounding Chapman Lake. Criteria used to focus the search results was applied using the regional and forest districts for the Sunshine Coast filters. In addition, the biogeoclimatic zone of Coastal Western Hemlock, subzone very wet maritime and montane (CHWvm2) variant filters were applied. Table 2 below provides the results of the ecological community database search of the area, which includes BC sensitive species status.

Table 2. Sensitive Ecological Community Plant Species in the Sunshine Coast, Coastal Western Hemlock Biogeoclimatic Zone (CHWvm2)

Common Name	Scientific Name	BC Status	Endemic
Amabilis fir - Sitka Spruce / devil's club	<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	
Amabilis fir - Western Red cedar / salmonberry Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Yellow	
amabilis fir - western red cedar / three-leaved foamflower Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Wet Maritime	Yellow	
Sitka sedge / peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	Y
Sitka willow / Sitka sedge	<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Blue	Y
western redcedar - western hemlock / sword fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	
western redcedar - yellow-cedar / spleenwort-leaved goldthread	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis asplenifolia</i>	Yellow	
western redcedar - yellow-cedar / skunk cabbage	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Lysichiton americanus</i>	Yellow	
western hemlock - amabilis fir / deer fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	
western hemlock - amabilis fir / Alaskan blueberry	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Vaccinium alaskaense</i>	Yellow	
western hemlock - lodgepole pine / grey reindeer	<i>Tsuga heterophylla</i> - <i>Pinus contorta</i> / <i>Cladina rangiferina</i>	Yellow	Y
western hemlock - western redcedar / salal Very Wet Maritime	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	Blue	Y
yellow-cedar / peat-mosses	<i>Xanthocyparis nootkatensis</i> / <i>Sphagnum</i> spp.	Yellow	

Wildlife Resources

Wildlife values within the Chapman Creek watershed are not well known and information is limited. The watershed appears to support populations of Columbian black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), cougar (*Puma concolor*) and other furbearing animals. Other wildlife known to use the watershed include: waterfowl, gulls, shorebirds, raptors, upland game birds, woodpeckers, a variety of songbirds, small mammals, amphibians and reptiles. Species recorded in Tetrahedron Provincial Park include: mountain goat (*Oreamnos americanus*), coyote (*Canis latrans*), mink (*Mustela vison*), marten (*Martes Americana*), river otter (*Lontra canadensis*) and bobcat (*Lynx rufus*), a variety of rodents, rock ptarmigan (*Lagopus muta*), woodpecker, grouse, ravens (*Corvus corax*), and marbled murrelets (*Brachyramphus marmoratus*; MELP 1997). It is thought that many of the larger animals tend to be transient users wildlife corridors to pass through the park. Hunting is prohibited within the park; however, the lower reaches of the watershed provide recreational hunting opportunities. There are no approved Wildlife Habitat Areas in the assessment area. There is a lack of emergent vegetation (e.g., cattail, bulrush) within the high water perimeter of Chapman Lake, however, some limited opportunities for nesting birds is available in this area.

Fish Values

Chapman Creek is a salmon bearing creek with populations of Coho, Chum, and Pink salmon. Populations of rainbow and cutthroat trout and steelhead are also present in Chapman Creek. A salmon hatchery also exists on the creek where populations of Coho salmon are raised.

For most years, the timing of instream flow requirements to support Coho and Chum salmon coincide with the fall rains as salmon runs for both of these salmon species peak in October and November. Pink salmon tend to start their run in August and September. In years where water supplies are limited and at risk of becoming fully depleted, the minimum instream flows are targeted in order to prolong the available water supply for as long as possible.

Sensitive Wildlife Species

A list of sensitive wildlife species potentially found in the study area was compiled using the BC Conservation Data Centre database. The search categories used to compile the information included a search of the Sunshine Coast Forest District and refining the search results using the Coastal Western Hemlock and Mountain Hemlock biogeoclimatic zones. Habitat types used to further filter survey results included forest, grassland/shrub, lakes, riparian, stream/river and wetland. BC Red listed species include any plant, animal or plant community that is extirpated, endangered or threatened and Blue listed species are considered to be of special concern in BC, but are not extirpated, endangered or threatened. The Species at Risk Act, Schedule 1, is federal government legislation enacted to protect extirpated, endangered and threatened species and species of special concern across Canada. A total of 45 sensitive BC wildlife species were identified, with 16 SARA listed species results.

Water Resources

The Chapman Creek watershed (Watershed Code: 900-120400) is located approximately 5 km east of Sechelt, BC and provides approximately 85% of the drinking water and fire protection for more than 2123,000 residents between Langdale and Earl's Cove, including the District of Sechelt. Water storage is provided by both Chapman and Edwards Lakes which are located on the Tetrahedron Plateau in

Comment [DB1]: I think the number mentioned earlier in the report was 10k

Tetrahedron Provincial Park. A control structure on Edwards Lake allows water to be released when required to augment flows in Chapman Creek.

Chapman Creek flows south from the Tetrahedron Plateau for approximately 24 km and discharges into the Strait of Georgia. Chapman Creek watershed is approximately 73 km² in area and the drinking water intake is located approximately 175 m above sea level and 7.5 km upstream of the mouth of Chapman Creek. Approximately 65 km² of the Chapman Creek watershed is located above the SCRD water intake.

Chapman Lake

Chapman Lake lies at an elevation of ~~976 m~~ 974 m above sea level in steeply sloping terrain; surrounding ridgetops and peaks typically reach more than 1,500 m elevation. The lake has a surface area of 31.2 ha and a maximum depth of approximately 30 m, making it the largest lake in the Chapman Creek watershed. The catchment area of the lake is 6.58 km², and the lake is fed by 2 main streams, both of which enter at the east end of the lake. The lake volume at the high water level is approximately 3.7 million m³ with an average outflow rate of 0.476 m³/s. Based on these data, the average retention time of water in the lake is approximately 90 days. The short retention time reflects the high level of precipitation in the watershed. Outflow from the lake is controlled by a concrete dam and valve located on the west side of the lake and operated by the SCRD. During a typical year, water stored behind the dam is allowed to overflow naturally until there is a need to supplement the flows to Chapman Creek, at which time the dam is opened to release stored water from the reservoir. The annual lake level variation is currently between 1.5 m to 3 m.

Chapman Lake Water Quality

Whitehead (1999) reported the results of limited water quality monitoring on Chapman Lake. Parameters measured included Secchi disc transparency, temperature and dissolved oxygen. The Secchi disk indicated clear water with a reading at 6.5 metres. Temperature and dissolved oxygen results ranged from 16°C at the surface to 7°C at depth and from 16 mg/l at the surface to 6.5 mg/l at depth, and indicated the lake was stratified with a thermocline between 2 m and 3 m. During the monitoring program gas bubbles were observed throughout the lake and particularly at the east end in the shallower areas. Based on the smell of hydrogen sulphide it was concluded the gas bubbles were originating from anaerobic decomposition originating in the lake sediments.

Comment [DB2]: Check number. This is a little high for the elevation and temperature.

Chapman Lake Water Quantity

A water demand and supply analysis under changing climatic conditions was conducted on the Chapman water system on the Sunshine Coast. The study assessed the impacts of climate change on water consumption and water supply within the Chapman watershed. Historic temperature, precipitation and discharge data were collected to determine historic trends. The impacts from Pacific Decadal Oscillations and El Niño Southern Oscillations on climate and discharge were analyzed to determine the impacts of climate change.

The results from this study indicated that climate patterns on the Sunshine Coast have changed over the last 50 years, with annual average temperatures increasing by approximately 2°C and average total

annual precipitation decreasing by 24 mm. Climate trends were determined to impact the available water supply as temperatures and snowpack elevation were increasing. This increased temperatures and diminishing snow pack is causing the snow to melt earlier and more rapidly during the spring season and existing streamflow regime in Chapman Creek is shifting towards a more rain dominated regime, which would change the entire water holding dynamic of the watershed. Discharge data further showed that peak discharge occurred earlier in the spring, which affects summer base flows when demand for domestic distribution and environmental services was highest. Climate conditions during the summer season were also determined to be impacting supply as the increasing temperatures were assumed to cause the snowpack to be depleted earlier in the summer season and the decreasing trends in precipitation were resulting in less recharge to storage reservoirs.

The increases in temperature and decreases in precipitation trends were shown to be correlated to water consumption during the summer season when water supplies are the most limited. The significant correlation between water consumption and temperature and precipitation identifies how climate change may impact water consumption behaviors on the Sunshine Coast.

Sunshine Coast climate is characterized by cool and wet winters and warm and dry summers (Figure 3). The summer season is the critical time of year for water supply, as this is when water demand is highest and available water supply is most limited. Trends over the last 50 years are suggesting that summer temperatures are increasing (Figure 4) and total summer precipitation is decreasing (Figure 5).

Figure 2. Annual average total monthly precipitation and average monthly temperature in Gibsons, BC (1962 to 2013)

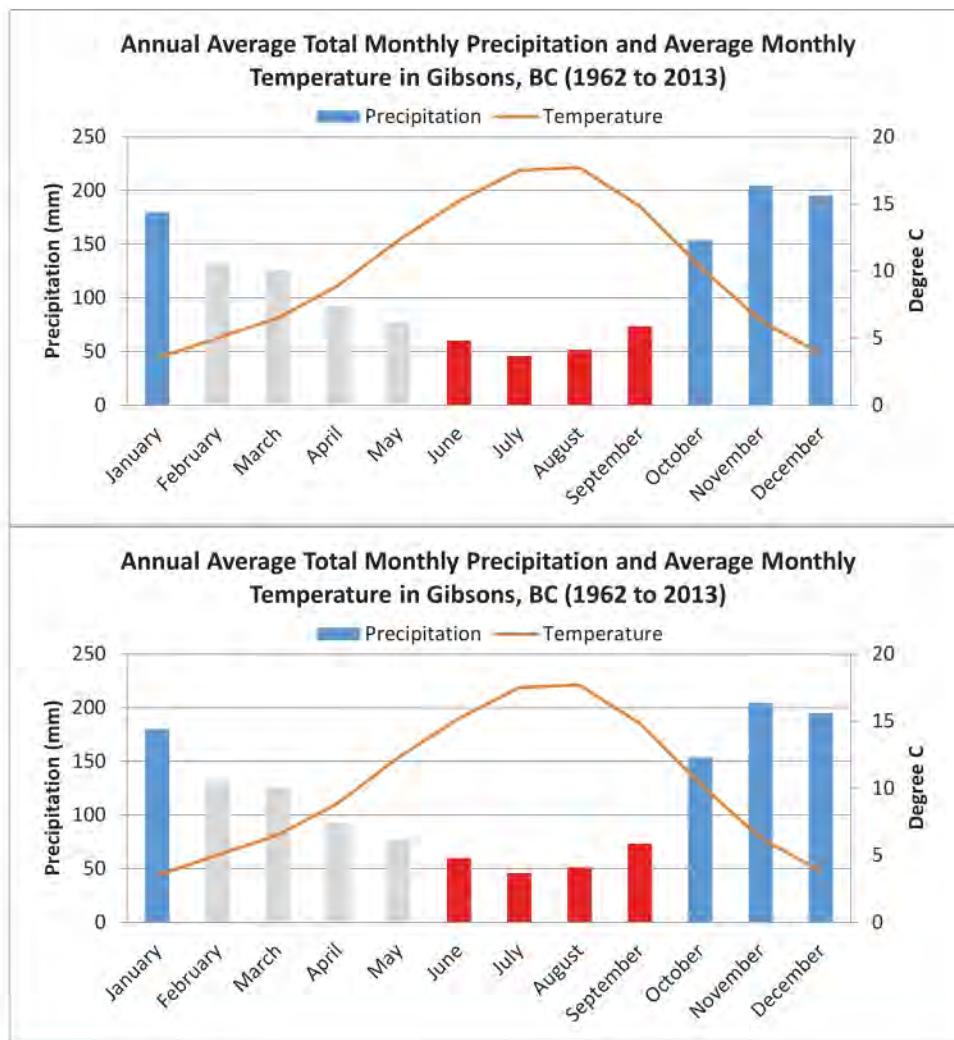


Figure 3. Historic monthly mean temperatures for July to September collected in Gibsons, BC from 1962 to 2013

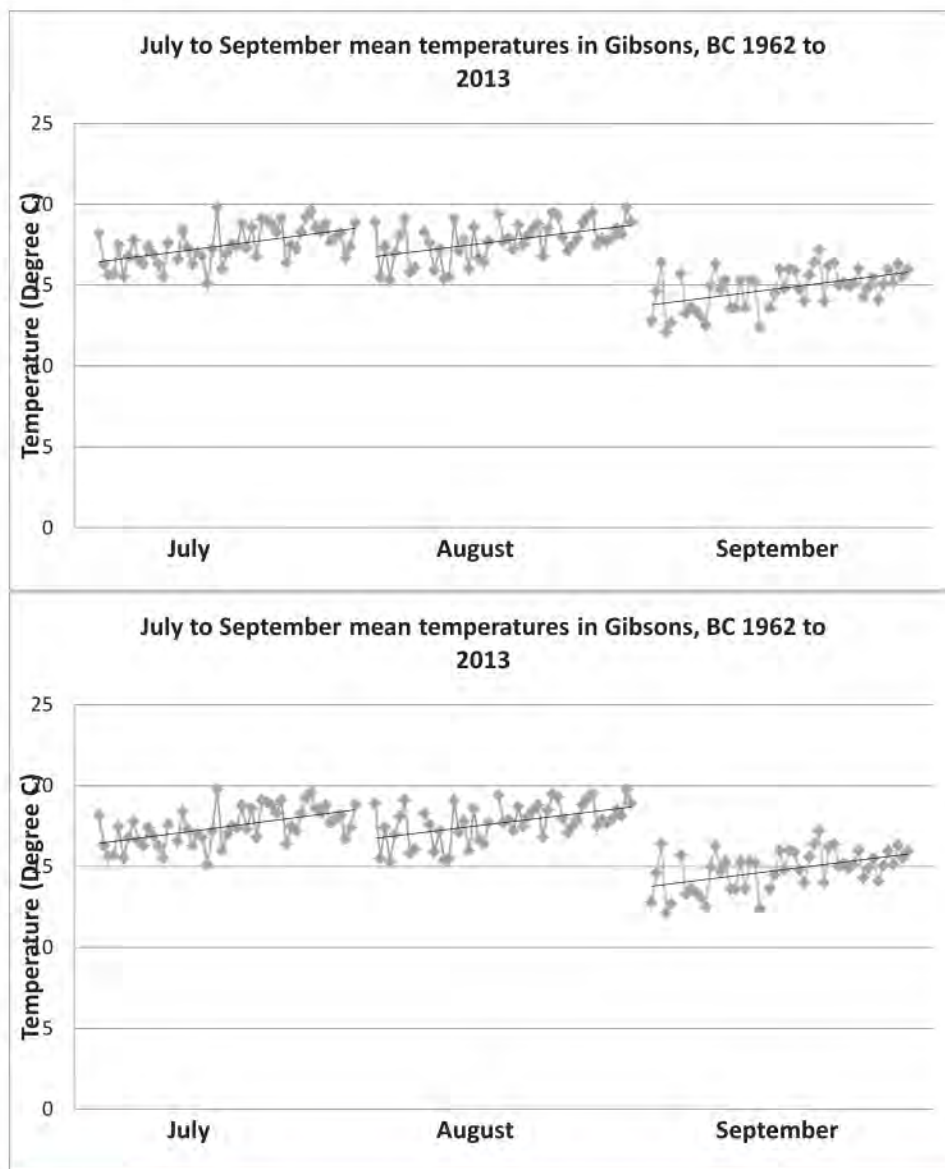
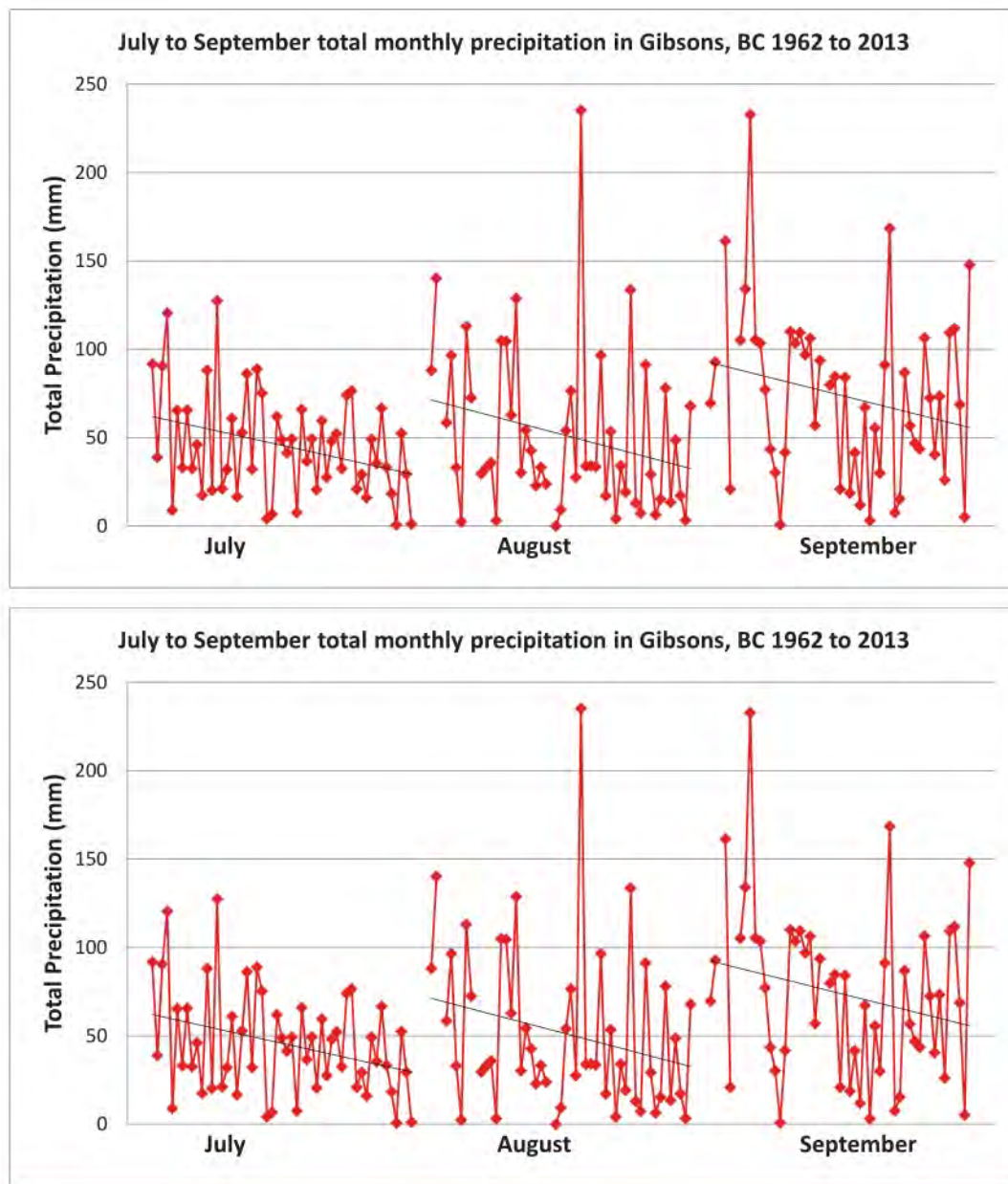


Figure 4: Historic monthly total monthly precipitation for July to October collected in Gibsons, BC from 1962 to 2013



As part of the study, a sensitivity analysis was completed and identified that the total water consumption during the summer could regularly exceed the equivalent to the available water supply in the next 10 years if water demand does not change, snow pack continues to decrease in the winter,

summer temperatures increase by an average 1 or 2 °C, and prolonged droughts become more common.

Geology

Chapman Lake lies within an area of granite rock of the late Jurassic and early Cretaceous ages (156 to 114 million years old), characterised as quartz diorite. Coastal watersheds underlain by rock types such as quartz diorite tend to be slightly acidic due to the low buffering capacity of these rocks and the natural low pH of rainfall.

The dominant soil-types within the Chapman watershed contain large concentrations of organically combined iron and ~~aluminium~~aluminum in their subsoils. In poorly-drained soils on the Tetrahedron Plateau organic matter is not broken down as quickly as in areas of well-drained soils, which means that organic and clay colloids, and ~~aluminium~~aluminum and iron compounds are common elements in the water supply and characterize the natural water quality in this area.

Historical and Cultural Significance

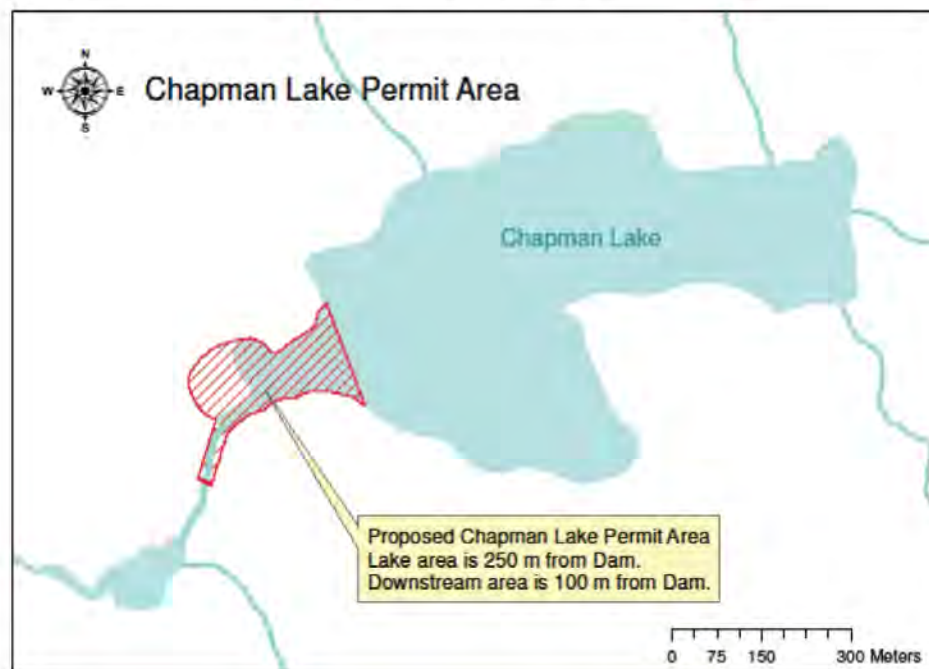
There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shishálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

c. Location and size of all proposed and current improvements

Location

The location of the proposed permit area is outlined in the figure below.

Figure 5. Proposed amended permit area at Chapman Lake



Siphon Design

The siphon consists of five parallel 200 mm HDPE pipes that are 255 m in length. The siphon will run over the existing dam structure from Chapman Lake into Chapman Creek. The inlet will be installed at an elevation of 963 m which is approximately 11 m below the top of the dam and will reach into the lake approximately 180 m from the existing dam. The inlets will be secured and anchored in place using concrete blocks and buoys. The outlet of the pipe will be located approximately 50 meters downstream of the existing dam at an approximate elevation of 965 m. Refer to attached engineering design drawings.

Siphon Construction

The installation of the siphon system will involve transportation of pre-fused sections of HDPE pipe to Chapman Lake via helicopter. The installation process will begin with laying the outlet pipe (with attached gate valve) then will proceed with laying the subsequent lengths of that pipe, ending with the inlet pipe (with attached check valve and buoy). The sections of pipe will be bolted together at Chapman Lake and the inlet pipe will be tied-off to lake bed anchor blocks. This process will be duplicated for a second complete siphon length. Once the first two pipe lengths are assembled and in place, the

pump/vacuum and blow-off ports will be constructed at the high point of each pipe. The siphons will be primed and commissioned as soon as possible after completion of construction. The operation of the first two siphons will be monitored for 24 hours by the SCRD Siphon Technicians. If the operation of the first two siphon lengths is considered to be a success, the remaining lengths will be constructed through the same process as the previous two. For construction details, refer to the detailed [Construction Plan-Chapman Lake Siphon System Workplan and Timeline](#).

If the siphon is considered to be unsuccessful after 24 hours of operation, alternative options will be considered in consultation with First Nations, BC Parks, and MFLNRO.

d. If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes

The physical changes and the proposed mitigation strategies are outlined in the table below.

Table 3. Physical changes and proposed mitigation measures from the proposed works

Physical changes	Proposed mitigation
Lake bed disturbance from machine activity when assembling the pipes	Operating the machine in the upper areas of the exposed lake bed where the ground cover is compacted and disturbance is minimal. In sensitive areas where lake grasses are present or ground conditions are softer, $\frac{3}{4}$ " plywood will be placed on the ground to form a track and reduce any significant disturbance from a machine.
Excavating benches where necessary within the lake bed for the level placement of the lock blocks	An excavator will be used to dig out a flat area for placement of the lock blocks. The area to be disturbed will be sized according to the size of the lock blocks to minimize disturbance. This work will occur when the lake level is below the location where the lock block will be placed to minimize any sedimentation into the lake.
Soil disturbance from machine activity	Machine access routes will be flagged at predetermined locations and routes in advance to minimize vegetation disturbance and to concentrate all disturbance from the machine into as small of an area as possible.

e. Construction Schedule (if applicable) for proposed new permanent and/or temporary facilities

A project of this nature has numerous variables that impact timing (e.g. weather, water demand etc.). The dates for the construction schedule are unknown until it is realized that the siphon is needed, which is when the water supply has approximately 30 days remaining.

From when the decision is made to install the siphon, construction and commissioning are estimated at 35 days of which approximately eight days will be in channel/lake work.

f. Photographs of the site and area adjacent to the proposed land use/occupancy

Figure 6. The proposed site at Chapman Lake showing the proposed alignment of the siphon lines and the sensitive aquatic grassy area to be protected as detailed in Table 3.



Figure 7. Site plan at Chapman Lake showing the camp area, access path, proposed alignment of the siphon pipes, and general assembly area.

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g. Type of transportation and access route to the proposed site

Helicopter will be the primary mode of transport to and from the proposed site.

h. Initial five year operational plan

Because this is a short term plan, there is no intention of operating this siphon system for five years. Once the siphons are operational, the operational plan will consist of having at least one person on site at all times to ensure that the siphons are in operation and to also address any issues with operation in a timely manner.

Section B – Experiences of the Applicant

Park Use Permit - The SCRD has held a Park Use Permit (PUP) for the purposes of maintaining water impoundment infrastructure at Chapman and Edwards Lake and a helicopter pad at Chapman Lake in Tetrahedron Park since the park was established. The SCRD's PUP was renewed February 1, 2014 and the current PUP No. 102714 is valid until January 31, 2024

Constructing waterworks – The Sunshine Coast Regional District's waterworks crew consist of staff members who have been installing waterworks infrastructure for over 30 years.

Environmental management/monitoring – The SCRD has personal on staff who have extensive experience in environmental management, including experience in designing, implementing and monitoring Environmental Monitoring Plans.

Section C – Potential Impacts

a. Impacts and mitigation measures on vegetation, wildlife and watercourses

Table 4. Impacts and mitigation measures on vegetation, wildlife, and watercourses

Introduction of invasive plants	All machines and equipment to be used for this project will be cleaned and inspected prior to being used at the lake for the construction and operation of the siphon. This strategy is intended to prevent the spread or introduction of invasive plants through the transport of machines and equipment.
Soil and vegetation disturbance from temporary camp to be used during installation and operation of the siphon	The periphery of areas required for accommodation, staging and construction will be marked with flagging. All personnel who will be working on site will be directed during orientation to concentrate all of the activity and foot traffic to select areas only.
Disturbance to Wildlife	<p>All wildlife observations and encounters will be recorded. This will include any instances where wildlife activity is disturbed from personnel working at the site.</p> <p>Minimizing attractants to wildlife will be achieved through sound waste management. Food waste or any other waste that may attract wildlife will be contained in a lockable bear-proof container. The waste generated from the site will be removed on an as needed basis. A portable toilet will be available and all human waste will be collected in the toilet and flown off site as needed.</p>
Disturbance from a petrochemical <u>petrochemical</u> spill	<p>To mitigate the impacts from any potential petrochemical spill, all machinery with hydraulics will use vegetable oil wherever possible. A spill kit will be on stand-by to contain any spills should they occur and spill response training will be provided to operators and staff. While fueling equipment, containment will be maintained by using soaker cloth under the area of where the filling is occurring. The pumps used for priming the siphons will be housed in containment boxes lined with plastic.</p> <p>In the event of a spill, the spill will be reported to the Spills Reporting Line and the Lead Environmental Monitor (EM) will be contacted and will provide mitigation advice. Depending on the severity of the spill the EM will be brought to the site as soon as possible to oversee mitigation measures. An onsite staff or operator will be required to record the causes of the spill, the response undertaken and the apparent effects of the spill.</p>
Disturbance from erosion and sediment laden run-off	The risk of erosion and sedimentation is highest when periods of intense rainfall coincide with active construction. These risks will be minimized by ensuring the construction takes place during dry conditions. The exposed lake bed on the south side of the outlet channel will be where the assembly and moving of the pipe will occur and the setting of lock blocks to anchor the pipe. Construction activity will occur on the most compacted ground accessible below the high

	water mark where the substrate consists of a shallow layer of sandy loam above glacial till and bedrock. This area is considered to be stable and the risk that planned activities will result in a rise in creek turbidity over the background level is considered to be low.
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b. Impacts to watercourses or water bodies

Refer to Table 3.

c. Special features

N/A

d. Impacts on Park access

Access to the park will not be impacted from the proposed works.

e. Impacts to aesthetics and visual values

The location of the proposed works is not visible from any trails with the park and therefore is expected to have no impacts to landscape aesthetics or visual values (see also section g).

f. Impacts on cultural values including traditional use by First Nations

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shíshálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

g. Impacts to park users

Although no park trails intersect with the proposed location for the works, park users who are on any nearby trails may be impacted when the siphon pipes, equipment, or personnel are being transported by helicopter. This potential disturbance to park users will be mitigated through notification of schedule of works to BC parks and appropriate signage within the park to notify users of the works.

Figure 5. General location of Chapman Lake

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Park Use Permit application (temporary amendment) – Sunshine Coast Regional District – Siphon at Chapman Lake

Part 3:

Section A – Proposed Activity

a. Purpose of Land use or occupancy

The purpose of this amendment to Park Use Permit 102714 (PUP) held by the Sunshine Coast Regional District (SCRD) is to increase the available late summer water supply from Chapman Creek through the installation of a temporary siphon system in Chapman Lake, which is located in the Tetrahedron Provincial Park.

Chapman Creek is the primary water supply to the Regional Water System on the Sunshine Coast and supplies water to approximately 23,000 people. In two out of the last five years, this water supply has become nearly depleted due to prolonged periods of drought and increased water demand during the summer season. To alleviate potential acute water shortage in 2017 and 2018, the SCRD is seeking approval from BC Parks (and the Ministry of Forests, Lands and Natural Resource Operations), to access an additional five meters of water storage (1 million cubic meters) in Chapman Lake should doing so become necessary.

In the immediate term, the SCRD is proposing to have the necessary permits in place to allow the temporary installation of a siphon in the event that the region experience another water shortage from a prolonged period of drought. The main drivers behind this request for a temporary amendment to the SCRD's PUP are:

- Meeting increased environmental flow targets for Chapman Creek established by the Ministry of Forests Lands and Natural Resource Operations (FLNRO) to facilitate fish migration as per recommendations from a fisheries biologist and requirements under the *Water Sustainability Act*;
- Uncertainties in short term weather projections: recent climate studies suggest that prolonged periods of drought in the South Coast could occur more frequently but shorter term weather forecasts of precipitation are highly unreliable; and
- Meeting increased summer season water demand (water use nearly doubles in the summer season from irrigation and tourism).

In order to both reduce demand and increase water supply from sources other than Chapman Creek, the SCRD is implementing demand and supply management in accordance with the Comprehensive Regional Water Plan (CRWP), including such measures as water metering, well protection measures, and groundwater resource investigation.

Also in accordance with the CRWP and outside of the scope of this amendment application, the SCRD is also in the process of obtaining approvals to deepen the channel in Chapman Lake which will permanently enhance redundancy in the water system. This is an essential measure in the medium term prior to the construction of long term source development projects specified in the SCRD's CRWP are constructed.

b. Details of existing uses, vegetation cover, wildlife present, water resources, geology, and historical and cultural significance

Existing uses

The existing uses for the proposed area within this PUP amendment application are for water impoundment and a helicopter pad.

Studies

The SCRD has undertaken various studies which indirectly or directly impact the siphon installation project. Previous studies submitted to BC Parks are included in Appendix A & B.

Vegetation Cover

Vegetation Overview

Forest cover around Chapman Lake and the upper Chapman Creek watershed consists of Mountain Hemlock (*Tsuga mertensiana*), Yellow Cedar (*Chamaecyparis nootkatensis*) and Pacific Silver (Amabilis) fir (*Abies amabilis*), while lower elevations in Tetrahedron Provincial Park contain Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*; Triton 2006). The canopy formed by the tree cover varies from relatively open to dense. Throughout the park, semi-open meadows, marsh complexes, and areas of dense shrub [e.g., blueberry (*Vaccinium sp.*)] are also found.

The mid and lower reaches of the Chapman Creek watershed, outside the park boundaries, fall within the Coastal Western Hemlock biogeoclimatic zone (CWHm), and are characterized by forests dominated by Douglas fir (*Pseudotsuga menziesii var. menziesii*), Western Hemlock, Western Red Cedar and a variety of understory shrub species. Widespread logging and associated disturbance and revegetation have resulted in a change in forest composition from old-growth conifer forests to communities with a higher proportion of broadleaved trees. Much of the riparian zone in the mid and lower reaches of Chapman Creek now consists of alder stands. The park is situated within the Southern Pacific Ranges ecosection and Coastal Western Hemlock/Mountain Hemlock biogeoclimatic zones. The park contains one of the oldest undisturbed forests in Canada with stands containing trees over 1,000 years. Semi-open meadows, marsh complexes and dense understorey (e.g. blueberry) are characteristic of the park, which also contains ten lakes.

Riparian Vegetation

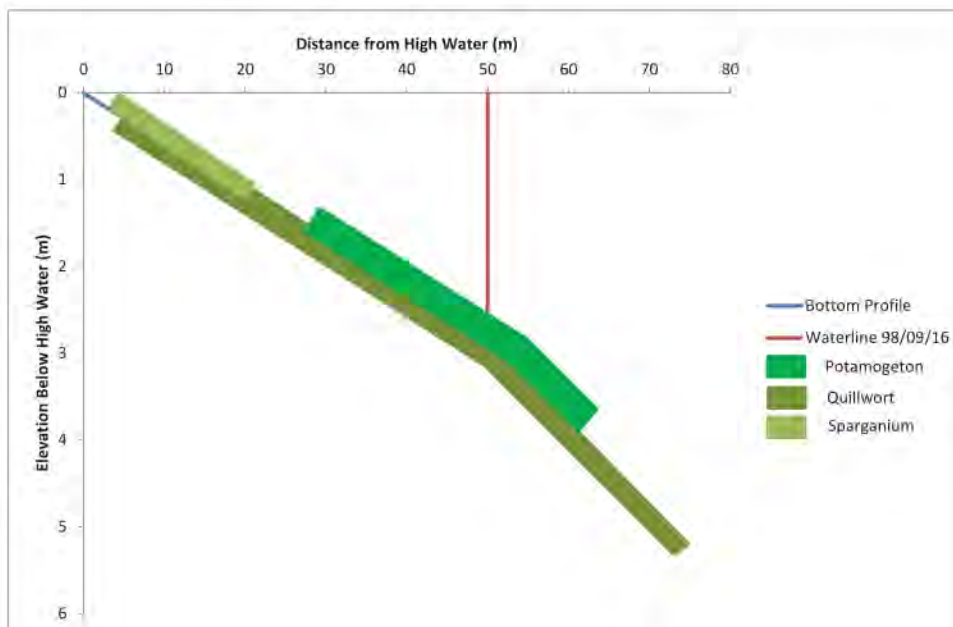
The riparian area is largely forested to the high water level with several smaller areas where shrubs and/or herbaceous species predominate. The four habitat types identified include forest, shrub land, wet meadow and wetland/aquatic. Forest vegetation consisted of Mountain Hemlock and Amabilis Fir with some Yellow Cedar. The shrub layer was dominated by Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*) with the herb layer consisting of moss. Meadow and wetland areas contained a graduation from one to the other with an increase in soil moisture. Meadow areas tended to be moist due to subsurface drainage from hillslope areas. Vegetation growth within the lake that was less than 2 m in depth was considered part of the wetland habitat.

Aquatic Vegetation

Aquatic vegetation transects were conducted in Chapman Lake during late summer of 1998. Aquatic plants surveyed were limited to submergent species; however, water levels in the lake were below normal high water levels. The dominant species inventoried consisted of bristle-like quillwort (*Isoetes echinospora*) and was observed growing on suitable substrates throughout the lake. Dominant plant species typically occur between the 1 m and 4 m below the high water level. Narrow-leaved bur-reed (*Sparganium sp.*) and pondweed (*Potamogeton sp.*) were observed on the exposed or shallow lake areas, particularly at the east end of the lake. Figure 1 illustrates the zonation of aquatic vegetation in Chapman Lake from the survey transects for the study completed in 1998.

The main disturbance to aquatic vegetation during operations was identified as desiccation due to drying; however, it was noted that drying stress is already present seasonally in the littoral zone where most of the aquatic vegetation occurs and the dominant plant (quillwort) appeared to be very tolerant to desiccation under existing water level fluctuations in the reservoir. It is likely that the reduced growing season caused by existing drawdown leads to increased thermal drying stress on bur-reed and pondweed and abundance levels were low.

Figure 1. Zonation of Aquatic Vegetation in Chapman Lake



Source: Whitehead 1999

Sensitive Species

A list of plant species potentially within the study area was compiled using the BC Conservation Data Centre database. The same search categories as above were used to compile the information. Table 1 provides a summary of the resulting species, including the BC designation and Species at Risk statuses. A total of seven sensitive BC species were identified, with no SARA listed species results.

Table 1. Sensitive Plant Species in the Sunshine Coast Forest District

Common Name	Scientific Name	Species Type	BC Status	SARA Status
elegant Jacob's-ladder	<i>Polemonium elegans</i>	Dicot	Blue	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Monocot	Blue	
poison oak	<i>Toxicodendron diversilobum</i>	Dicot	Blue	
Roell's brotherella	<i>Brotherella roellii</i>	Nonvascular plant	Red	
slimleaf onion	<i>Allium amplexans</i>	Monocot	Blue	
small spike-rush	<i>Eleocharis parvula</i>	Monocot	Blue	
snow bramble	<i>Rubus nivalis</i>	Dicot	Blue	

A search was also conducted in the BC Conservation Data Centre database for terrestrial ecological communities in the area surrounding Chapman Lake. Criteria used to focus the search results was applied using the regional and forest districts for the Sunshine Coast filters. In addition, the biogeoclimatic zone of Coastal Western Hemlock, subzone very wet maritime and montane (CHWvm2) variant filters were applied. Table 2 below provides the results of the ecological community database search of the area, which includes BC sensitive species status.

Table 2. Sensitive Ecological Community Plant Species in the Sunshine Coast, Coastal Western Hemlock Biogeoclimatic Zone (CHWvm2)

Common Name	Scientific Name	BC Status	Endemic
Amabilis fir - Sitka Spruce / devil's club	<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	
Amabilis fir - Western Red cedar / salmonberry Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Yellow	
amabilis fir - western red cedar / three-leaved foamflower Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Wet Maritime	Yellow	
Sitka sedge / peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	Y
Sitka willow / Sitka sedge	<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Blue	Y
western redcedar - western hemlock / sword fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	
western redcedar - yellow-cedar / spleenwort-leaved goldthread	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis asplenifolia</i>	Yellow	
western redcedar - yellow-cedar / skunk cabbage	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Lysichiton americanus</i>	Yellow	
western hemlock - amabilis fir / deer fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	
western hemlock - amabilis fir / Alaskan blueberry	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Vaccinium alaskaense</i>	Yellow	
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Wildlife Resources

Wildlife values within the Chapman Creek watershed are not well known and information is limited. The watershed appears to support populations of Columbian black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), cougar (*Puma concolor*) and other furbearing animals. Other wildlife known to use the watershed include: waterfowl, gulls, shorebirds, raptors, upland game birds, woodpeckers, a variety of songbirds, small mammals, amphibians and reptiles. Species recorded in Tetrahedron Provincial Park include: mountain goat (*Oreamnos americanus*), coyote (*Canis latrans*), mink (*Mustela vison*), marten (*Martes Americana*), river otter (*Lontra canadensis*) and bobcat (*Lynx rufus*), a variety of rodents, rock ptarmigan (*Lagopus muta*), woodpecker, grouse, ravens (*Corvus corax*), and marbled murrelets (*Brachyramphus marmoratus*; MELP 1997). It is thought that many of the larger animals tend to be transient users wildlife corridors to pass through the park. Hunting is prohibited within the park; however, the lower reaches of the watershed provide recreational hunting opportunities. There are no approved Wildlife Habitat Areas in the assessment area. There is a lack of emergent vegetation (e.g., cattail, bulrush) within the high water perimeter of Chapman Lake, however, some limited opportunities for nesting birds is available in this area.

Fish Values

Chapman Creek is a salmon bearing creek with populations of Coho, Chum, and Pink salmon. Populations of rainbow and cutthroat trout and steelhead are also present in Chapman Creek. A salmon hatchery also exists on the creek where populations of Coho salmon are raised.

For most years, the timing of instream flow requirements to support Coho and Chum salmon coincide with the fall rains as salmon runs for both of these salmon species peak in October and November. Pink salmon tend to start their run in August and September. In years where water supplies are limited and at risk of becoming fully depleted, the minimum instream flows are targeted in order to prolong the available water supply for as long as possible.

Sensitive Wildlife Species

A list of sensitive wildlife species potentially found in the study area was compiled using the BC Conservation Data Centre database. The search categories used to compile the information included a search of the Sunshine Coast Forest District and refining the search results using the Coastal Western Hemlock and Mountain Hemlock biogeoclimatic zones. Habitat types used to further filter survey results included forest, grassland/shrub, lakes, riparian, stream/river and wetland. BC Red listed species include any plant, animal or plant community that is extirpated, endangered or threatened and Blue listed species are considered to be of special concern in BC, but are not extirpated, endangered or threatened. The Species at Risk Act, Schedule 1, is federal government legislation enacted to protect extirpated, endangered and threatened species and species of special concern across Canada. A total of 45 sensitive BC wildlife species were identified, with 16 SARA listed species results.

Water Resources

The Chapman Creek watershed (Watershed Code: 900-120400) is located approximately 5 km east of Sechelt, BC and provides approximately 85% of the drinking water and fire protection for more than 23,000 residents between Langdale and Earl's Cove, including the District of Sechelt. Water storage is provided by both Chapman and Edwards Lakes which are located on the Tetrahedron Plateau in

Tetrahedron Provincial Park. A control structure on Edwards Lake allows water to be released when required to augment flows in Chapman Creek.

Chapman Creek flows south from the Tetrahedron Plateau for approximately 24 km and discharges into the Strait of Georgia. Chapman Creek watershed is approximately 73 km² in area and the drinking water intake is located approximately 175 m above sea level and 7.5 km upstream of the mouth of Chapman Creek. Approximately 65 km² of the Chapman Creek watershed is located above the SCRD water intake.

Chapman Lake

Chapman Lake lies at an elevation of 974m above sea level in steeply sloping terrain; surrounding ridgetops and peaks typically reach more than 1,500 m elevation. The lake has a surface area of 31.2 ha and a maximum depth of approximately 30 m, making it the largest lake in the Chapman Creek watershed. The catchment area of the lake is 6.58 km², and the lake is fed by 2 main streams, both of which enter at the east end of the lake. The lake volume at the high water level is approximately 3.7 million m³ with an average outflow rate of 0.476 m³/s. Based on these data, the average retention time of water in the lake is approximately 90 days. The short retention time reflects the high level of precipitation in the watershed. Outflow from the lake is controlled by a concrete dam and valve located on the west side of the lake and operated by the SCRD. During a typical year, water stored behind the dam is allowed to overflow naturally until there is a need to supplement the flows to Chapman Creek, at which time the dam is opened to release stored water from the reservoir. The annual lake level variation is currently between 1.5 m to 3 m.

Chapman Lake Water Quality

Whitehead (1999) reported the results of limited water quality monitoring on Chapman Lake. Parameters measured included Secchi disc transparency, temperature and dissolved oxygen. The Secchi disk indicated clear water with a reading at 6.5 metres. Temperature and dissolved oxygen results ranged from 16°C at the surface to 7°C at depth and from 16 mg/l at the surface to 6.5 mg/l at depth, and indicated the lake was stratified with a thermocline between 2 m and 3 m. During the monitoring program gas bubbles were observed throughout the lake and particularly at the east end in the shallower areas. Based on the smell of hydrogen sulphide it was concluded the gas bubbles were originating from anaerobic decomposition originating in the lake sediments.

Chapman Lake Water Quantity

A water demand and supply analysis under changing climatic conditions was conducted on the Chapman water system on the Sunshine Coast. The study assessed the impacts of climate change on water consumption and water supply within the Chapman watershed. Historic temperature, precipitation and discharge data were collected to determine historic trends. The impacts from Pacific Decadal Oscillations and El Niño Southern Oscillations on climate and discharge were analyzed to determine the impacts of climate change.

The results from this study indicated that climate patterns on the Sunshine Coast have changed over the last 50 years, with annual average temperatures increasing by approximately 2°C and average total annual precipitation decreasing by 24 mm. Climate trends were determined to impact the available water supply as temperatures and snowpack elevation were increasing. This increased temperatures and diminishing snow pack is causing the snow to melt earlier and more rapidly during the spring season.

and existing streamflow regime in Chapman Creek is shifting towards a more rain dominated regime, which would change the entire water holding dynamic of the watershed. Discharge data further showed that peak discharge occurred earlier in the spring, which affects summer base flows when demand for domestic distribution and environmental services was highest. Climate conditions during the summer season were also determined to be impacting supply as the increasing temperatures were assumed to cause the snowpack to be depleted earlier in the summer season and the decreasing trends in precipitation were resulting in less recharge to storage reservoirs.

The increases in temperature and decreases in precipitation trends were shown to be correlated to water consumption during the summer season when water supplies are the most limited. The significant correlation between water consumption and temperature and precipitation identifies how climate change may impact water consumption behaviors on the Sunshine Coast.

Sunshine Coast climate is characterized by cool and wet winters and warm and dry summers (Figure 3). The summer season is the critical time of year for water supply, as this is when water demand is highest and available water supply is most limited. Trends over the last 50 years are suggesting that summer temperatures are increasing (Figure 4) and total summer precipitation is decreasing (Figure 5).

Figure 2. Annual average total monthly precipitation and average monthly temperature in Gibsons, BC (1962 to 2013)

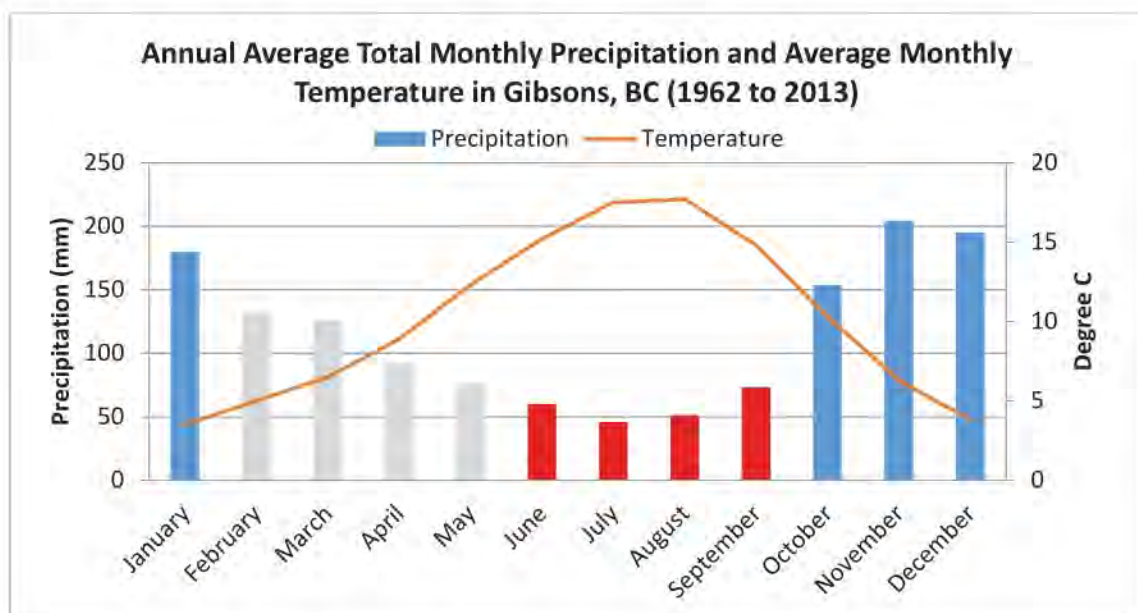


Figure 3. Historic monthly mean temperatures for July to September collected in Gibsons, BC from 1962 to 2013

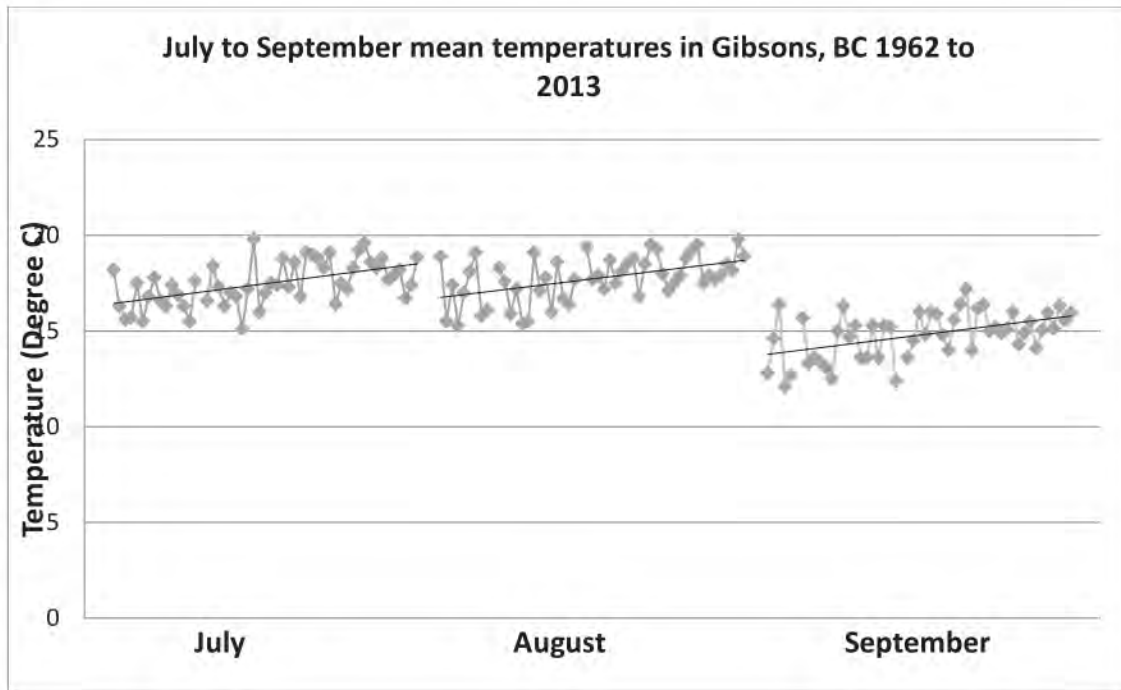
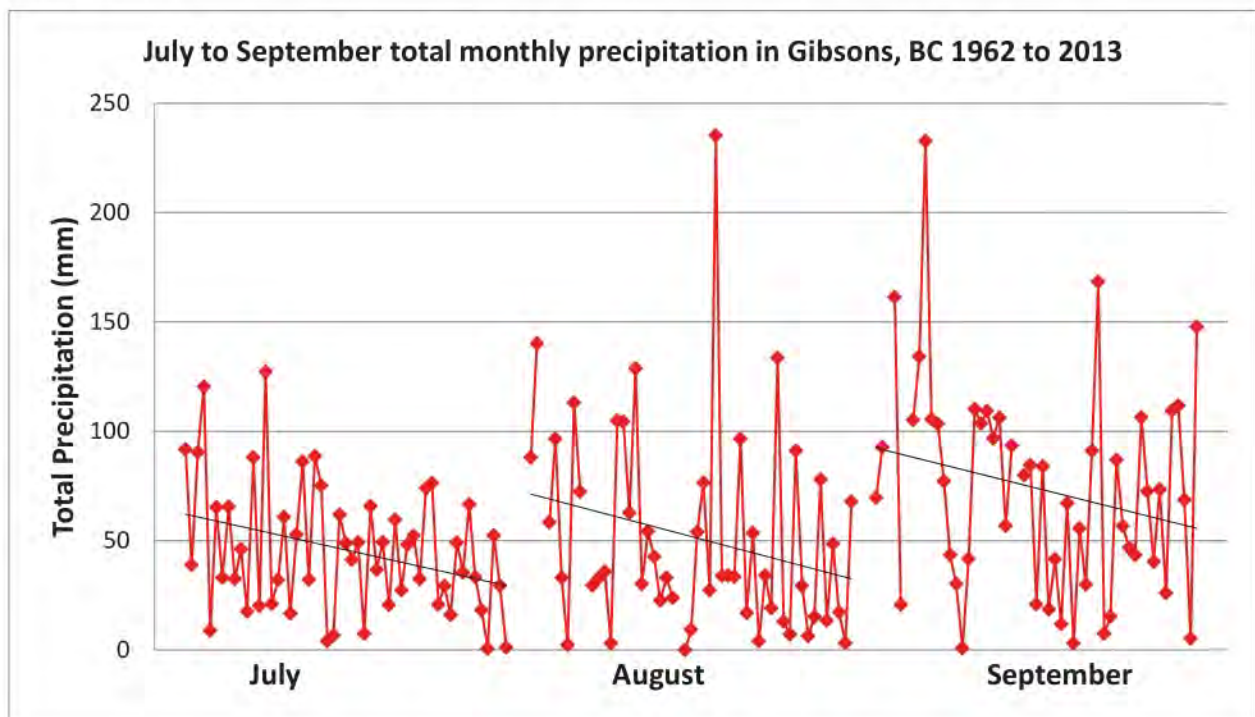


Figure 4: Historic monthly total monthly precipitation for July to October collected in Gibsons, BC from 1962 to 2013



As part of the study, a sensitivity analysis was completed and identified that the total water consumption during the summer could regularly exceed the equivalent to the available water supply in the next 10 years if water demand does not change, snow pack continues to decrease in the winter, summer temperatures increase by an average 1 or 2 °C, and prolonged droughts become more common.

Geology

Chapman Lake lies within an area of granite rock of the late Jurassic and early Cretaceous ages (156 to 114 million years old), characterised as quartz diorite. Coastal watersheds underlain by rock types such as quartz diorite tend to be slightly acidic due to the low buffering capacity of these rocks and the natural low pH of rainfall.

The dominant soil-types within the Chapman watershed contain large concentrations of organically combined iron and aluminum in their subsoils. In poorly-drained soils on the Tetrahedron Plateau organic matter is not broken down as quickly as in areas of well-drained soils, which means that organic and clay colloids, and aluminum and iron compounds are common elements in the water supply and characterize the natural water quality in this area.

Historical and Cultural Significance

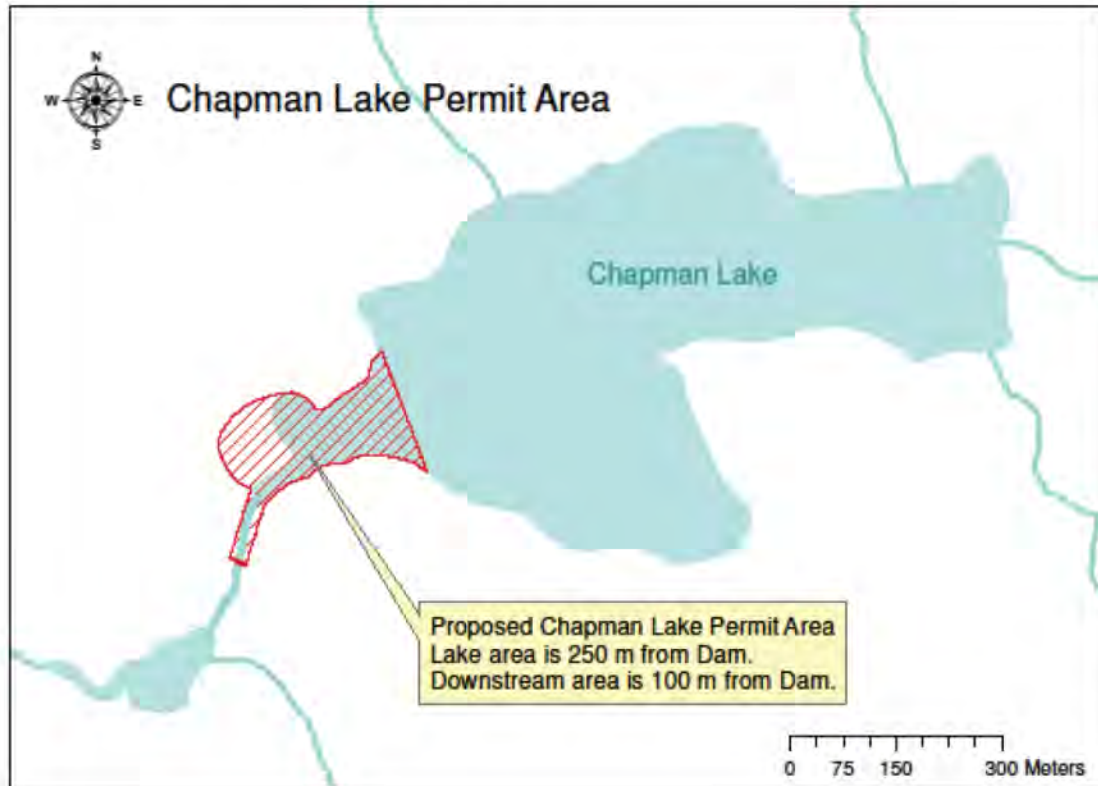
There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shíshálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

c. Location and size of all proposed and current improvements

Location

The location of the proposed permit area is outlined in the Figure below.

Figure 5. Proposed amended permit area at Chapman Lake



Siphon Design

The siphon consists of five parallel 200 mm HDPE pipes that are 255 m in length. The siphon will run over the existing dam structure from Chapman Lake into Chapman Creek. The inlet will be installed at an elevation of 963 m which is approximately 11 m below the top of the dam and will reach into the lake approximately 180 m from the existing dam. The inlets will be secured and anchored in place using concrete blocks and buoys. The outlet of the pipe will be located approximately 50 meters downstream of the existing dam at an approximate elevation of 965 m. Refer to attached engineering design drawings.

Siphon Construction

The installation of the siphon system will involve transportation of pre-fused sections of HDPE pipe to Chapman Lake via helicopter. The installation process will begin with laying the outlet pipe (with attached gate valve) then will proceed with laying the subsequent lengths of that pipe, ending with the inlet pipe (with attached check valve and buoy). The sections of pipe will be bolted together at Chapman Lake and the inlet pipe will be tied-off to lake bed anchor blocks. This process will be duplicated for a second complete siphon length. Once the first two pipe lengths are assembled and in place, the

pump/vacuum and blow-off ports will be constructed at the high point of each pipe. The siphons will be primed and commissioned as soon as possible after completion of construction. The operation of the first two siphons will be monitored for 24 hours by the SCRD Siphon Technicians. If the operation of the first two siphon lengths is considered to be a success, the remaining lengths will be constructed through the same process as the previous two. For construction details, refer to the Detailed Chapman Lake Siphon System Workplan and Timeline.

If the siphon is considered to be unsuccessful after 24 hours of operation, alternative options will be considered in consultation with First Nations, BC Parks, and MFLNRO.

d. If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes

The physical changes and the proposed mitigation strategies are outlined in the table below.

Table 3. Physical changes and proposed mitigation measures from the proposed works

Physical changes	Proposed mitigation
Lake bed disturbance from machine activity when assembling the pipes	Operating the machine in the upper areas of the exposed lake bed where the ground cover is compacted and disturbance is minimal. In sensitive areas where lake grasses are present or ground conditions are softer, $\frac{3}{4}$ " plywood will be placed on the ground to form a track and reduce any significant disturbance from a machine.
Excavating benches where necessary within the lake bed for the level placement of the lock blocks	An excavator will be used to dig out a flat area for placement of the lock blocks. The area to be disturbed will be sized according to the size of the lock blocks to minimize disturbance. This work will occur when the lake level is below the location where the lock block will be placed to minimize any sedimentation into the lake.
Soil disturbance from machine activity	Machine access routes will be flagged at predetermined locations and routes in advance to minimize vegetation disturbance and to concentrate all disturbance from the machine into a small area as possible.

e. Construction Schedule (if applicable) for proposed new permanent and/or temporary facilities

A project of this nature has numerous variables that impact timing (e.g. weather, water demand etc.). The dates for the construction schedule are unknown until it is realized that the siphon is needed, which is when the water supply has approximately 30 days remaining.

From when the decision is made to install the siphon, construction and commissioning are estimated at 35 days of which approximately eight days will be in channel/lake work.

f. Photographs of the site and area adjacent to the proposed land use/occupancy

Figure 6. The proposed site at Chapman Lake showing the proposed alignment of the siphon lines and the sensitive aquatic grassy area to be protected as detailed in Table 3.



Figure 7. Site plan at Chapman Lake showing the camp area, access pad, proposed alignment of the siphon pipes, and general assembly area.

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g. Type of transportation and access route to the proposed site

Helicopter will be the primary mode of transport to and from the proposed site.

h. Initial five year operational plan

Because this is a short term plan, there is no intention of operating this siphon system for five years. Once the siphons are operational, the operational plan will consist of having at least one person on site at all times to ensure that the siphons are in operation and to also address any issues with operation in a timely manner.

Section B – Experiences of the Applicant

Park Use Permit - The SCRD has held a Park Use Permit (PUP) for the purposes of maintaining water impoundment infrastructure at Chapman and Edwards Lake and a helicopter pad at Chapman Lake in Tetrahedron Park since the park was established. The SCRD's PUP was renewed February 1, 2014 and the current PUP No. 102714 is valid until January 31, 2024

Constructing waterworks – The Sunshine Coast Regional District's waterworks crew consist of staff members who have been installing waterworks infrastructure for over 30 years.

Environmental management/monitoring – The SCRD has personal on staff who have extensive experience in environmental management, including experience in designing, implementing and monitoring Environmental Monitoring Plans.

Section C – Potential Impacts

a. Impacts and mitigation measures on vegetation, wildlife and watercourses

Table 4. Impacts and mitigation measures on vegetation, wildlife, and watercourses

Introduction of invasive plants	All machines and equipment to be used for this project will be cleaned and inspected prior to being used at the lake for the construction and operation of the siphon. This strategy is intended to prevent the spread or introduction of invasive plants through the transport of machines and equipment.
Soil and vegetation disturbance from temporary camp to be used during installation and operation of the siphon	The periphery of areas required for accommodation, staging and construction will be marked with flagging. All personnel who will be working on site will be directed during orientation to concentrate all of the activity and foot traffic to select areas only.
Disturbance to Wildlife	<p>All wildlife observations and encounters will be recorded. This will include any instances where wildlife activity is disturbed from personnel working at the site.</p> <p>Minimizing attractants to wildlife will be achieved through sound waste management. Food waste or any other waste that may attract wildlife will be contained in a lockable bear-proof container. The waste generated from the site will be removed on an as needed basis. A portable toilet will be available and all human waste will be collected in the toilet and flown off site as needed.</p>
Disturbance from a petrochemical spill	<p>To mitigate the impacts from any potential petrochemical spill, all machinery with hydraulics will use vegetable oil wherever possible. A spill kit will be on stand-by to contain any spills should they occur and spill response training will be provided to operators and staff. While fueling equipment, containment will be maintained by using soaker cloth under the area of where the filling is occurring. The pumps used for priming the siphons will be housed in containment boxes lined with plastic.</p> <p>In the event of a spill, the spill will be reported to the Spills Reporting Line and the Lead Environmental Monitor (EM) will be contacted and will provide mitigation advice. Depending on the severity of the spill the EM will be brought to the site as soon as possible to oversee mitigation measures. An onsite staff or operator will be required to record the causes of the spill, the response undertaken and the apparent effects of the spill.</p>
Disturbance from erosion and sediment laden run-off	The risk of erosion and sedimentation is highest when periods of intense rainfall coincide with active construction. These risks will be minimized by ensuring the construction takes place during dry conditions. The exposed lake bed on the south side of the outlet channel will be where the assembly and moving of the pipe will occur and the setting of lock blocks to anchor the pipe. Construction activity will occur on the most compacted ground accessible below the high

	water mark where the substrate consists of a shallow layer of sandy loam above glacial till and bedrock. This area is considered to be stable and the risk that planned activities will result in a rise in creek turbidity over the background level is considered to be low.
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b. Impacts to watercourses or water bodies

Refer to Table 3.

c. Special features

N/A

d. Impacts on Park access

Access to the park will not be impacted from the proposed works.

e. Impacts to aesthetics and visual values

The location of the proposed works is not visible from any trails with the park and therefore is expected to have no impacts to landscape aesthetics or visual values (see also section g).

f. Impacts on cultural values including traditional use by First Nations

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shíshálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

g. Impacts to park users

Although no park trails intersect with the proposed location for the works, park users who are on any nearby trails may be impacted when the siphon pipes, equipment, or personnel are being transported by helicopter. This potential disturbance to park users will be mitigated through notification of schedule of works to BC parks and appropriate signage within the park to notify users of the works.

Figure 5. General location of Chapman Lake

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Park Use Permit application (temporary amendment) – Sunshine Coast Regional District – Siphon at Chapman Lake

Part 3:

Section A – Proposed Activity

a. Purpose of Land use or occupancy

The purpose of this amendment to Park Use Permit 102714 (PUP) held by the Sunshine Coast Regional District (SCRD) is to increase the available late summer water supply from Chapman Creek through the installation of a temporary siphon system in Chapman Lake, which is located in the Tetrahedron Provincial Park.

Chapman Creek is the primary water supply to the Regional Water System on the Sunshine Coast and supplies water to approximately 23,000 people. In two out of the last five years, this water supply has become nearly depleted due to prolonged periods of drought and increased water demand during the summer season. To alleviate potential acute water shortage in 2017 and 2018, the SCRD is seeking approval from BC Parks (and the Ministry of Forests, Lands and Natural Resource Operations), to access an additional five meters of water storage (1 million cubic meters) in Chapman Lake should doing so become necessary.

In the immediate term, the SCRD is proposing to have the necessary permits in place to allow the temporary installation of a siphon in the event that the region experience another water shortage from a prolonged period of drought. The main drivers behind this request for a temporary amendment to the SCRD's PUP are:

- Meeting increased environmental flow targets for Chapman Creek established by the Ministry of Forests Lands and Natural Resource Operations (FLNRO) to facilitate fish migration as per recommendations from a fisheries biologist and requirements under the *Water Sustainability Act*;
- Uncertainties in short term weather projections: recent climate studies suggest that prolonged periods of drought in the South Coast could occur more frequently but shorter term weather forecasts of precipitation are highly unreliable; and
- Meeting increased summer season water demand (water use nearly doubles in the summer season from irrigation and tourism).

In order to both reduce demand and increase water supply from sources other than Chapman Creek, the SCRD is implementing demand and supply management in accordance with the Comprehensive Regional Water Plan (CRWP), including such measures as water metering, well protection measures, and groundwater resource investigation.

Also in accordance with the CRWP and outside of the scope of this amendment application, the SCRD is also in the process of obtaining approvals to deepen the channel in Chapman Lake which will permanently enhance redundancy in the water system. This is an essential measure in the medium term prior to the construction of long term source development projects specified in the SCRD's CRWP are constructed.

b. Details of existing uses, vegetation cover, wildlife present, water resources, geology, and historical and cultural significance

Existing uses

The existing uses for the proposed area within this PUP amendment application are for water impoundment and a helicopter pad.

Vegetation Cover

Vegetation Overview

Forest cover around Chapman Lake and the upper Chapman Creek watershed consists of Mountain Hemlock (*Tsuga mertensiana*), Yellow Cedar (*Chamaecyparis nootkatensis*) and Pacific Silver (Amabilis) fir (*Abies amabilis*), while lower elevations in Tetrahedron Provincial Park contain Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*; Triton 2006). The canopy formed by the tree cover varies from relatively open to dense. Throughout the park, semi-open meadows, marsh complexes, and areas of dense shrub [e.g., blueberry (*Vaccinium sp.*)] are also found.

The mid and lower reaches of the Chapman Creek watershed, outside the park boundaries, fall within the Coastal Western Hemlock biogeoclimatic zone (CWHm), and are characterized by forests dominated by Douglas fir (*Pseudotsuga menziesii var. menziesii*), Western Hemlock, Western Red Cedar and a variety of understory shrub species. Widespread logging and associated disturbance and revegetation have resulted in a change in forest composition from old-growth conifer forests to communities with a higher proportion of broadleaved trees. Much of the riparian zone in the mid and lower reaches of Chapman Creek now consists of alder stands. The park is situated within the Southern Pacific Ranges ecosection and Coastal Western Hemlock/Mountain Hemlock biogeoclimatic zones. The park contains one of the oldest undisturbed forests in Canada with stands containing trees over 1,000 years. Semi-open meadows, marsh complexes and dense understorey (e.g. blueberry) are characteristic of the park, which also contains ten lakes.

Riparian Vegetation

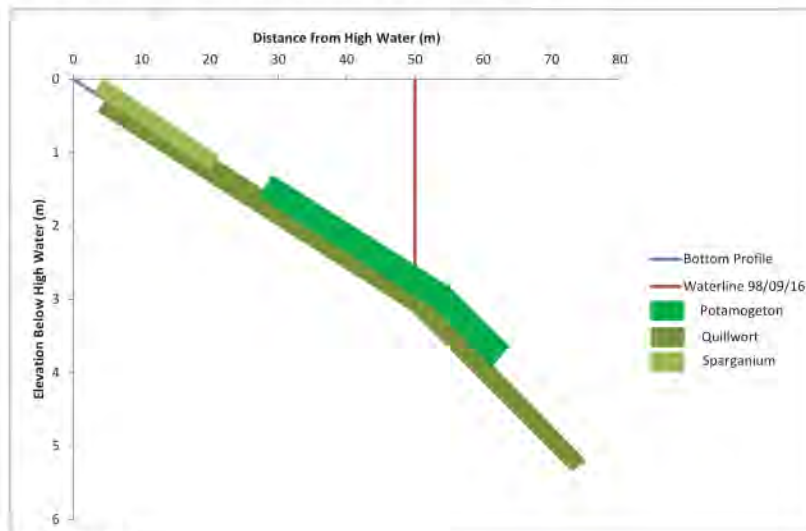
Riparian vegetation surveys were completed in 1998 as part of impact assessment from the 5 m lake depth to 5 m above the high water level. The riparian area is largely forested to the high water level with several smaller areas where shrubs and/or herbaceous species predominate. The four habitat types identified include forest, shrub land, wet meadow and wetland/aquatic. Forest vegetation consisted of Mountain Hemlock and Amabilis Fir with some Yellow Cedar. The shrub layer was dominated by Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*) with the herb layer consisting of moss. Meadow and wetland areas contained a graduation from one to the other with an increase in soil moisture. Meadow areas tended to be moist due to subsurface drainage from hillslope areas. Vegetation growth within the lake that was less than 2 m in depth was considered part of the wetland habitat.

Aquatic Vegetation

Aquatic vegetation transects were conducted in Chapman Lake during late summer of 1998. Aquatic plants surveyed were limited to submergent species; however, water levels in the lake were below normal high water levels. The dominant species inventoried consisted of bristle-like quillwort (*Isoetes echinospora*) and was observed growing on suitable substrates throughout the lake. Dominant plant species typically occur between the 1 m and 4 m below the high water level. Narrow-leaved bur-reed (*Sparganium sp.*) and pondweed (*Potamogeton sp.*) were observed on the exposed or shallow lake areas, particularly at the east end of the lake. Figure 1 illustrates the zonation of aquatic vegetation in Chapman Lake from the survey transects for the study completed in 1998.

The main disturbance to aquatic vegetation during operations was identified as desiccation due to drying; however, it was noted that drying stress is already present seasonally in the littoral zone where most of the aquatic vegetation occurs and the dominant plant (quillwort) appeared to be very tolerant to desiccation under existing water level fluctuations in the reservoir. It is likely that the reduced growing season caused by existing drawdown leads to increased thermal drying stress on bur-reed and pondweed and abundance levels were low.

Figure 1. Zonation of Aquatic Vegetation in Chapman Lake



Source: Whitehead 1999

Sensitive Species

A list of plant species potentially within the study area was compiled using the BC Conservation Data Centre database. The same search categories as above were used to compile the information. Table 1 provides a summary of the resulting species, including the BC designation and Species at Risk statuses. A total of seven sensitive BC species were identified, with no SARA listed species results.

Table 1. Sensitive Plant Species in the Sunshine Coast Forest District

Common Name	Scientific Name	Species Type	BC Status	SARA Status
elegant Jacob's-ladder	<i>Polemonium elegans</i>	Dicot	Blue	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Monocot	Blue	
poison oak	<i>Toxicodendron diversilobum</i>	Dicot	Blue	
Roell's brotherella	<i>Brotherella roellii</i>	Nonvascular plant	Red	
slimleaf onion	<i>Allium amplexans</i>	Monocot	Blue	
small spike-rush	<i>Eleocharis parvula</i>	Monocot	Blue	
snow bramble	<i>Rubus nivalis</i>	Dicot	Blue	

A search was also conducted in the BC Conservation Data Centre database for terrestrial ecological communities in the area surrounding Chapman Lake. Criteria used to focus the search results was applied using the regional and forest districts for the Sunshine Coast filters. In addition, the biogeoclimatic zone of Coastal Western Hemlock, subzone very wet maritime and montane (CHWvm2) variant filters were applied. Table 2 below provides the results of the ecological community database search of the area, which includes BC sensitive species status.

Table 2. Sensitive Ecological Community Plant Species in the Sunshine Coast, Coastal Western Hemlock Biogeoclimatic Zone (CHWvm2)

Common Name	Scientific Name	BC Status	Endemic
Amabilis fir - Sitka Spruce / devil's club	<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	
Amabilis fir - Western Red cedar / salmonberry Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Yellow	
amabilis fir - western red cedar / three-leaved foamflower Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Wet Maritime	Yellow	
Sitka sedge / peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	Y
Sitka willow / Sitka sedge	<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Blue	Y
western redcedar - western hemlock / sword fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	
western redcedar - yellow-cedar / spleenwort-leaved goldthread	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis asplenifolia</i>	Yellow	
western redcedar - yellow-cedar / skunk cabbage	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Lysichiton americanus</i>	Yellow	
western hemlock - amabilis fir / deer fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	
western hemlock - amabilis fir / Alaskan blueberry	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Vaccinium alaskaense</i>	Yellow	
western hemlock - lodgepole pine / grey reindeer	<i>Tsuga heterophylla</i> - <i>Pinus contorta</i> / <i>Cladina rangiferina</i>	Yellow	Y
western hemlock - western redcedar / salal Very Wet Maritime	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	Blue	Y
yellow-cedar / peat-mosses	<i>Xanthocyparis nootkatensis</i> / <i>Sphagnum</i> spp.	Yellow	

Wildlife Resources

Wildlife values within the Chapman Creek watershed are not well known and information is limited. The watershed appears to support populations of Columbian black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), cougar (*Puma concolor*) and other furbearing animals. Other wildlife known to use the watershed include: waterfowl, gulls, shorebirds, raptors, upland game birds, woodpeckers, a variety of songbirds, small mammals, amphibians and reptiles. Species recorded in Tetrahedron Provincial Park include: mountain goat (*Oreamnos americanus*), coyote (*Canis latrans*), mink (*Mustela vison*), marten (*Martes Americana*), river otter (*Lontra canadensis*) and bobcat (*Lynx rufus*), a variety of rodents, rock ptarmigan (*Lagopus muta*), woodpecker, grouse, ravens (*Corvus corax*), and marbled murrelets (*Brachyramphus marmoratus*; MELP 1997). It is thought that many of the larger animals tend to be transient users wildlife corridors to pass through the park. Hunting is prohibited within the park; however, the lower reaches of the watershed provide recreational hunting opportunities. There are no approved Wildlife Habitat Areas in the assessment area. There is a lack of emergent vegetation (e.g., cattail, bulrush) within the high water perimeter of Chapman Lake, however, some limited opportunities for nesting birds is available in this area.

Sensitive Wildlife Species

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Comment [DB1]: I think the number mentioned earlier in the report was 10k

Chapman Lake

Chapman Lake lies at an elevation of 976 m above sea level in steeply sloping terrain; surrounding ridgetops and peaks typically reach more than 1,500 m elevation. The lake has a surface area of 31.2 ha and a maximum depth of approximately 30 m, making it the largest lake in the Chapman Creek watershed. The catchment area of the lake is 6.58 km², and the lake is fed by 2 main streams, both of which enter at the east end of the lake. The lake volume at the high water level is approximately 3.7 million m³ with an average outflow rate of 0.476 m³/s. Based on these data, the average retention time of water in the lake is approximately 90 days. The short retention time reflects the high level of precipitation in the watershed. Outflow from the lake is controlled by a concrete dam and valve located on the west side of the lake and operated by the SCRD. During a typical year, water stored behind the dam is allowed to overflow naturally until there is a need to supplement the flows to Chapman Creek, at which time the dam is opened to release stored water from the reservoir. The annual lake level variation is currently between 1.5 m to 3 m.

Chapman Lake Water Quality

Whitehead (1999) reported the results of limited water quality monitoring on Chapman Lake. Parameters measured included Secchi disc transparency, temperature and dissolved oxygen. The Secchi disk indicated clear water with a reading at 6.5 metres. Temperature and dissolved oxygen results ranged from 16°C at the surface to 7°C at depth and from 16 mg/l at the surface to 6.5 mg/l at depth, and indicated the lake was stratified with a thermocline between 2 m and 3 m. During the monitoring program gas bubbles were observed throughout the lake and particularly at the east end in the shallower areas. Based on the smell of hydrogen sulphide it was concluded the gas bubbles were originating from anaerobic decomposition originating in the lake sediments.

Comment [DB2]: Check number. This is a little high for the elevation and temperature

Chapman Lake Water Quantity

A water demand and supply analysis under changing climatic conditions was conducted on the Chapman water system on the Sunshine Coast. The study assessed the impacts of climate change on water consumption and water supply within the Chapman watershed. Historic temperature, precipitation and discharge data were collected to determine historic trends. The impacts from Pacific Decadal Oscillations and El Niño Southern Oscillations on climate and discharge were analyzed to determine the impacts of climate change.

The results from this study indicated that climate patterns on the Sunshine Coast have changed over the last 50 years, with annual average temperatures increasing by approximately 2°C and average total annual precipitation decreasing by 24 mm. Climate trends were determined to impact the available water supply as temperatures and snowpack elevation were increasing. This increased temperatures and diminishing snow pack is causing the snow to melt earlier and more rapidly during the spring season and existing streamflow regime in Chapman Creek is shifting towards a more rain dominated regime, which would change the entire water holding dynamic of the watershed. Discharge data further showed that peak discharge occurred earlier in the spring, which affects summer base flows when demand for domestic distribution and environmental services was highest. Climate conditions during the summer season were also determined to be impacting supply as the increasing temperatures were assumed to cause the snowpack to be depleted earlier in the summer season and the decreasing trends in precipitation were resulting in less recharge to storage reservoirs.

The increases in temperature and decreases in precipitation trends were shown to be correlated to water consumption during the summer season when water supplies are the most limited. The significant correlation between water consumption and temperature and precipitation identifies how climate change may impact water consumption behaviors on the Sunshine Coast.

Sunshine Coast climate is characterized by cool and wet winters and warm and dry summers (Figure 3). The summer season is the critical time of year for water supply, as this is when water demand is highest and available water supply is most limited. Trends over the last 50 years are suggesting that summer temperatures are increasing (Figure 4) and total summer precipitation is decreasing (Figure 5).

Figure 2. Annual average total monthly precipitation and average monthly temperature in Gibsons, BC (1962 to 2013)

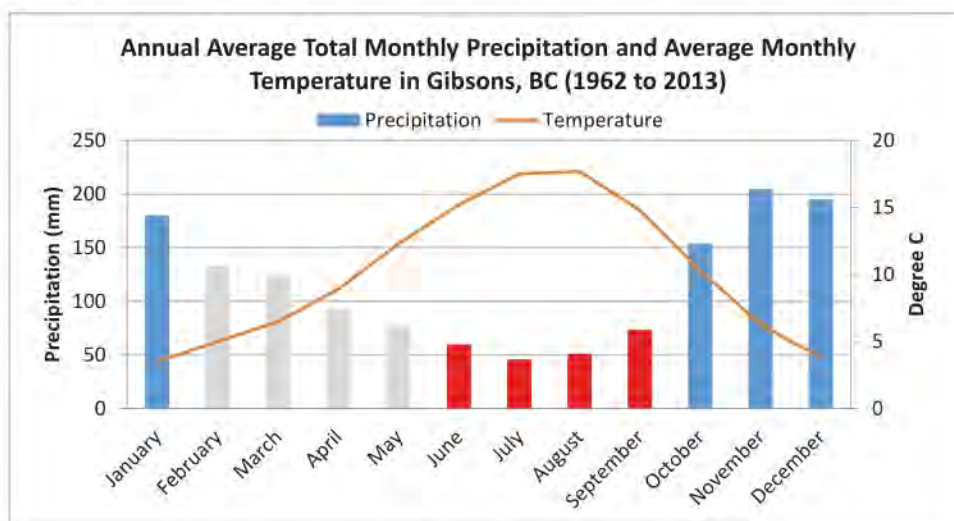
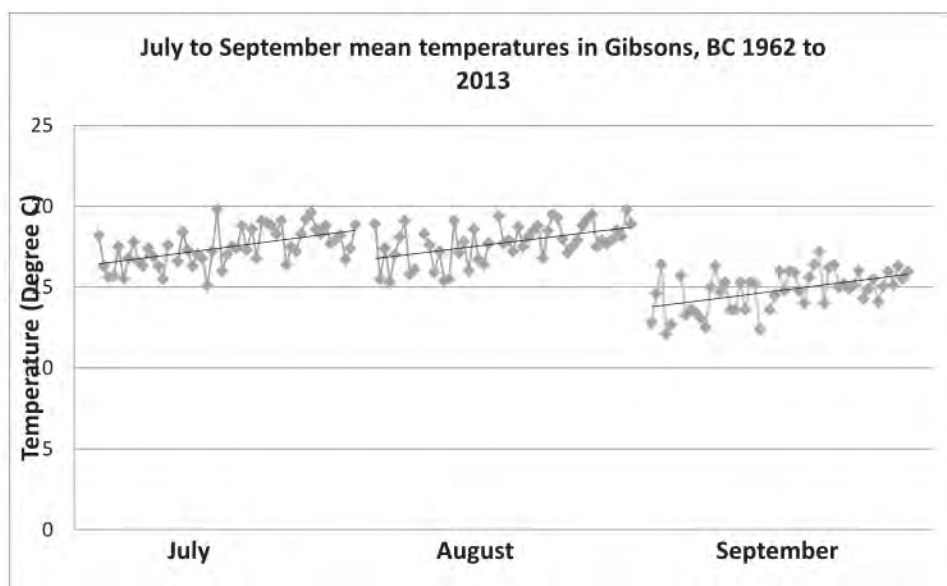


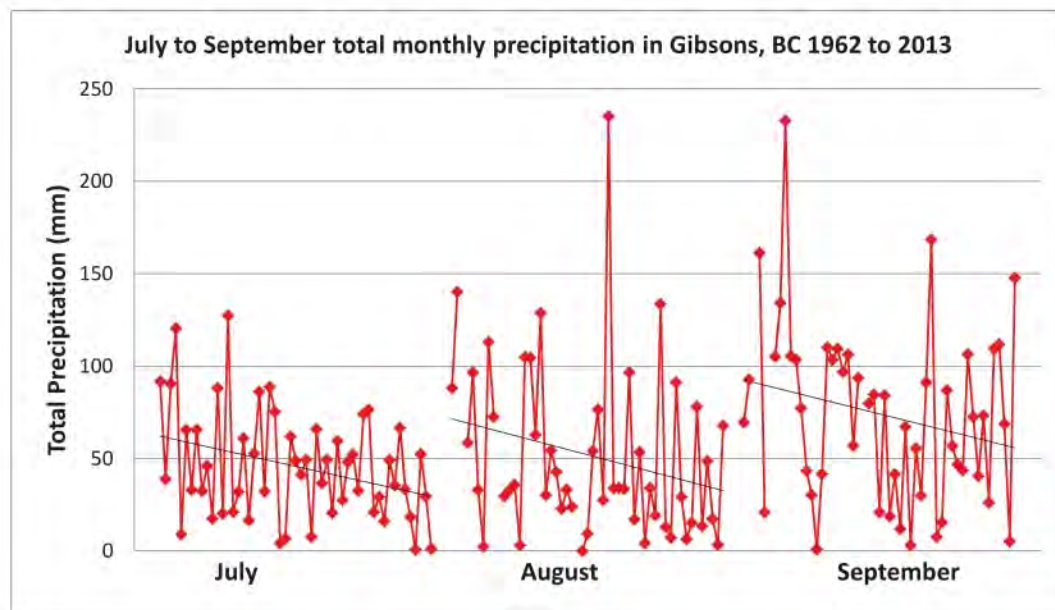
Figure 3. Historic monthly mean temperatures for July to September collected in Gibsons, BC from 1962 to 2013



*

*

Figure 4: Historic monthly total monthly precipitation for July to October collected in Gibsons, BC from 1962 to 2013



As part of the study, a sensitivity analysis was completed and identified that the total water consumption during the summer could regularly exceed the equivalent to the available water supply in the next 10 years if water demand does not change, snow pack continues to decrease in the winter, summer temperatures increase by an average 1 or 2 °C, and prolonged droughts become more common.

Geology

Chapman Lake lies within an area of granite rock of the late Jurassic and early Cretaceous ages (156 to 114 million years old), characterised as quartz diorite. Coastal watersheds underlain by rock types such as quartz diorite tend to be slightly acidic due to the low buffering capacity of these rocks and the natural low pH of rainfall.

The dominant soil-types within the Chapman watershed contain large concentrations of organically combined iron and aluminium in their subsoils. In poorly-drained soils on the Tetrahedron Plateau organic matter is not broken down as quickly as in areas of well-drained soils, which means that organic and clay colloids, and aluminium and iron compounds are common elements in the water supply and characterize the natural water quality in this area.

Historical and Cultural Significance

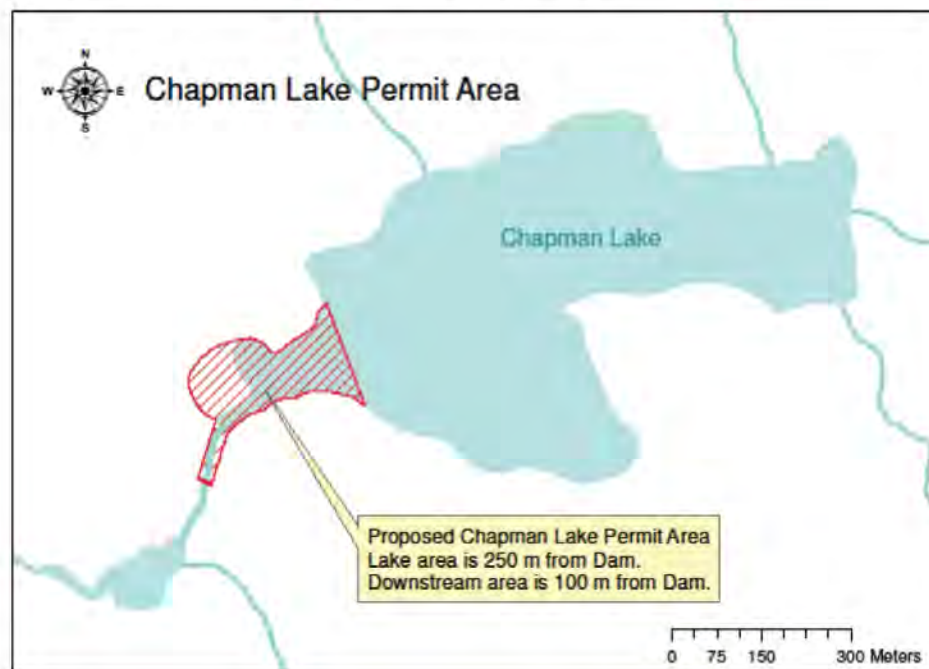
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c. Location and size of all proposed and current improvements

Location

The location of the proposed permit area is outlined in the Figure below.

Figure 5. Proposed amended permit area at Chapman Lake



Siphon Design

The siphon consists of five parallel 200 mm HDPE pipes that are 255 m in length. The siphon will run over the existing dam structure from Chapman Lake into Chapman Creek. The inlet will be installed at an elevation of 963 m which is approximately 11 m below the top of the dam and will reach into the lake approximately 180 m from the existing dam. The inlets will be secured and anchored in place using concrete blocks and buoys. The outlet of the pipe will be located approximately 50 meters downstream of the existing dam at an approximate elevation of 965 m. Refer to attached engineering design drawings.

Siphon Construction

The installation of the siphon system will involve transportation of pre-fused sections of HDPE pipe to Chapman Lake via helicopter. The installation process will begin with laying the outlet pipe (with attached gate valve) then will proceed with laying the subsequent lengths of that pipe, ending with the inlet pipe (with attached check valve and buoy). The sections of pipe will be bolted together at Chapman Lake and the inlet pipe will be tied-off to lake bed anchor blocks. This process will be duplicated for a second complete siphon length. Once the first two pipe lengths are assembled and in place, the

pump/vacuum and blow-off ports will be constructed at the high point of each pipe. The siphons will be primed and commissioned as soon as possible after completion of construction. The operation of the first two siphons will be monitored for 24 hours by the SCRD Siphon Technicians. If the operation of the first two siphon lengths is considered to be a success, the remaining lengths will be constructed through the same process as the previous two. For construction details, refer to the Detailed Construction Plan.

If the siphon is considered to be unsuccessful after 24 hours of operation, alternative options will be considered in consultation with First Nations, BC Parks, and MFLNRO.

d. If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes

The physical changes and the proposed mitigation strategies are outlined in the table below.

Table 3. Physical changes and proposed mitigation measures from the proposed works

Physical changes	Proposed mitigation
Lake bed disturbance from machine activity when assembling the pipes	Operating the machine in the upper areas of the exposed lake bed where the ground cover is compacted and disturbance is minimal. In sensitive areas where lake grasses are present or ground conditions are softer, $\frac{3}{4}$ " plywood will be placed on the ground to form a track and reduce any significant disturbance from a machine.
Excavating benches where necessary within the lake bed for the level placement of the lock blocks	An excavator will be used to dig out a flat area for placement of the lock blocks. The area to be disturbed will be sized according to the size of the lock blocks to minimize disturbance. This work will occur when the lake level is below the location where the lock block will be placed to minimize any sedimentation into the lake.
Soil disturbance from machine activity	Machine access routes will be flagged at predetermined locations and routes in advance to minimize vegetation disturbance and to concentrate all disturbance from the machine into a small of an area as possible.

e. Construction Schedule (if applicable) for proposed new permanent and/or temporary facilities

A project of this nature has numerous variables that impact timing (e.g. weather, water demand etc.). The dates for the construction schedule are unknown until it is realized that the siphon is needed, which is when the water supply has approximately 30 days remaining.

From when the decision is made to install the siphon, construction and commissioning are estimated at 35 days of which approximately eight days will be in channel/lake work.

f. Photographs of the site and area adjacent to the proposed land use/occupancy

Figure 6. The proposed site at Chapman Lake showing the proposed alignment of the siphon lines and the sensitive aquatic grassy area to be protected as detailed in Table 3.



Figure 7. Site plan at Chapman Lake showing the camp area, access pad, proposed alignment of the siphon pipes, and general assembly area.

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g. Type of transportation and access route to the proposed site

Helicopter will be the primary mode of transport to and from the proposed site.

h. Initial five year operational plan

Because this is a short term plan, there is no intention of operating this siphon system for five years. Once the siphons are operational, the operational plan will consist of having at least one person on site at all times to ensure that the siphons are in operation and to also address any issues with operation in a timely manner.

Section B – Experiences of the Applicant

Park Use Permit - The SCRD has held a Park Use Permit (PUP) for the purposes of maintaining water impoundment infrastructure at Chapman and Edwards Lake and a helicopter pad at Chapman Lake in Tetrahedron Park since the park was established. The SCRD's PUP was renewed February 1, 2014 and the current PUP No. 102714 is valid until January 31, 2024

Constructing waterworks – The Sunshine Coast Regional District's waterworks crew consist of staff members who have been installing waterworks infrastructure for over 30 years.

Environmental management/monitoring – The SCRD has personal on staff who have extensive experience in environmental management, including experience in designing, implementing and monitoring Environmental Monitoring Plans.

Section C – Potential Impacts

a. Impacts and mitigation measures on vegetation, wildlife and watercourses

Table 4. Impacts and mitigation measures on vegetation, wildlife, and watercourses

Introduction of invasive plants	All machines and equipment to be used for this project will be cleaned and inspected prior to being used at the lake for the construction and operation of the siphon. This strategy is intended to prevent the spread or introduction of invasive plants through the transport of machines and equipment.
Soil and vegetation disturbance from temporary camp to be used during installation and operation of the siphon	The periphery of areas required for accommodation, staging and construction will be marked with flagging. All personnel who will be working on site will be directed during orientation to concentrate all of the activity and foot traffic to select areas only.
Disturbance to Wildlife	<p>All wildlife observations and encounters will be recorded. This will include any instances where wildlife activity is disturbed from personnel working at the site.</p> <p>Minimizing attractants to wildlife will be achieved through sound waste management. Food waste or any other waste that may attract wildlife will be contained in a lockable bear-proof container. The waste generated from the site will be removed on an as needed basis. A portable toilet will be available and all human waste will be collected in the toilet and flown off site as needed.</p>
Disturbance from a petrochemical spill	<p>To mitigate the impacts from any potential petrochemical spill, all machinery with hydraulics will use vegetable oil wherever possible. A spill kit will be on stand-by to contain any spills should they occur and spill response training will be provided to operators and staff. While fueling equipment, containment will be maintained by using soaker cloth under the area of where the filling is occurring. The pumps used for priming the siphons will be housed in containment boxes lined with plastic.</p> <p>In the event of a spill, the spill will be reported to the Spills Reporting Line and the Lead Environmental Monitor (EM) will be contacted and will provide mitigation advice. Depending on the severity of the spill the EM will be brought to the site as soon as possible to oversee mitigation measures. An onsite staff or operator will be required to record the causes of the spill, the response undertaken and the apparent effects of the spill.</p>
Disturbance from erosion and sediment laden run-off	The risk of erosion and sedimentation is highest when periods of intense rainfall coincide with active construction. These risks will be minimized by ensuring the construction takes place during dry conditions. The exposed lake bed on the south side of the outlet channel will be where the assembly and moving of the pipe will occur and the setting of lock blocks to anchor the pipe. Construction activity will occur on the most compacted ground accessible below the high

	water mark where the substrate consists of a shallow layer of sandy loam above glacial till and bedrock. This area is considered to be stable and the risk that planned activities will result in a rise in creek turbidity over the background level is considered to be low.
--	--

b. Impacts to watercourses or water bodies

Refer to Table 3,

c. Special features

N/A

d. Impacts on Park access

Access to the park will not be impacted from the proposed works.

e. Impacts to aesthetics and visual values

The location of the proposed works is not visible from any trails with the park and therefore is expected to have no impacts to landscape aesthetics or visual values (see also section g).

f. Impacts on cultural values including traditional use by First Nations

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shishálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

g. Impacts to park users


Although no park trails intersect with the proposed location for the works, park users who are on any nearby trails may be impacted when the siphon pipes, equipment, or personnel are being transported by helicopter. This potential disturbance to park users will be mitigated through notification of schedule of works to BC parks and appropriate signage within the park to notify users of the works.

Figure 5. General location of Chapman Lake

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RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)

Friday, October 13, 2017
2:08 PM

Subject	RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)
From	Michael Day
To	Aikman, Jennie S ENV:EX
Cc	Rosenboom, Remko FLNR:EX; Janette Loveys
Sent	Wednesday, August 9, 2017 11:33 AM
Attachments	 2015-08-12 Siphon De...

Jennie,

I have been provided with a more current and correct design drawing than the one I attached earlier.

The prior version was correct in principal, but not in detail.

Please substitute this for the original.

Michael Day, P. Eng. | General Manager, Infrastructure Services / Regional Engineer

Infrastructure Services | Sunshine Coast Regional District

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

From: Michael Day

Sent: Wednesday, August 09, 2017 10:48 AM

To: Jennie.Aikman@gov.bc.ca

Cc: Remko Rosenboom (Remko.Rosenboom@gov.bc.ca) ; Janette Loveys

Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

Dear Jennie,

Re: Parks Use Permit 102714 Amendment Application

As per CAO Loveys earlier email, please note the attached Parks Use Permit (PUP) Amendment application form and associated supporting documents.

I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and followed up again today. Chris August, Implementation and Compliance Manager, has verbally expressed his willingness to provide a letter of support for the temporary siphon application. I have received some assurance a letter of support will be provided by Monday, August 14th.

I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.

If you have any questions or concerns, please contact me directly at:

E-mail: michael.day@scrd.ca

Office: +1 (604) 885-6810

Mobile: +1 (604) 740-1452

Best Regards,

Michael Day, P. Eng. | General Manager, Infrastructure Services and Regional Engineer

Infrastructure Services | Sunshine Coast Regional District

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

Fax: 604.885.7909

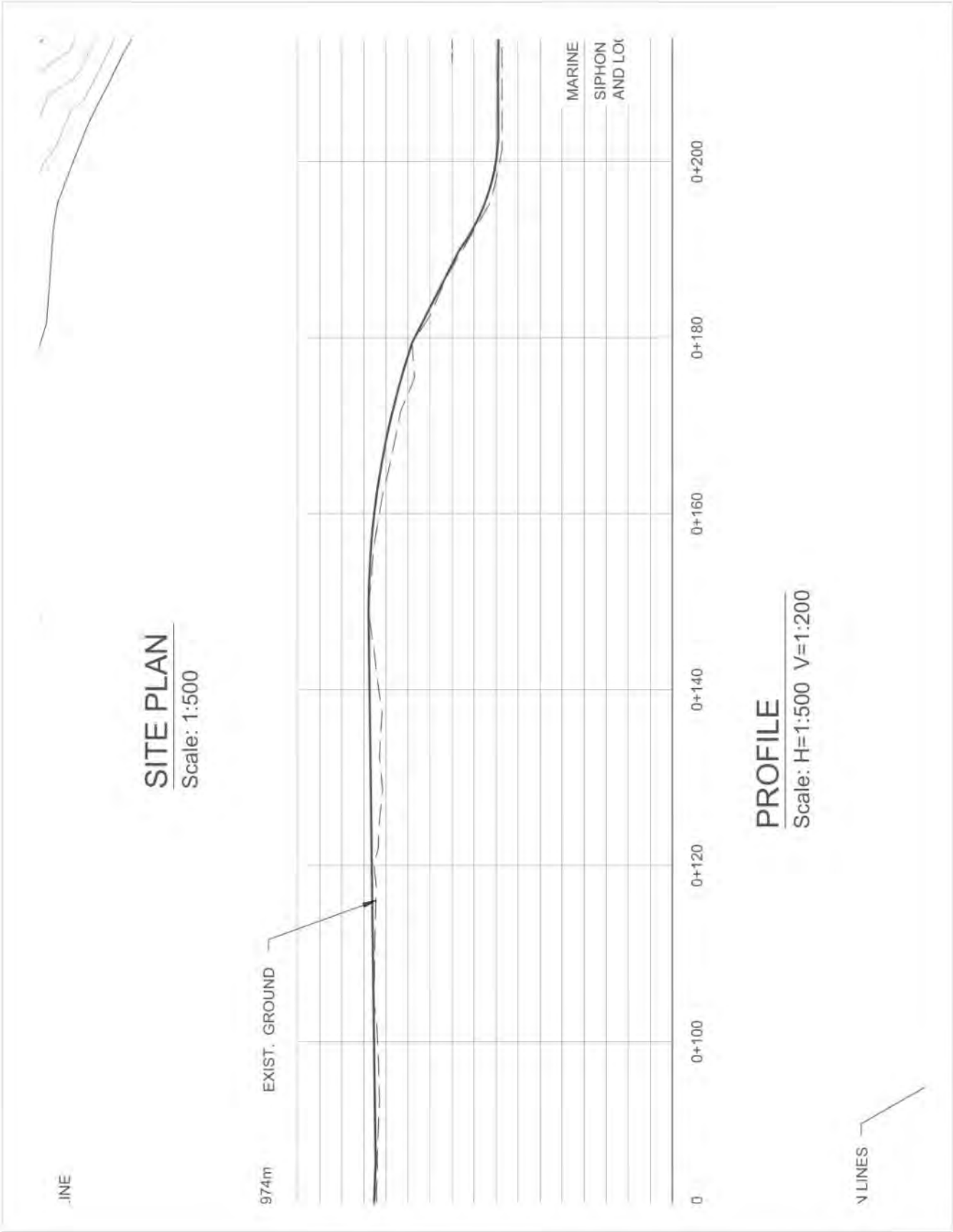
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RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)

Thursday, October 12, 2017
11:08 AM

Subject	RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)
From	Michael Day
To	Aikman, Jennie S ENV:EX
Cc	Rosenboom, Remko FLNR:EX; Janette Loveys
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FYI: Parks Use Permit 102714 Amendment Application re: temporary siphon

Thursday, October 12, 2017
2:39 PM

Subject	FYI: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Aikman, Jennie S ENV:EX
To	Dalziel, Rod ENV:EX; Coupur, Meghan FLNR:EX
Sent	Thursday, August 10, 2017 9:25 AM
Attachments	 2015 Chapman ...  2017-08-08 Park use p...  2017-08-09 MOE Park ...  RE Parks Use Permi...

Hello Rob and Meghan,

We have received the attached PUP amendment application from the SCRD.

Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.

Thanks.

Jennie

Jennie Aikman

Regional Director, South Coast Region

BC Parks | Ministry of Environment

Office phone: (604) 924-2227

Cell phone: (778) 875-8494

BC Parks has recently launched new speciality plates! [Get your BC Parks licence plate today.](#)



From: Michael Day [<mailto:Michael.Day@scrd.ca>]

Sent: Wednesday, August 9, 2017 10:48 AM

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Cc: Rosenboom, Remko FLNR:EX; Janette Loveys

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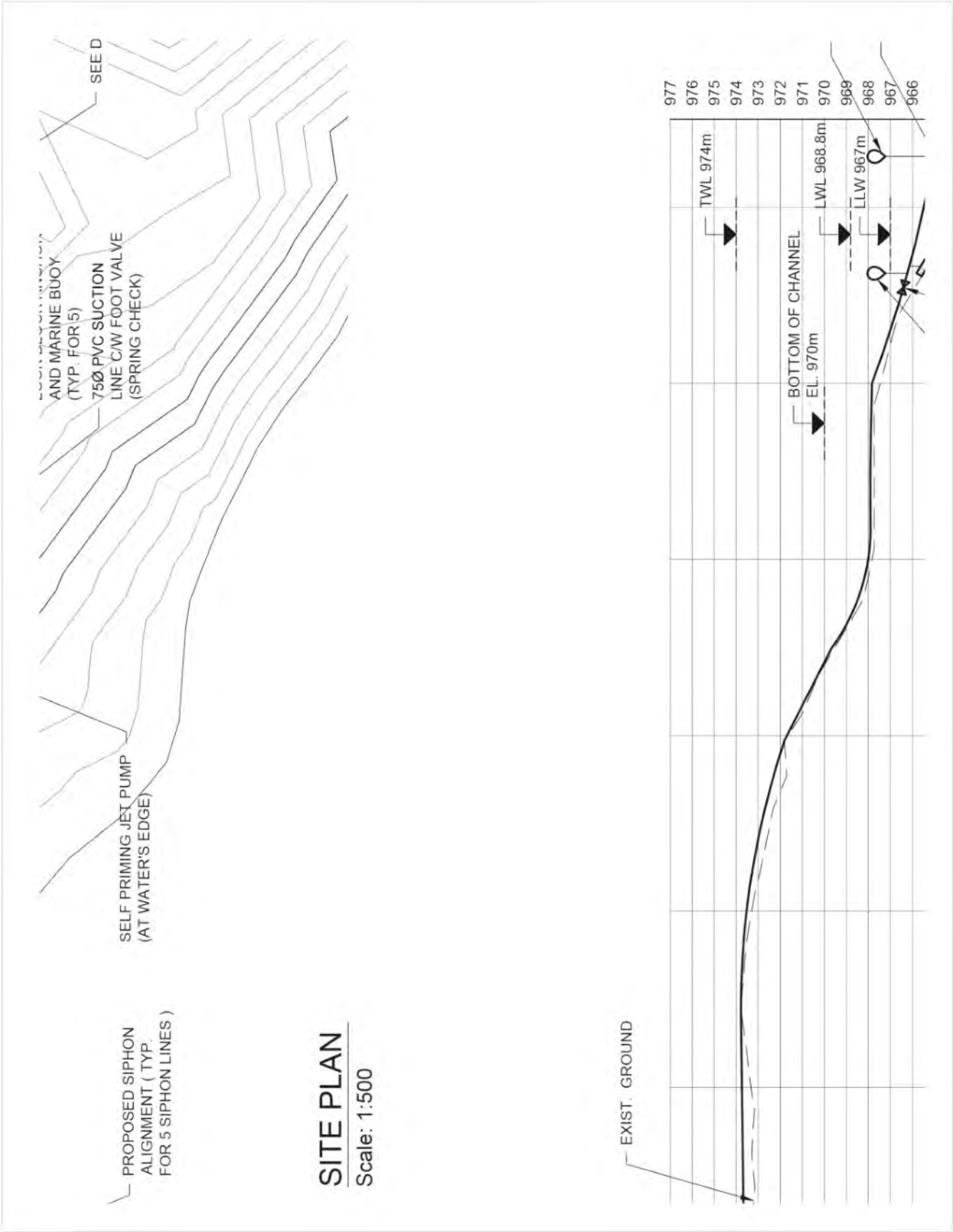
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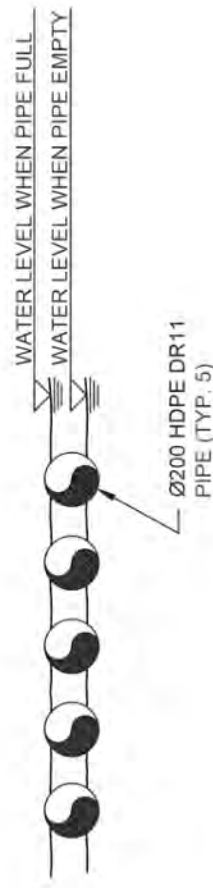
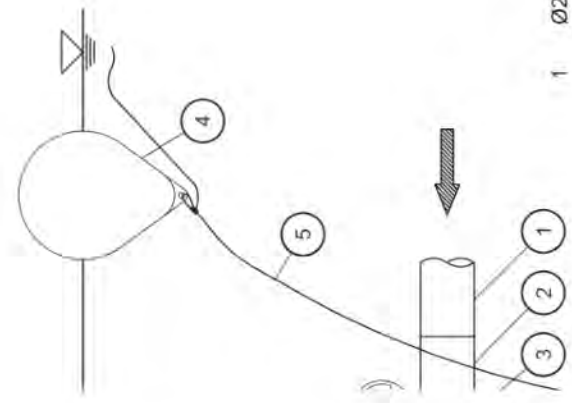
Scale: 1:10

- 1 FEMALE NPT PIPE SADDLE
- 1 BRASS BALL VALVE
- 1 HOSE C/W M AND F CAMLOCK ENDS
- 1 PT TO FEMALE CAMLOCK ADAPTER
- 1 NPT FEMALE REDUCING ELBOW
- 1 PVC NIPPLE (TYP 3)
- 1 PT TO FEMALE CAMLOCK ADAPTER
- 1 FEE FEMALE ELBOW
- 1 OM PVC NIPPLE (TYP 2)



RIMING STRUCTURE DETAIL

OCATE AT CREST OF DAM) Scale: 1:15



TYPICAL SIPHON LINE LAKE SECTION

Scale: 1:25



SIPHON LINE LAYOUT SCHEMATIC - INDEX TO PIPE ASSEMBLY SHEETS

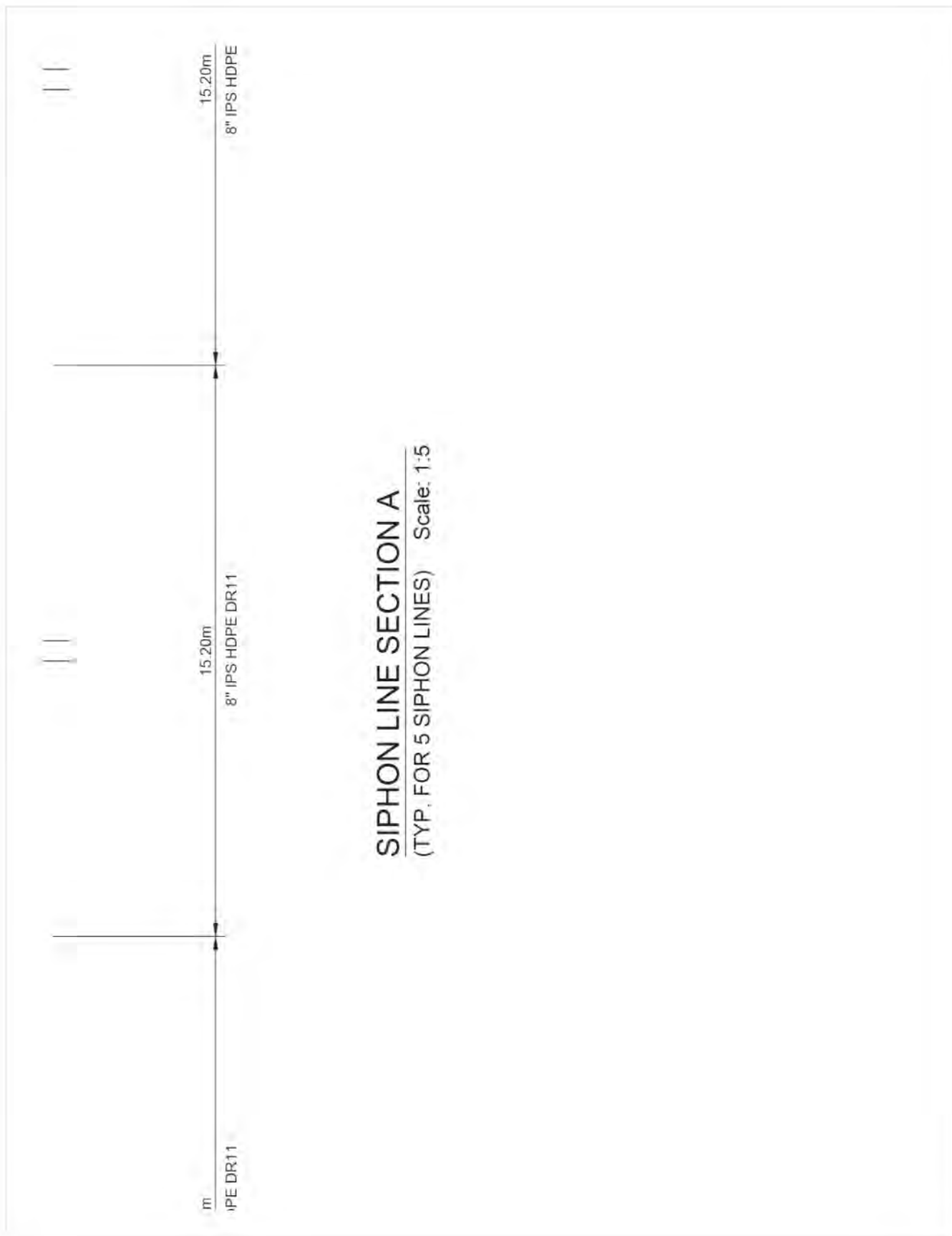
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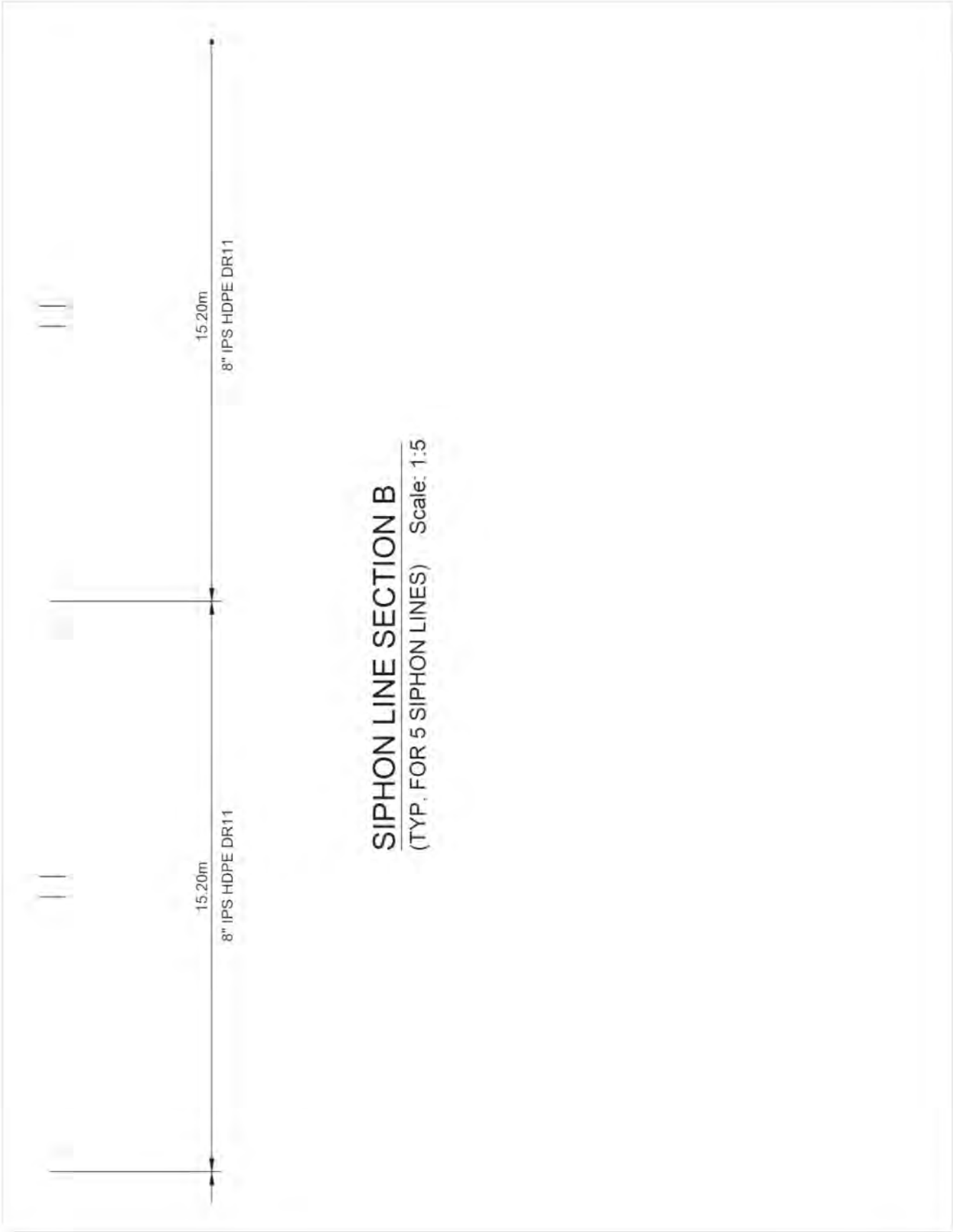
SECTION METHOD WHERE REQUIRED
FOR CONNECTING LONG PIPE SECTIONS,
WELDED IN ACCORDANCE WITH THE PIPE

WELDS BE FREE OF DEBRIS IMMEDIATELY

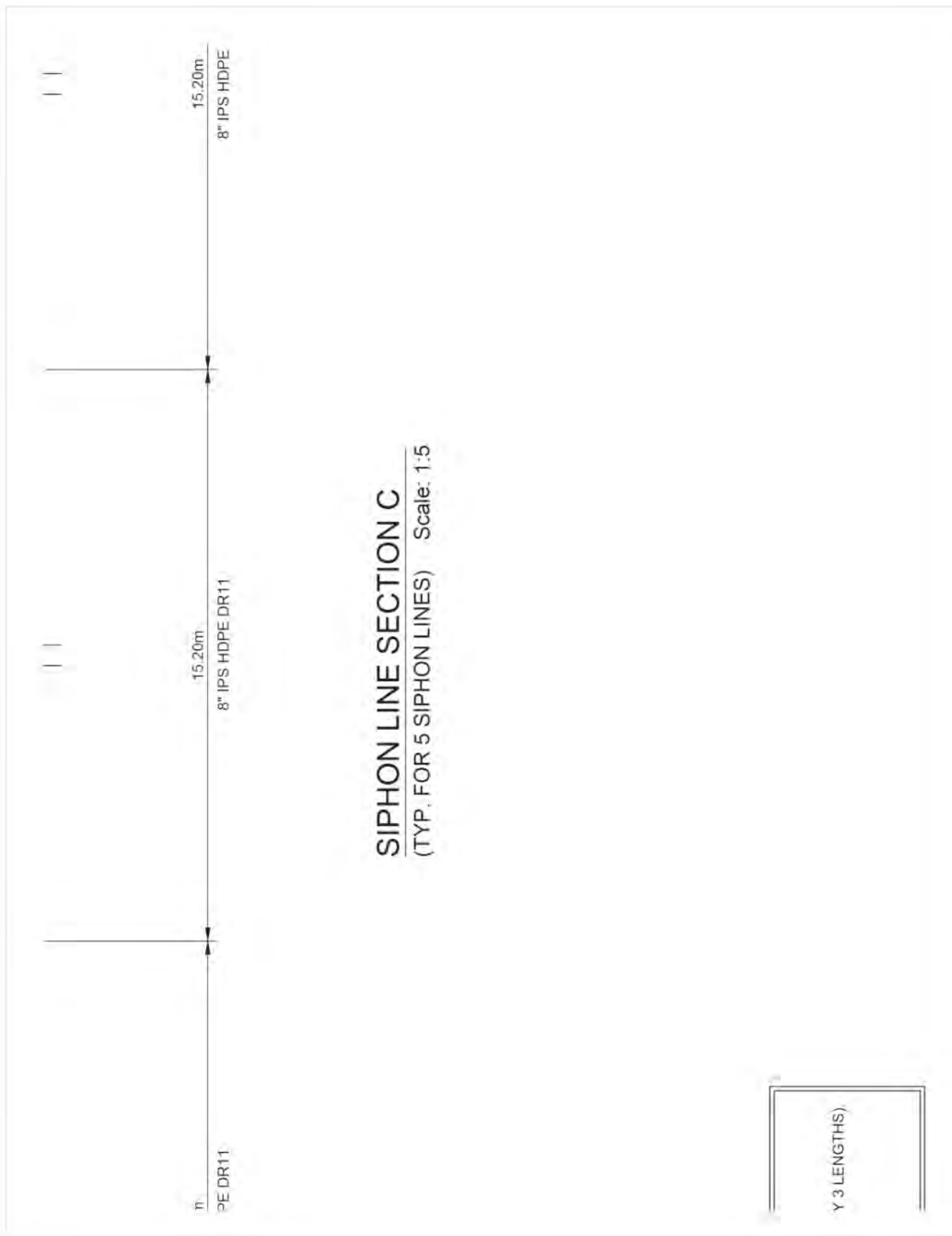
WELDS AT WELD STRENGTH EQUAL OR GREATER

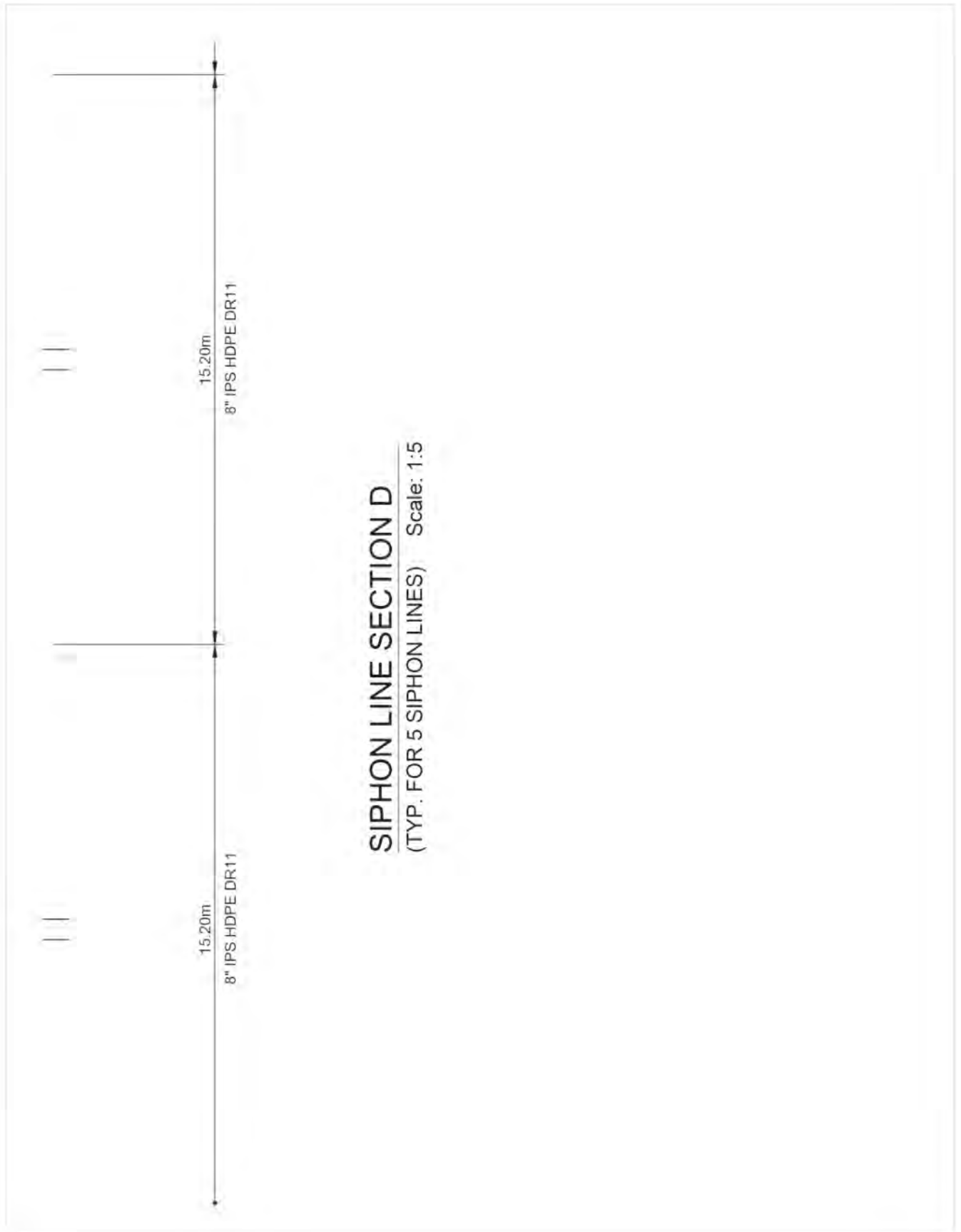
ENSURING THAT THE PIPE JOINING HAS BEEN PROPERLY
WELDED TO THE STRENGTH OF PIPE BEING JOINED





SIPHON LINE SECTION B
(TYP. FOR 5 SIPHON LINES) Scale: 1:5





SIPHON LINE SECTION D
(TYP. FOR 5 SIPHON LINES) Scale: 1:5



SIPHON LINE SECTION E
(TYP. FOR 5 SIPHON LINES) Scale: 1:5

FOR EACH SIPHON LINE - SECTION E:

- 8" IPS HDPE DR11 PIPE LENGTHS @ 15.20m (50ft) / LENGTH (QTY 1 LENGTH).
- 8" IPS FLANGE ADAPTER (QTY 2).
- 8" IPS CONVOLUTED BACK UP FLANGES (QTY 2).
- ESTIMATED DRY WEIGHT SECTION E: 500 lb. ±

Park Use Permit application (temporary amendment) – Sunshine Coast Regional District – Siphon at Chapman Lake

Part 3:

Section A – Proposed Activity

a. Purpose of Land use or occupancy

The purpose of this amendment to Park Use Permit 102714 (PUP) held by the Sunshine Coast Regional District (SCRD) is to increase the available late summer water supply from Chapman Creek through the installation of a temporary siphon system in Chapman Lake, which is located in the Tetrahedron Provincial Park.

Chapman Creek is the primary water supply to the Regional Water System on the Sunshine Coast and supplies water to approximately 23,000 people. In two out of the last five years, this water supply has become nearly depleted due to prolonged periods of drought and increased water demand during the summer season. To alleviate potential acute water shortage in 2017 and 2018, the SCRD is seeking approval from BC Parks (and the Ministry of Forests, Lands and Natural Resource Operations), to access an additional five meters of water storage (1 million cubic meters) in Chapman Lake should doing so become necessary.

In the immediate term, the SCRD is proposing to have the necessary permits in place to allow the temporary installation of a siphon in the event that the region experience another water shortage from a prolonged period of drought. The main drivers behind this request for a temporary amendment to the SCRD's PUP are:

- Meeting increased environmental flow targets for Chapman Creek established by the Ministry of Forests Lands and Natural Resource Operations (FLNRO) to facilitate fish migration as per recommendations from a fisheries biologist and requirements under the *Water Sustainability Act*;
- Uncertainties in short term weather projections: recent climate studies suggest that prolonged periods of drought in the South Coast could occur more frequently but shorter term weather forecasts of precipitation are highly unreliable; and
- Meeting increased summer season water demand (water use nearly doubles in the summer season from irrigation and tourism).

In order to both reduce demand and increase water supply from sources other than Chapman Creek, the SCRD is implementing demand and supply management in accordance with the Comprehensive Regional Water Plan (CRWP), including such measures as water metering, well protection measures, and groundwater resource investigation.

Also in accordance with the CRWP and outside of the scope of this amendment application, the SCRD is also in the process of obtaining approvals to deepen the channel in Chapman Lake which will permanently enhance redundancy in the water system. This is an essential measure in the medium term prior to the construction of long term source development projects specified in the SCRD's CRWP are constructed.

b. Details of existing uses, vegetation cover, wildlife present, water resources, geology, and historical and cultural significance

Existing uses

The existing uses for the proposed area within this PUP amendment application are for water impoundment and a helicopter pad.

Vegetation Cover

Vegetation Overview

Forest cover around Chapman Lake and the upper Chapman Creek watershed consists of Mountain Hemlock (*Tsuga mertensiana*), Yellow Cedar (*Chamaecyparis nootkatensis*) and Pacific Silver (Amabilis) fir (*Abies amabilis*), while lower elevations in Tetrahedron Provincial Park contain Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*; Triton 2006). The canopy formed by the tree cover varies from relatively open to dense. Throughout the park, semi-open meadows, marsh complexes, and areas of dense shrub [e.g., blueberry (*Vaccinium sp.*)] are also found.

The mid and lower reaches of the Chapman Creek watershed, outside the park boundaries, fall within the Coastal Western Hemlock biogeoclimatic zone (CWHm), and are characterized by forests dominated by Douglas fir (*Pseudotsuga menziesii var. menziesii*), Western Hemlock, Western Red Cedar and a variety of understory shrub species. Widespread logging and associated disturbance and revegetation have resulted in a change in forest composition from old-growth conifer forests to communities with a higher proportion of broadleaved trees. Much of the riparian zone in the mid and lower reaches of Chapman Creek now consists of alder stands. The park is situated within the Southern Pacific Ranges ecosection and Coastal Western Hemlock/Mountain Hemlock biogeoclimatic zones. The park contains one of the oldest undisturbed forests in Canada with stands containing trees over 1,000 years. Semi-open meadows, marsh complexes and dense understorey (e.g. blueberry) are characteristic of the park, which also contains ten lakes.

Riparian Vegetation

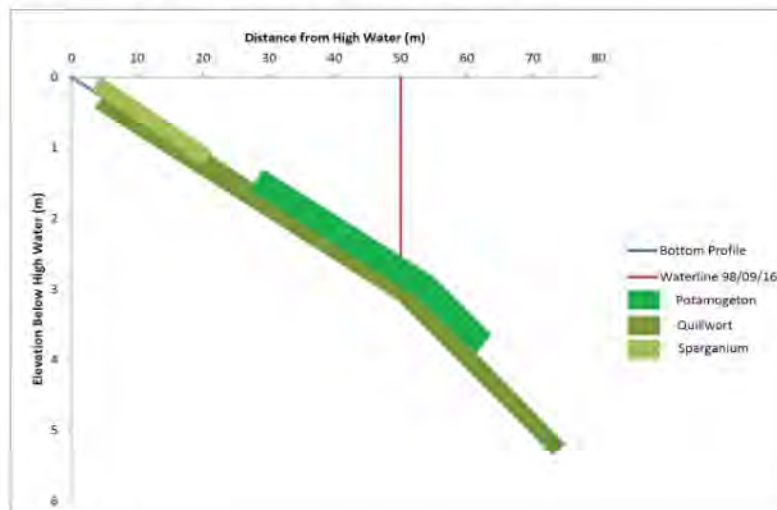
Riparian vegetation surveys were completed in 1998 as part of impact assessment from the 5 m lake depth to 5 m above the high water level. The riparian area is largely forested to the high water level with several smaller areas where shrubs and/or herbaceous species predominate. The four habitat types identified include forest, shrub land, wet meadow and wetland/aquatic. Forest vegetation consisted of Mountain Hemlock and Amabilis Fir with some Yellow Cedar. The shrub layer was dominated by Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*) with the herb layer consisting of moss. Meadow and wetland areas contained a graduation from one to the other with an increase in soil moisture. Meadow areas tended to be moist due to subsurface drainage from hillslope areas. Vegetation growth within the lake that was less than 2 m in depth was considered part of the wetland habitat.

Aquatic Vegetation

Aquatic vegetation transects were conducted in Chapman Lake during late summer of 1998. Aquatic plants surveyed were limited to submergent species; however, water levels in the lake were below normal high water levels. The dominant species inventoried consisted of bristle-like quillwort (*Isoetes echinospora*) and was observed growing on suitable substrates throughout the lake. Dominant plant species typically occur between the 1 m and 4 m below the high water level. Narrow-leaved bur-reed (*Sparganium sp.*) and pondweed (*Potamogeton sp.*) were observed on the exposed or shallow lake areas, particularly at the east end of the lake. Figure 1 illustrates the zonation of aquatic vegetation in Chapman Lake from the survey transects for the study completed in 1998.

The main disturbance to aquatic vegetation during operations was identified as desiccation due to drying; however, it was noted that drying stress is already present seasonally in the littoral zone where most of the aquatic vegetation occurs and the dominant plant (quillwort) appeared to be very tolerant to desiccation under existing water level fluctuations in the reservoir. It is likely that the reduced growing season caused by existing drawdown leads to increased thermal drying stress on bur-reed and pondweed and abundance levels were low.

Figure 1. Zonation of Aquatic Vegetation in Chapman Lake



Source: Whitehead 1999

Sensitive Species

A list of plant species potentially within the study area was compiled using the BC Conservation Data Centre database. The same search categories as above were used to compile the information. Table 1 provides a summary of the resulting species, including the BC designation and Species at Risk statuses. A total of seven sensitive BC species were identified, with no SARA listed species results.

Table 1. Sensitive Plant Species in the Sunshine Coast Forest District

Common Name	Scientific Name	Species Type	BC Status	SARA Status
elegant Jacob's-ladder	<i>Polemonium elegans</i>	Dicot	Blue	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Monocot	Blue	
poison oak	<i>Toxicodendron diversilobum</i>	Dicot	Blue	
Roell's brotherella	<i>Brotherella roellii</i>	Nonvascular plant	Red	
slimleaf onion	<i>Allium amplexans</i>	Monocot	Blue	
small spike-rush	<i>Eleocharis parvula</i>	Monocot	Blue	
snow bramble	<i>Rubus nivalis</i>	Dicot	Blue	

A search was also conducted in the BC Conservation Data Centre database for terrestrial ecological communities in the area surrounding Chapman Lake. Criteria used to focus the search results was applied using the regional and forest districts for the Sunshine Coast filters. In addition, the biogeoclimatic zone of Coastal Western Hemlock, subzone very wet maritime and montane (CHWvm2) variant filters were applied. Table 2 below provides the results of the ecological community database search of the area, which includes BC sensitive species status.

Table 2. Sensitive Ecological Community Plant Species in the Sunshine Coast, Coastal Western Hemlock Biogeoclimatic Zone (CHWvm2)

Common Name	Scientific Name	BC Status	Endemic
Amabilis fir - Sitka Spruce / devil's club	<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	
Amabilis fir - Western Red cedar / salmonberry Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Yellow	
amabilis fir - western red cedar / three-leaved foamflower Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Wet Maritime	Yellow	
Sitka sedge / peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	Y
Sitka willow / Sitka sedge	<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Blue	Y
western redcedar - western hemlock / sword fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	
western redcedar - yellow-cedar / spleenwort-leaved goldthread	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis asplenifolia</i>	Yellow	
western redcedar - yellow-cedar / skunk cabbage	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Lysichiton americanus</i>	Yellow	
western hemlock - amabilis fir / deer fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	
western hemlock - amabilis fir / Alaskan blueberry	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Vaccinium alaskaense</i>	Yellow	
western hemlock - lodgepole pine / grey reindeer	<i>Tsuga heterophylla</i> - <i>Pinus contorta</i> / <i>Cladina rangiferina</i>	Yellow	Y
western hemlock - western redcedar / salal Very Wet Maritime	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	Blue	Y
yellow-cedar / peat-mosses	<i>Xanthocyparis nootkatensis</i> / <i>Sphagnum</i> spp.	Yellow	

Wildlife Resources

Wildlife values within the Chapman Creek watershed are not well known and information is limited. The watershed appears to support populations of Columbian black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), cougar (*Puma concolor*) and other furbearing animals. Other wildlife known to use the watershed include: waterfowl, gulls, shorebirds, raptors, upland game birds, woodpeckers, a variety of songbirds, small mammals, amphibians and reptiles. Species recorded in Tetrahedron Provincial Park include: mountain goat (*Oreamnos americanus*), coyote (*Canis latrans*), mink (*Mustela vison*), marten (*Martes Americana*), river otter (*Lontra canadensis*) and bobcat (*Lynx rufus*), a variety of rodents, rock ptarmigan (*Lagopus muta*), woodpecker, grouse, ravens (*Corvus corax*), and marbled murrelets (*Brachyramphus marmoratus*; MELP 1997). It is thought that many of the larger animals tend to be transient users wildlife corridors to pass through the park. Hunting is prohibited within the park; however, the lower reaches of the watershed provide recreational hunting opportunities. There are no approved Wildlife Habitat Areas in the assessment area. There is a lack of emergent vegetation (e.g., cattail, bulrush) within the high water perimeter of Chapman Lake, however, some limited opportunities for nesting birds is available in this area.

Sensitive Wildlife Species

A list of sensitive wildlife species potentially found in the study area was compiled using the BC Conservation Data Centre database. The search categories used to compile the information included a search of the Sunshine Coast Forest District and refining the search results using the Coastal Western Hemlock and Mountain Hemlock biogeoclimatic zones. Habitat types used to further filter survey results included forest, grassland/shrub, lakes, riparian, stream/river and wetland. BC Red listed species include any plant, animal or plant community that is extirpated, endangered or threatened and Blue listed species are considered to be of special concern in BC, but are not extirpated, endangered or threatened. The Species at Risk Act, Schedule 1, is federal government legislation enacted to protect extirpated, endangered and threatened species and species of special concern across Canada. A total of 45 sensitive BC wildlife species were identified, with 16 SARA listed species results.

Water Resources

The Chapman Creek watershed (Watershed Code: 900-120400) is located approximately 5 km east of Sechelt, BC and provides approximately 85% of the drinking water and fire protection for more than 21,000 residents between Langdale and Earl's Cove, including the District of Sechelt. Water storage is provided by both Chapman and Edwards Lakes which are located on the Tetrahedron Plateau in Tetrahedron Provincial Park. A control structure on Edwards Lake allows water to be released when required to augment flows in Chapman Creek.

Chapman Creek flows south from the Tetrahedron Plateau for approximately 24 km and discharges into the Strait of Georgia. Chapman Creek watershed is approximately 73 km² in area and the drinking water intake is located approximately 175 m above sea level and 7.5 km upstream of the mouth of Chapman Creek. Approximately 65 km² of the Chapman Creek watershed is located above the SCRD water intake.

Chapman Lake

Chapman Lake lies at an elevation of 976 m above sea level in steeply sloping terrain; surrounding ridgetops and peaks typically reach more than 1,500 m elevation. The lake has a surface area of 31.2 ha and a maximum depth of approximately 30 m, making it the largest lake in the Chapman Creek watershed. The catchment area of the lake is 6.58 km², and the lake is fed by 2 main streams, both of which enter at the east end of the lake. The lake volume at the high water level is approximately 3.7 million m³ with an average outflow rate of 0.476 m³/s. Based on these data, the average retention time of water in the lake is approximately 90 days. The short retention time reflects the high level of precipitation in the watershed. Outflow from the lake is controlled by a concrete dam and valve located on the west side of the lake and operated by the SCRD. During a typical year, water stored behind the dam is allowed to overflow naturally until there is a need to supplement the flows to Chapman Creek, at which time the dam is opened to release stored water from the reservoir. The annual lake level variation is currently between 1.5 m to 3 m.

Chapman Lake Water Quality

Whitehead (1999) reported the results of limited water quality monitoring on Chapman Lake. Parameters measured included Secchi disc transparency, temperature and dissolved oxygen. The Secchi disk indicated clear water with a reading at 6.5 metres. Temperature and dissolved oxygen results ranged from 16°C at the surface to 7°C at depth and from 16 mg/l at the surface to 6.5 mg/l at depth, and indicated the lake was stratified with a thermocline between 2 m and 3 m. During the monitoring program gas bubbles were observed throughout the lake and particularly at the east end in the shallower areas. Based on the smell of hydrogen sulphide it was concluded the gas bubbles were originating from anaerobic decomposition originating in the lake sediments.

Chapman Lake Water Quantity

A water demand and supply analysis under changing climatic conditions was conducted on the Chapman water system on the Sunshine Coast. The study assessed the impacts of climate change on water consumption and water supply within the Chapman watershed. Historic temperature, precipitation and discharge data were collected to determine historic trends. The impacts from Pacific Decadal Oscillations and El Niño Southern Oscillations on climate and discharge were analyzed to determine the impacts of climate change.

The results from this study indicated that climate patterns on the Sunshine Coast have changed over the last 50 years, with annual average temperatures increasing by approximately 2°C and average total annual precipitation decreasing by 24 mm. Climate trends were determined to impact the available water supply as temperatures and snowpack elevation were increasing. This increased temperatures and diminishing snow pack is causing the snow to melt earlier and more rapidly during the spring season and existing streamflow regime in Chapman Creek is shifting towards a more rain dominated regime, which would change the entire water holding dynamic of the watershed. Discharge data further showed that peak discharge occurred earlier in the spring, which affects summer base flows when demand for domestic distribution and environmental services was highest. Climate conditions during the summer season were also determined to be impacting supply as the increasing temperatures were assumed to cause the snowpack to be depleted earlier in the summer season and the decreasing trends in precipitation were resulting in less recharge to storage reservoirs.

The increases in temperature and decreases in precipitation trends were shown to be correlated to water consumption during the summer season when water supplies are the most limited. The significant correlation between water consumption and temperature and precipitation identifies how climate change may impact water consumption behaviors on the Sunshine Coast.

Sunshine Coast climate is characterized by cool and wet winters and warm and dry summers (Figure 3). The summer season is the critical time of year for water supply, as this is when water demand is highest and available water supply is most limited. Trends over the last 50 years are suggesting that summer temperatures are increasing (Figure 4) and total summer precipitation is decreasing (Figure 5).

Figure 2. Annual average total monthly precipitation and average monthly temperature in Gibsons, BC (1962 to 2013)

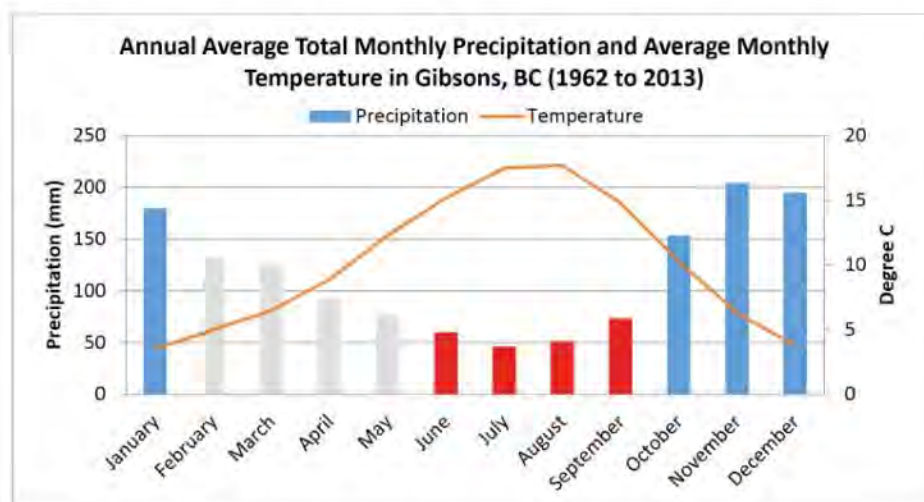


Figure 3. Historic monthly mean temperatures for July to September collected in Gibsons, BC from 1962 to 2013

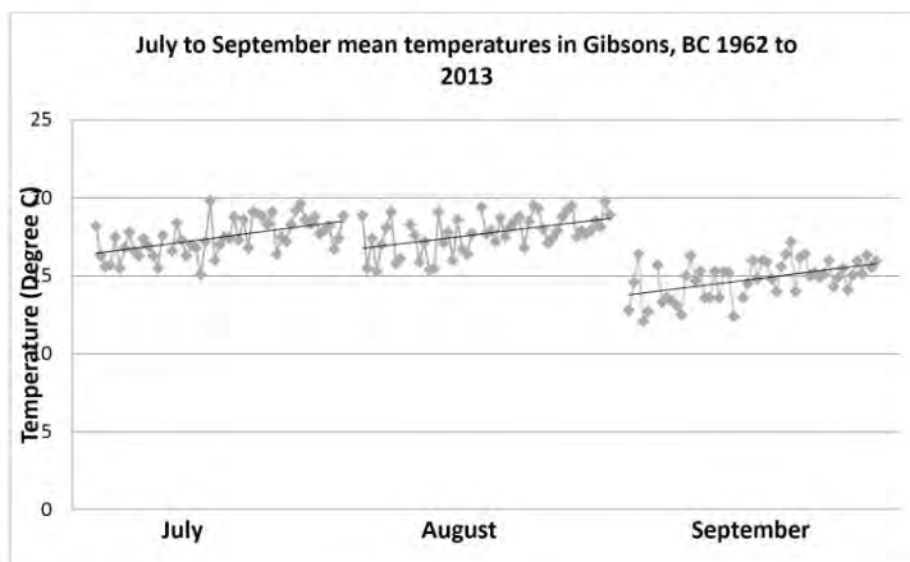
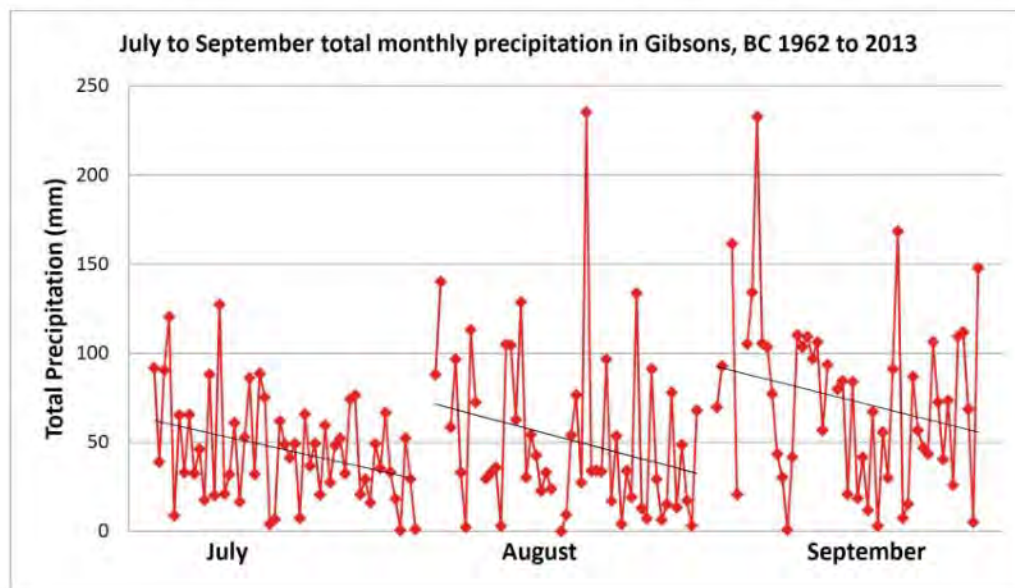


Figure 4: Historic monthly total monthly precipitation for July to October collected in Gibsons, BC from 1962 to 2013



As part of the study, a sensitivity analysis was completed and identified that the total water consumption during the summer could regularly exceed the equivalent to the available water supply in the next 10 years if water demand does not change, snow pack continues to decrease in the winter, summer temperatures increase by an average 1 or 2 °C, and prolonged droughts become more common.

Geology

Chapman Lake lies within an area of granite rock of the late Jurassic and early Cretaceous ages (156 to 114 million years old), characterised as quartz diorite. Coastal watersheds underlain by rock types such as quartz diorite tend to be slightly acidic due to the low buffering capacity of these rocks and the natural low pH of rainfall.

The dominant soil-types within the Chapman watershed contain large concentrations of organically combined iron and aluminium in their subsoils. In poorly-drained soils on the Tetrahedron Plateau organic matter is not broken down as quickly as in areas of well-drained soils, which means that organic and clay colloids, and aluminium and iron compounds are common elements in the water supply and characterize the natural water quality in this area.

Historical and Cultural Significance

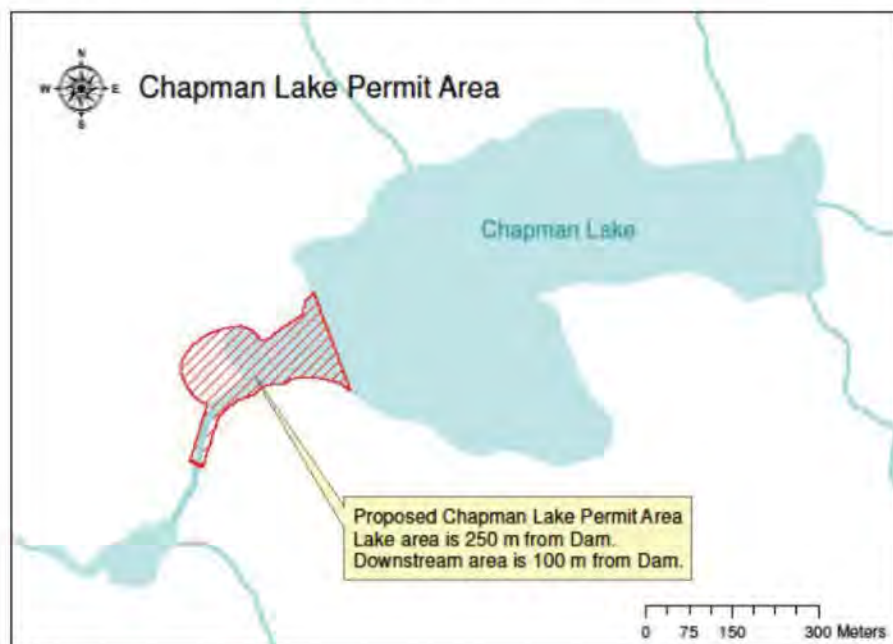
There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shíshálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the '*no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek*'. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

c. Location and size of all proposed and current improvements

Location

The location of the proposed permit area is outlined in the Figure below.

Figure 5. Proposed amended permit area at Chapman Lake



Siphon Design

The siphon consists of five parallel 200 mm HDPE pipes that are 255 m in length. The siphon will run over the existing dam structure from Chapman Lake into Chapman Creek. The inlet will be installed at an elevation of 963 m which is approximately 11 m below the top of the dam and will reach into the lake approximately 180 m from the existing dam. The inlets will be secured and anchored in place using concrete blocks and buoys. The outlet of the pipe will be located approximately 50 meters downstream of the existing dam at an approximate elevation of 965 m. Refer to attached engineering design drawings.

Siphon Construction

The installation of the siphon system will involve transportation of pre-fused sections of HDPE pipe to Chapman Lake via helicopter. The installation process will begin with laying the outlet pipe (with attached gate valve) then will proceed with laying the subsequent lengths of that pipe, ending with the inlet pipe (with attached check valve and buoy). The sections of pipe will be bolted together at Chapman Lake and the inlet pipe will be tied-off to lake bed anchor blocks. This process will be duplicated for a second complete siphon length. Once the first two pipe lengths are assembled and in place, the

pump/vacuum and blow-off ports will be constructed at the high point of each pipe. The siphons will be primed and commissioned as soon as possible after completion of construction. The operation of the first two siphons will be monitored for 24 hours by the SCRD Siphon Technicians. If the operation of the first two siphon lengths is considered to be a success, the remaining lengths will be constructed through the same process as the previous two. For construction details, refer to the Detailed Construction Plan.

If the siphon is considered to be unsuccessful after 24 hours of operation, alternative options will be considered in consultation with First Nations, BC Parks, and MFLNRO.

d. If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes

The physical changes and the proposed mitigation strategies are outlined in the table below.

Table 3. Physical changes and proposed mitigation measures from the proposed works

Physical changes	Proposed mitigation
Lake bed disturbance from machine activity when assembling the pipes	Operating the machine in the upper areas of the exposed lake bed where the ground cover is compacted and disturbance is minimal. In sensitive areas where lake grasses are present or ground conditions are softer, $\frac{3}{4}$ " plywood will be placed on the ground to form a track and reduce any significant disturbance from a machine.
Excavating benches where necessary within the lake bed for the level placement of the lock blocks	An excavator will be used to dig out a flat area for placement of the lock blocks. The area to be disturbed will be sized according to the size of the lock blocks to minimize disturbance. This work will occur when the lake level is below the location where the lock block will be placed to minimize any sedimentation into the lake.
Soil disturbance from machine activity	Machine access routes will be flagged at predetermined locations and routes in advance to minimize vegetation disturbance and to concentrate all disturbance from the machine into a small of an area as possible.

e. Construction Schedule (if applicable) for proposed new permanent and/or temporary facilities

A project of this nature has numerous variables that impact timing (e.g. weather, water demand etc.). The dates for the construction schedule are unknown until it is realized that the siphon is needed, which is when the water supply has approximately 30 days remaining.

From when the decision is made to install the siphon, construction and commissioning are estimated at 35 days of which approximately eight days will be in channel/lake work.

f. Photographs of the site and area adjacent to the proposed land use/occupancy

Figure 6. The proposed site at Chapman Lake showing the proposed alignment of the siphon lines and the sensitive aquatic grassy area to be protected as detailed in Table 3.



Figure 7. Site plan at Chapman Lake showing the camp area, access pad, proposed alignment of the siphon pipes, and general assembly area.

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g. Type of transportation and access route to the proposed site

Helicopter will be the primary mode of transport to and from the proposed site.

h. Initial five year operational plan

Because this is a short term plan, there is no intention of operating this siphon system for five years. Once the siphons are operational, the operational plan will consist of having at least one person on site at all times to ensure that the siphons are in operation and to also address any issues with operation in a timely manner.

Section B – Experiences of the Applicant

Park Use Permit - The SCRD has held a Park Use Permit (PUP) for the purposes of maintaining water impoundment infrastructure at Chapman and Edwards Lake and a helicopter pad at Chapman Lake in Tetrahedron Park since the park was established. The SCRD's PUP was renewed February 1, 2014 and the current PUP No. 102714 is valid until January 31, 2024

Constructing waterworks – The Sunshine Coast Regional District's waterworks crew consist of staff members who have been installing waterworks infrastructure for over 30 years.

Environmental management/monitoring – The SCRD has personal on staff who have extensive experience in environmental management, including experience in designing, implementing and monitoring Environmental Monitoring Plans.

Section C – Potential Impacts

a. Impacts and mitigation measures on vegetation, wildlife and watercourses

Table 4. Impacts and mitigation measures on vegetation, wildlife, and watercourses

Introduction of invasive plants	All machines and equipment to be used for this project will be cleaned and inspected prior to being used at the lake for the construction and operation of the siphon. This strategy is intended to prevent the spread or introduction of invasive plants through the transport of machines and equipment.
Soil and vegetation disturbance from temporary camp to be used during installation and operation of the siphon	The periphery of areas required for accommodation, staging and construction will be marked with flagging. All personnel who will be working on site will be directed during orientation to concentrate all of the activity and foot traffic to select areas only.
Disturbance to Wildlife	<p>All wildlife observations and encounters will be recorded. This will include any instances where wildlife activity is disturbed from personnel working at the site.</p> <p>Minimizing attractants to wildlife will be achieved through sound waste management. Food waste or any other waste that may attract wildlife will be contained in a lockable bear-proof container. The waste generated from the site will be removed on an as needed basis. A portable toilet will be available and all human waste will be collected in the toilet and flown off site as needed.</p>
Disturbance from a petrochemical spill	<p>To mitigate the impacts from any potential petrochemical spill, all machinery with hydraulics will use vegetable oil wherever possible. A spill kit will be on stand-by to contain any spills should they occur and spill response training will be provided to operators and staff. While fueling equipment, containment will be maintained by using soaker cloth under the area of where the filling is occurring. The pumps used for priming the siphons will be housed in containment boxes lined with plastic.</p> <p>In the event of a spill, the spill will be reported to the Spills Reporting Line and the Lead Environmental Monitor (EM) will be contacted and will provide mitigation advice. Depending on the severity of the spill the EM will be brought to the site as soon as possible to oversee mitigation measures. An onsite staff or operator will be required to record the causes of the spill, the response undertaken and the apparent effects of the spill.</p>
Disturbance from erosion and sediment laden run-off	The risk of erosion and sedimentation is highest when periods of intense rainfall coincide with active construction. These risks will be minimized by ensuring the construction takes place during dry conditions. The exposed lake bed on the south side of the outlet channel will be where the assembly and moving of the pipe will occur and the setting of lock blocks to anchor the pipe. Construction activity will occur on the most compacted ground accessible below the high

	water mark where the substrate consists of a shallow layer of sandy loam above glacial till and bedrock. This area is considered to be stable and the risk that planned activities will result in a rise in creek turbidity over the background level is considered to be low.
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b. Impacts to watercourses or water bodies

Refer to Table 3.

c. Special features

N/A

d. Impacts on Park access

Access to the park will not be impacted from the proposed works.

e. Impacts to aesthetics and visual values

The location of the proposed works is not visible from any trails with the park and therefore is expected to have no impacts to landscape aesthetics or visual values (see also section g).

f. Impacts on cultural values including traditional use by First Nations

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shíshálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

g. Impacts to park users

Although no park trails intersect with the proposed location for the works, park users who are on any nearby trails may be impacted when the siphon pipes, equipment, or personnel are being transported by helicopter. This potential disturbance to park users will be mitigated through notification of schedule of works to BC parks and appropriate signage within the park to notify users of the works.

Figure 5. General location of Chapman Lake

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Ministry of
Environment

Land Use / Occupancy Park Use Permit Application

Only applications that are considered by BC Parks to be compatible with the conservation and recreation objectives identified for the park(s), protected area(s), conservancy(ies) and recreation area(s) (collectively 'parks') involved in the proposal will be evaluated.

All applications must include completed application form, map, attachments (as indicated below) and non-refundable application fee (plus applicable taxes). Please make payment by VISA/MasterCard/American Express or by cheque, made payable to the Minister of Finance.

INFORMATION REGARDING APPLYING FOR A PARK USE PERMIT AVAILABLE AT:

<http://www.frontcounterbc.gov.bc.ca/Start/parks/>

Application Type:

- ☐ New
☐ Renewal (Authorization #)
☒ Amendment (Authorization #) 102714

Requested Period of Use (Inclusive): From 08/09/2017 to 11/30/2018
mm/dd/yy mm/dd/yy

PART 1. NAME(S) AND MAILING ADDRESS

Applicant Name:

FULL LEGAL NAME of Individual(s), Company or Society, Ministry or Government Agency:

SUNSHINE COAST REGIONAL DISTRICT

Contact Name for Company or Ministry Applicants: Michael Day, P.Eng

☐ BC Incorporation ☐ BC Registration ☐ Society Act # _____

Age: _____ 19 or over ☒ Yes ☐ No

Legal Mailing Address:

1975 Field Road

City/Town: Sechelt

Province: BC Postal code: V0N 3A1

Contact Information:

Daytime Phone: 604 885 6810

Cell: s.16

Fax: _____

Email Address: Michael.Day@scrd.ca

Billing Address (if different from legal mailing add.):

City/Town: _____

Province: _____ Postal code: _____

Contact Information:

Daytime Phone: _____

Cell: _____

Fax: _____

Email Address: _____

Preferred method of contact: ☐ Phone ☐ Cell Phone ☐ Regular mail ☒ Email

<p>Do you hold a Crown Land Tenure: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide file number(s): _____</p>	<p>Have you previously held a Park Use Permit or Resource Use Permit: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide file number(s): _____</p>
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PART 2: PURPOSE, LOCATION, AREA

Name of Park(s):
Tetrehedron Provincial Park

Purpose (Summary of Proposed Activity):
Please select all that apply

- ☐ Aquaculture and mariculture
- ☐ Alternative power project
- ☐ Grazing
- ☐ Meteorological or hydrological station
- ☐ Seismic and gravity station
- ☐ Navigation Aid
- ☐ Trapping
 - ☐ Trapline cabin
- ☐ Forestry Activities
- ☐ Mining, sand and gravel quarry
- ☐ Restoration/habitat enhancement project
- ☐ Roads and Trails
- ☐ Rights-of-way

- ☐ Privately owned structure
 - ☐ Cabin
 - ☐ Private moorage
 - ☐ Other: _____
- ☐ Provincially owned structure
- ☐ Communication sites
- ☐ Hydro transmission/distribution lines
- ☐ Pipelines (gas or oil)
- ☐ Telephone Booths
- ☐ Telephone lines
- ☒ Water impoundment (dam or dyke)
- ☒ Waterline/sewer

Location of Proposed Activities:

- 1) Is the activity proposed for any frontcountry* areas? ☐ Yes ☒ No
 **"Frontcountry" means an area within one kilometre of either side of the centreline of a park road or a highway.
- 2) Are the activities selected above the same for all parks listed on the application? ☒ Yes ☐ No
- If 'No', please indicate which park(s) each activity is proposed for (if not enough space, please provide an attachment):

PART 3: DETAILED PROPOSAL

Please attach a detailed proposal description that addresses the following (A-D):

- A.** Please describe the proposed activity and provide the following information:
 - a) Purpose of the land use or occupancy;
 - b) Details of the existing uses, vegetation cover, wildlife present, water resources, geology, and historical/cultural significance of the proposed site and adjacent area;
 - c) Location and size of all proposed and current improvements (facilities/structures);
 - d) If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes;
 - e) Construction schedule (if applicable) for proposed new permanent and/or temporary facilities;
 - f) Photographs of the site and area adjacent to the proposed land use/occupancy;
 - g) Proposed site and adjacent area description and mapping in terms of its current legal status;
 - h) Type of transportation and access route to the proposed site(s); and
 - i) The initial 5 year operational plan related to this proposal.
- B.** List all experiences of the applicant and/or others involved in this proposal in previous park use permits including the name, number, date and location of the permit(s).
- C.** Describe expected or potential impacts on the park's environmental, cultural, recreational values changes including, but not limited to:
 - a) Habitat for vegetation and wildlife, particularly listed species or species at risk;
 - b) Any watercourses or water bodies (diversions, flows, potential siltation, etc.)
 - c) Special features such as unique geological formations;
 - d) Access to the park, and the area of the park under consideration;
 - e) aesthetics and visual values;
 - f) Cultural values, including traditional use of the area by First Nations;
 - g) Park visitors and local communities, including public health and safety and recreational use or enjoyment of the park;and actions that will be taken to mitigate identified impacts on the park(s).
- D.** Provide maps of the proposed application area, including (if required):
 - a) General Location Map: A map(s) of the individual protected areas within the application, drawn to 1:50 000 to 1:250 000 (or larger if required to encompass boundaries of permit area) scale that illustrates at a landscape level scale the general location of the area under application, including boundaries of the proposed permit area and major landmarks, travel/access routes.
 - b) Permit Area Map: Where the land use/occupancy utilizes improvements or structures, a more detailed map(s) of the proposed permit area(s) within each park, drawn to 1:20 000 to 1:50 000 scale showing the exact proposed boundaries of the permit area, including the area (in hectares) as well as any watercourses or other identifying features (trails, facilities, roads, etc.). The permit area map must clearly identify the location of travel/access routes, and specific activity site(s). If applicable, the location and construction description of any temporary facilities or the use of existing facilities within the permit area, as well as the location and size of all proposed improvements must also be included.
 - c) Detailed Site Map: Where the operation proposes to use any existing or to construct any new improvements, a detailed site map at 1:1 000 to 1:5 000 scale must be submitted identifying the location of all improvements (buildings, structures, roads, power lines, fences, docks, etc.) in relation to the boundaries of the permit area.

PART 4: APPLICATION CERTIFICATION

All applications must be complete. Incomplete applications will not be processed until information is submitted. All of the following must be attached to or enclosed with this application form:

- **completed application form, including attached management plan;**
- **map(s) to standards detailed in application requirements;**
- **attachments as indicated below; and**
- **non-refundable application fee (plus applicable taxes).**

Upon submission of a complete application and application fee, allow 140 days to evaluate proposals. Applications requiring additional steps, or supplying insufficient information may delay evaluation. BC Parks reserves the right to deny any application. The information you provide will be subject to the *Freedom of Information and Protection of Privacy Act*. The submission of this form does not in any manner convey any rights to use or occupy land within a park, protected area, recreation area or conservancy.

- Businesses must either be licensed to do business in BC, or if licensed/incorporated outside of British Columbia (considered to be 'extra-provincial companies') must be in compliance with section 375 of the *Business Corporations Act* to operate in British Columbia.
- Extraprovincial societies must be registered under the *Society Act* in British Columbia in order to hold a park use permit or resource use permit. An extraprovincial society is a society or association formed outside British Columbia, and includes a branch of that society or association.

Additional costs and requirements:

Upon evaluation of the proposal it may be determined that additional costs and requirements must be provided prior to issuance of the permit, such as financial guarantees, or survey and inspection costs (as per Section 21 of the *Park Act*).

Commercial General Liability (CGL) insurance in the amount of \$2 million per occurrence may be required as a minimum for parks, protected areas, conservancies and recreation areas. Applications will be assessed to determine whether additional types of insurance, such as aviation liability or marine liability, may also be required.

Additional information on insurance is available at

http://www.env.gov.bc.ca/pasb/applications/process/park_use.html#insurance

THE APPLICANT HEREBY CERTIFIES THAT ALL THE INFORMATION PROVIDED IN THIS APPLICATION IS TRUE AND CORRECT.

Signature of Applicant or Authorized Signatory of Applicant: _____

Date: 2017-08-09

Interest will be charge on all overdue accounts, the interest rate charged is 3% + the prime lending rate of the principal banker to the Province as established each 3 month quarter starting Oct 1st.

Send completed application and proposal description to:
Ministry of Forests, Lands, and Natural Resource Operations
FrontCounter BC

For additional information on how or where to submit your application, please call the FrontCounter BC Contact Centre or visit the website to determine an office nearest you:

Call FrontCounter BC toll free at: **1-877-855-3222**

FrontCounter BC Website: <http://www.frontcounterbc.ca/locations/index.html>

PLEASE RETAIN A COPY OF THIS APPLICATION FOR YOUR RECORDS

First Nations Consultations

Consulting with First Nations

The Province of British Columbia's legal duty to consult with First Nations arises from section 35 of the *Canadian Constitution Act*, which recognizes and affirms aboriginal and treaty rights. The duty to consult arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right or title and contemplates conduct that might adversely affect it. Consultation with First Nations will be guided by principles of good faith, and meaningful dialogue with the intent to fully understand the nature and scope of the aboriginal right, the potential to adversely affect that aboriginal right, and address those potential impacts to an aboriginal right while balancing societal interests.

Agreements with First Nations

In many locations, the Province has agreements with First Nations. These agreements may be referred to as Collaborative Management Agreements, Reconciliation Protocol Agreements, Memorandum of Understanding or simply Working Agreements. In some cases the Province and Canada have entered into a treaty with a First Nation, which contains certain provisions regarding treaty rights within parks and protected areas. Modern treaties contain provisions to address those treaty rights in the management of parks and protected areas where a treaty right exists.

These agreements apply to a variety of parks and protected areas and conservancies and include obligations by the Province to discuss operational delivery of programs in addition to information associated with applications for park use permits with a First Nation. These discussions provide the First Nation and the Province with an opportunity to raise any questions or concerns associated with a park use permit application and/or the proposed activity in relation to aboriginal rights or title.

Important Considerations for Park Use Permit Applications

Applicants for park use permits should be aware of the Province's consultation obligations with First Nations and associated time requirements to seek meaningful consultation. There may be occasions when BC Parks may require additional, detailed information to allow for the necessary review of an application. It is important that applicants provide the necessary, detailed information as requested on the application form in order to avoid a longer than anticipated period of time to evaluate the application.

Balsom, Tami CSNR:EX

From: Michael Day <Michael.Day@scrd.ca>
Sent: Wednesday, August 9, 2017 11:33 AM
To: Aikman, Jennie S ENV:EX
Cc: Rosenboom, Remko FLNR:EX; Janette Loveys
Subject: RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)
Attachments: 2015-08-12 Siphon Design - Plan and Elevation.pdf

Jennie,

I have been provided with a more current and correct design drawing than the one I attached earlier.

The prior version was correct in principal, but not in detail.

Please substitute this for the original.

Michael Day, P. Eng. | General Manager, Infrastructure Services / Regional Engineer
Infrastructure Services | Sunshine Coast Regional District
 1975 Field Road, Sechelt, BC, V0N 3A1
 Phone: 604.885.6810

From: Michael Day
Sent: Wednesday, August 09, 2017 10:48 AM
To: Jennie.Aikman@gov.bc.ca
Cc: Remko Rosenboom (Remko.Rosenboom@gov.bc.ca) ; Janette Loveys
Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

Dear Jennie,

Re: Parks Use Permit 102714 Amendment Application

As per CAO Loveys earlier email, please note the attached Parks Use Permit (PUP) Amendment application form and associated supporting documents.

I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and followed up again today. Chris August, Implementation and Compliance Manager, has verbally expressed his willingness to provide a letter of support for the temporary siphon application. I have received some assurance a letter of support will be provided by Monday, August 14th.

I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.

If you have any questions or concerns, please contact me directly at:

E-mail: michael.day@scrd.ca
 Office: +1 (604) 885-6810
 Mobile: s.22

Best Regards,

**Michael Day, P. Eng. | General Manager, Infrastructure Services and Regional Engineer
Infrastructure Services | Sunshine Coast Regional District**

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

Fax: 604.885.7909

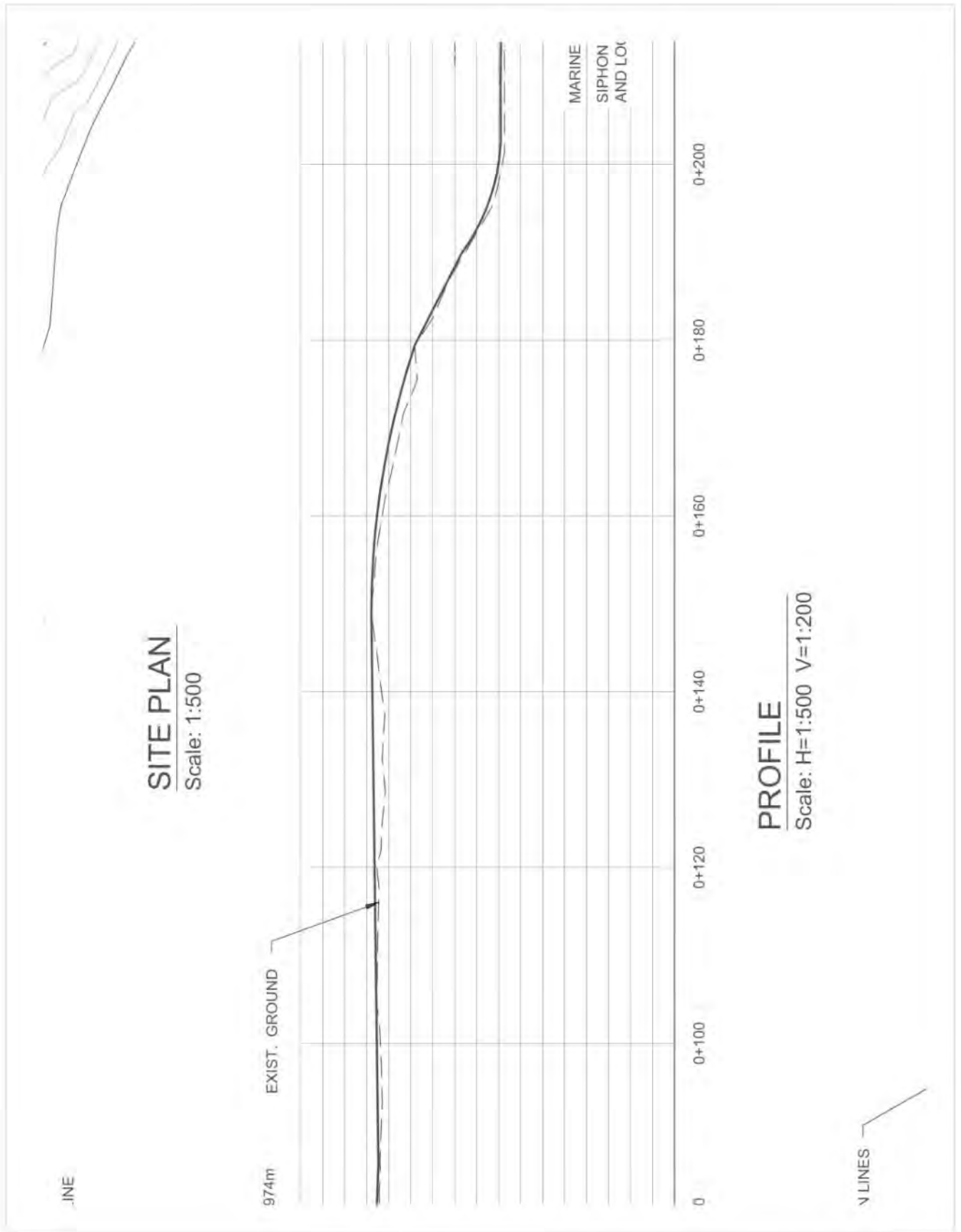
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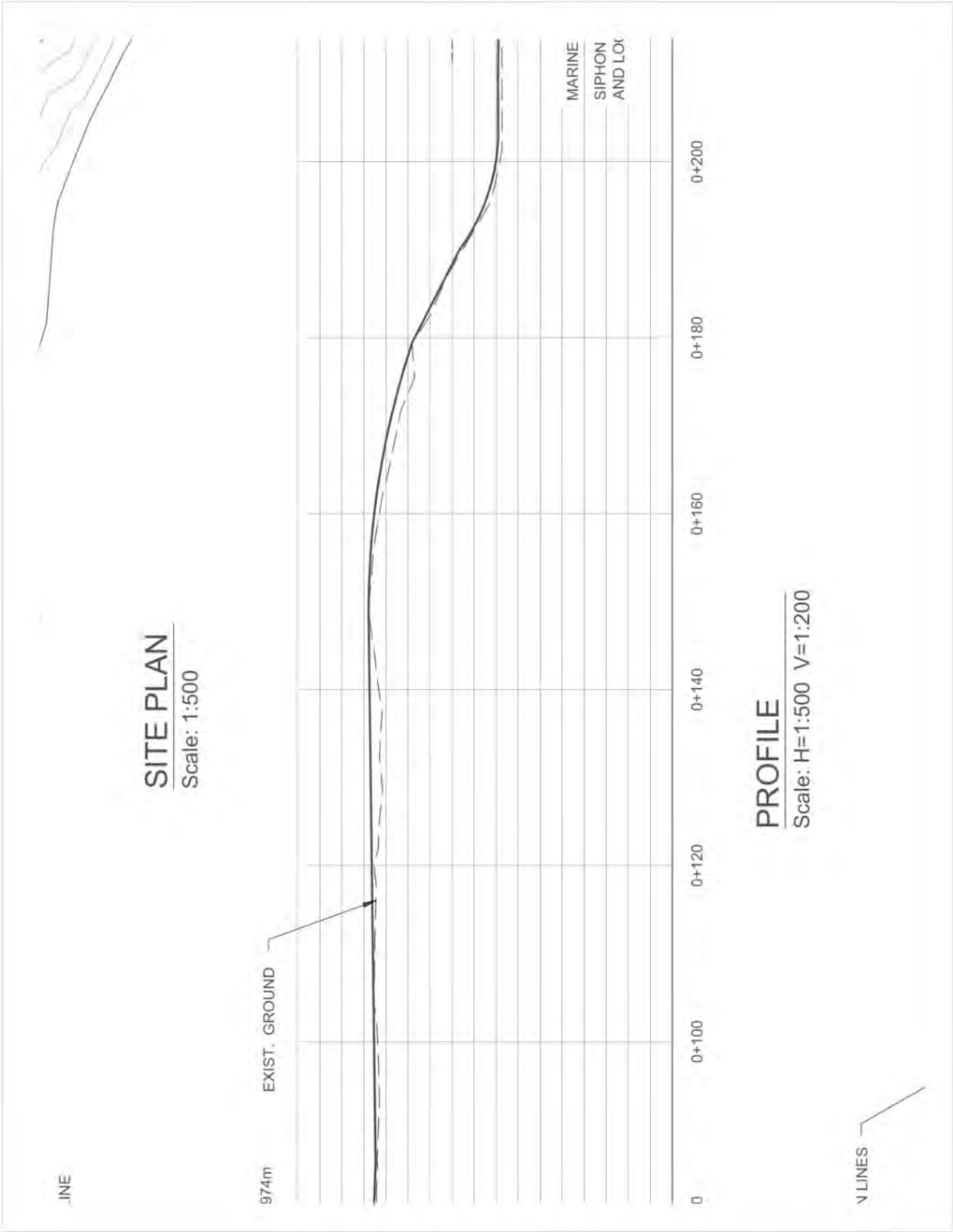
This email was scanned by Bitdefender





2015-08-12
Siphon De...

Inserted from: <<file:///C:/Users/tbalsom/AppData/Local/Temp/{2B6E5E0C-7AC2-4926-8482-54E3F3ACF563}.pdf>>



RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)

Friday, October 13, 2017
11:51 AM

Subject	RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)
From	Aikman, Jennie S ENV:EX
To	'Michael Day'; Dalziel, Rod ENV:EX
Cc	Rosenboom, Remko FLNR:EX; Janette Loveys; Coupar, Meghan FLNR:EX
Sent	Thursday, August 10, 2017 11:13 AM

Hello Michael,

Thank you for the permit amendment application. I have included the Sunshine Coast Area Supervisor, Rod Dalziel, as Rod is the lead contact on the park use permit. If you have any questions regarding the permit renewal process, please contact Rod at (604) 885-6755.

I have provided your application to our permit clerk, Meghan Coupar, for processing and Meghan may be following up with you regarding any additional requirements.

With kind regards,
Jennie

Jennie Aikman
Regional Director, South Coast Region
BC Parks | Ministry of Environment
Office phone: (604) 924-2227
Cell phone: (778) 875-8494

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From: Michael Day [<mailto:Michael.Day@scrd.ca>]
Sent: Wednesday, August 9, 2017 11:33 AM
To: Aikman, Jennie S ENV:EX
Cc: Rosenboom, Remko FLNR:EX; Janette Loveys
Subject: RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)

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Infrastructure Services | Sunshine Coast Regional District
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Phone: 604.885.6810

From: Michael Day
Sent: Wednesday, August 09, 2017 10:48 AM
To: Jennie.Aikman@gov.bc.ca
Cc: Remko Rosenboom (Remko.Rosenboom@gov.bc.ca) <Remko.Rosenboom@gov.bc.ca>; Janette Loveys <Janette.Loveys@scrd.ca>
Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

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If you have any questions or concerns, please contact me directly at:

E-mail:	michael.day@scrd.ca
Office:	+1 (604) 885-6810
Mobile:	s.16

Best Regards,

Michael Day, P. Eng. | General Manager, Infrastructure Services and Regional Engineer
Infrastructure Services | Sunshine Coast Regional District
1975 Field Road, Sechelt, BC, V0N 3A1
Phone: 604.885.6810
Fax: 604.885.7909

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FW: Parks Use Permit 102714 Amendment Application re: temporary siphon

Thursday, October 12, 2017
10:52 AM

Subject	FW: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Coupar, Meghan FLNR:EX
To	Dalziel, Rod ENV:EX
Cc	Aikman, Jennie S ENV:EX
Sent	Thursday, August 10, 2017 11:22 AM
Attachments	 2015 Chapman ...  2017-08-08 Park use p...  2017-08-09 MOE Park ...

Hi Rod,

Currently SCRD has an open Amendment job under Authorization #102714 from 2016 that is with you to Conduct Technical Review and Draft Permit (T #349679). The 2016 Amendment is for the "Installation of gravity fed water withdrawal system to access additional water from Chapman Lake to provide water to SCRD system during a drought."

Could you please advise if the Amendment Application for 2017 is for the same purpose as 2016 and if so can it be added to the existing Amendment Job (T #349679)?

Thanks,

Meghan Coupar

Parks Permit Clerk

FrontCounter BC - South Coast Regional Office

South Coast, Haida Gwaii/South Island Sections

Tel: (604) 586-4439 Fax: (604) 586-4434

Toll Free: 1-877-855-3222

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Or visit us at: www.frontcounterbc.gov.bc.ca

From: Aikman, Jennie S ENV:EX

Sent: Thursday, August 10, 2017 9:26 AM

To: Dalziel, Rod ENV:EX; Coupar, Meghan FLNR:EX

Subject: FYI: Parks Use Permit 102714 Amendment Application re: temporary siphon

Importance: High

Hello Rob and Meghan,

We have received the attached PUP amendment application from the SCRD.

Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.

Thanks.

Jennie

Jennie Aikman

Regional Director, South Coast Region

BC Parks | Ministry of Environment

Office phone: (604) 924-2227

Cell phone: (778) 875-8494

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From: Michael Day [<mailto:Michael.Day@scrd.ca>]

Sent: Wednesday, August 9, 2017 10:48 AM

To: Aikman, Jennie S ENV:EX

Cc: Rosenboom, Remko FLNR:EX; Janette Loveys

Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

Dear Jennie,

Re: Parks Use Permit 102714 Amendment Application

As per CAO Loveys earlier email, please note the attached Parks Use Permit (PUP) Amendment application form and associated supporting documents.

I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and followed up again today. Chris August, Implementation and Compliance Manager, has verbally expressed his willingness to provide a letter of support for the temporary siphon application. I have received some assurance a letter of support will be provided by Monday, August 14th.

I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.

If you have any questions or concerns, please contact me directly at:

E-mail: michael.day@scrd.ca

Office: +1 (604) 885-6810

Mobile: +s.16

Best Regards,

Michael Day, P. Eng. | General Manager, Infrastructure Services and Regional Engineer

Infrastructure Services | Sunshine Coast Regional District

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

Fax: 604.885.7909

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RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)

Thursday, October 12, 2017
10:56 AM

Subject	RE: Parks Use Permit 102714 Amendment Application re: temporary siphon (updated design drawing)
From	Michael Day
To	Aikman, Jennie S ENV:EX
Cc	Rosenboom, Remko FLNR:EX; Janette Loveys
Sent	Wednesday, August 9, 2017 11:33 AM
Attachments	 2015-08-12 Siphon De...

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Michael Day, P. Eng. | General Manager, Infrastructure Services / Regional Engineer

Infrastructure Services | Sunshine Coast Regional District

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

From: Michael Day

Sent: Wednesday, August 09, 2017 10:48 AM

To: Jennie.Aikman@gov.bc.ca

Cc: Remko Rosenboom (Remko.Rosenboom@gov.bc.ca) ; Janette Loveys

Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

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Office: +1 (604) 885-6810

Mobile: **s.16**

Best Regards,

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Infrastructure Services | Sunshine Coast Regional District

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Phone: 604.885.6810

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Re: Parks Use Permit 102714 Amendment Application re: temporary siphon

Friday, October 13, 2017
11:32 AM

Subject	Re: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Dalziel, Rod ENV:EX
To	Coupar, Meghan FLNR:EX
Sent	Thursday, August 10, 2017 11:30 AM

Hello Meghan,

I am in the field today but I believe that is the intent. I will check tomorrow when in the office.

Rod Dalziel
Sunshine Coast Area Supervisor
BC Parks

> On Aug 10, 2017, at 11:22 AM, Coupar, Meghan FLNR:EX <Meghan.Coupar@gov.bc.ca> wrote:
>
> Hi Rod,
>
> Currently SCRD has an open Amendment job under Authorization #102714 from 2016 that is with
you to Conduct Technical Review and Draft Permit (T #349679). The 2016 Amendment is for the
"Installation of gravity fed water withdrawal system to access additional water from Chapman Lake
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>
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and if so can it be added to the existing Amendment Job (T #349679)?
>
> Thanks,
>
> Meghan Coupar
> Parks Permit Clerk
> FrontCounter BC - South Coast Regional Office South Coast, Haida
> Gwaii/South Island Sections
> Tel: (604) 586-4439 Fax: (604) 586-4434 Toll Free: 1-877-855-3222 Our
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survey<[http://csd.cogix.com/ViewsFlash/servlet/viewsflash?cmd=page&pollid=FCBC_surveys!](http://csd.cogix.com/ViewsFlash/servlet/viewsflash?cmd=page&pollid=FCBC_surveys!CSAT)
CSAT>. We'd appreciate your input.
> Or visit us at:
> www.frontcounterbc.gov.bc.ca<<http://www.frontcounterbc.gov.bc.ca/>>
> *****
>
>
> From: Aikman, Jennie S ENV:EX
> Sent: Thursday, August 10, 2017 9:26 AM
> To: Dalziel, Rod ENV:EX; Coupar, Meghan FLNR:EX
> Subject: FYI: Parks Use Permit 102714 Amendment Application re:
> temporary siphon
> Importance: High

>
 > Hello Rob and Meghan,
 >
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 >
 > Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.
 >
 > Thanks.
 > Jennie
 >
 > Jennie Aikman
 > Regional Director, South Coast Region
 > BC Parks | Ministry of Environment
 > Office phone: (604) 924-2227
 > Cell phone: (778) 875-8494
 >
 > BC Parks has recently launched new speciality plates! Get your BC Parks licence plate today<<http://www.icbc.com/vehicle-registration/licence-plates/Pages/bc-parks-plates.aspx>>.
 > [cid:image002.jpg@01D2A301.A3452C40]
 >
 >
 >
 > From: Michael Day [<mailto:Michael.Day@scrd.ca>]
 > Sent: Wednesday, August 9, 2017 10:48 AM
 > To: Aikman, Jennie S ENV:EX
 > Cc: Rosenboom, Remko FLNR:EX; Janette Loveys
 > Subject: Parks Use Permit 102714 Amendment Application re: temporary
 > siphon
 >
 > Dear Jennie,
 >
 > Re: Parks Use Permit 102714 Amendment Application
 >
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 >
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 >
 > I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.
 >
 > If you have any questions or concerns, please contact me directly at:
 >
 > E-mail: michael.day@scrd.ca<<mailto:michael.day@scrd.ca>>
 > Office: +1 (604) 885-6810
 > Mobile: +1 (604) 885-6810
 >
 > Best Regards,
 >
 > Michael Day, P. Eng. | General Manager, Infrastructure Services and
 > Regional Engineer Infrastructure Services | Sunshine Coast Regional
 > District
 > 1975 Field Road, Sechelt, BC, V0N 3A1

> Phone: 604.885.6810
> Fax: 604.885.7909
>
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> 1967 to 2017 -- Celebrating 50 years of service<<http://www.scrd.ca/50th-anniversary>> for the
community.
>
>
> _____
> This email was scanned by Bitdefender
> <2015 Chapman Lake Siphon design D-028B5.00 ISSUED FOR REVIEW.PDF>
> <2017-08-08 Park use permit application part 3.docx>
> <2017-08-09 MOE Park Use Permit Application re Siphon.pdf>
> <RE: Parks Use Permit 102714 Amendment Application re: temporary
> siphon (updated design drawing).eml> <image001.jpg>

Earthwon "Conduct Technical Review and Draft Permit (PA)" task

Thursday, October 12, 2017
11:08 AM

Subject	Earthwon "Conduct Technical Review and Draft Permit (PA)" task
From	noreply@gov.bc.ca
To	Dalziel, Rod ENV:EX
Sent	Friday, August 11, 2017 10:49 AM

An Earthwon "Conduct Technical Review and Draft Permit (PA)" task has been assigned to you.

Tracking Number: 363734

Authorization Number: 102714

Please use the following link to access your To Do List.

<https://j200.gov.bc.ca/int/ams/default.aspx?PossePresentation=AMSInternal&PosseObjectId=6392234&PossePane=ToDoListDetails>

RE: Parks Use Permit 102714 Amendment Application re: temporary siphon

Friday, October 13, 2017
11:30 AM

Subject	RE: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Coupar, Meghan FLNR:EX
To	Dalziel, Rod ENV:EX
Sent	Friday, August 11, 2017 10:51 AM

Hi Rod,

I've entered the 2017 Amendment Application into ePUPS, under Tracking Number 363734. Application is now with you for Conduct Technical Review and Draft Permit.

Amendment Application Fee of \$525.00 has not been received yet, but I'm requesting it now.

Thanks,

Meghan Coupar
Parks Permit Clerk
FrontCounter BC - South Coast Regional Office South Coast, Haida Gwaii/South Island Sections
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-----Original Message-----

From: Dalziel, Rod ENV:EX

Sent: Friday, August 11, 2017 9:55 AM

To: Coupar, Meghan FLNR:EX

Subject: RE: Parks Use Permit 102714 Amendment Application re: temporary siphon

Hello Meghan,

I have taken a look and the open Amendment job under Authorization #102714 from 2016 (T # 349679) is a different amendment which is currently on hold. This new amendment application is a separate temporary amendment similar to the one approved in Aug 2015 (T#342040). I hope that makes sense give me a call if not.

Will you be in contact with applicant re: Application fees and any other requirements?

Cheers,

Rod Dalziel

Sunshine Coast Area Supervisor

BC Parks - South Coast Region - Ministry of Environment

: PO Box 950, 6451 Sechelt Inlet Road, Sechelt, BC V0N 3A0

P: Desk (604) 885-6755 Mobile (604) 741-1967 Fax (604) 885-2445
M: Rod.Dalziel@gov.bc.ca
Visit the BC Parks website @ bcparks.ca

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-----Original Message-----

From: Coupar, Meghan FLNR:EX
Sent: Thursday, August 10, 2017 12:48 PM
To: Dalziel, Rod ENV:EX
Subject: RE: Parks Use Permit 102714 Amendment Application re: temporary siphon

Sounds good, thanks.

Meghan Coupar
Parks Permit Clerk
FrontCounter BC – South Coast Regional Office South Coast, Haida Gwaii/South Island Sections
Tel: (604) 586-4439 Fax: (604) 586-4434 Toll Free: 1-877-855-3222 Our Vision: Economic prosperity
and environmental sustainability

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your input.

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-----Original Message-----

From: Dalziel, Rod ENV:EX
Sent: Thursday, August 10, 2017 11:31 AM
To: Coupar, Meghan FLNR:EX
Subject: Re: Parks Use Permit 102714 Amendment Application re: temporary siphon

Hello Meghan,

I am in the field today but I believe that is the intent. I will check tomorrow when in the office.

Rod Dalziel
Sunshine Coast Area Supervisor
BC Parks

> On Aug 10, 2017, at 11:22 AM, Coupar, Meghan FLNR:EX <Meghan.Coupar@gov.bc.ca> wrote:

>

> Hi Rod,

>

> Currently SCRD has an open Amendment job under Authorization #102714 from 2016 that is with
you to Conduct Technical Review and Draft Permit (T #349679). The 2016 Amendment is for the
"Installation of gravity fed water withdrawal system to access additional water from Chapman Lake
to provide water to SCRD system during a drought."

>

> Could you please advise if the Amendment Application for 2017 is for the same purpose as 2016
and if so can it be added to the existing Amendment Job (T #349679)?

>

> Thanks,

>

> Meghan Coupar

> Parks Permit Clerk

> FrontCounter BC - South Coast Regional Office South Coast, Haida

> Gwaii/South Island Sections

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> *****

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> Or visit us at:

> www.frontcounterbc.gov.bc.ca<<http://www.frontcounterbc.gov.bc.ca/>>

> *****

>

>

> From: Aikman, Jennie S ENV:EX

> Sent: Thursday, August 10, 2017 9:26 AM

> To: Dalziel, Rod ENV:EX; Coupar, Meghan FLNR:EX

> Subject: FYI: Parks Use Permit 102714 Amendment Application re:

> temporary siphon

> Importance: High

>

> Hello Rob and Meghan,

>

> We have received the attached PUP amendment application from the SCRD.

>

> Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.

>

> Thanks.

> Jennie

>

> Jennie Aikman

> Regional Director, South Coast Region

> BC Parks | Ministry of Environment

> Office phone: (604) 924-2227

> Cell phone: (778) 875-8494

>

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> [cid:image002.jpg@01D2A301.A3452C40]

>

>

>

> From: Michael Day [<mailto:Michael.Day@scrd.ca>]

> Sent: Wednesday, August 9, 2017 10:48 AM

> To: Aikman, Jennie S ENV:EX

> Cc: Rosenboom, Remko FLNR:EX; Janette Loveys

> Subject: Parks Use Permit 102714 Amendment Application re: temporary

> siphon

>

> Dear Jennie,

>

> Re: Parks Use Permit 102714 Amendment Application

>

> As per CAO Loveys earlier email, please note the attached Parks Use Permit (PUP) Amendment application form and associated supporting documents.

>

> I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and followed up again today. Chris August, Implementation and Compliance Manager, has verbally expressed his willingness to provide a letter of support for the temporary siphon application. I have received some assurance a letter of support will be provided by Monday, August 14th.

>

> I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.

>

> If you have any questions or concerns, please contact me directly at:

>

> E-mail: michael.day@scrd.ca<mailto:michael.day@scrd.ca>

> Office: +1 (604) 885-6810

> Mobile: +1 (604) 885-1616

>

> Best Regards,

>

> Michael Day, P. Eng. | General Manager, Infrastructure Services and
 > Regional Engineer Infrastructure Services | Sunshine Coast Regional
 > District
 > 1975 Field Road, Sechelt, BC, V0N 3A1
 > Phone: 604.885.6810
 > Fax: 604.885.7909

>

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 > sunshinecoastrd<https://twitter.com/sunshinecoastrd>
 > Like us on Facebook<https://www.facebook.com/sunshinecoastrd>

>

> 1967 to 2017 -- Celebrating 50 years of service<http://www.scrd.ca/50th-anniversary> for the community.

>

>

>

> _____

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> <2015 Chapman Lake Siphon design D-028B5.00 ISSUED FOR REVIEW.PDF>

> <2017-08-08 Park use permit application part 3.docx>

> <2017-08-09 MOE Park Use Permit Application re Siphon.pdf>

> <RE: Parks Use Permit 102714 Amendment Application re: temporary
 > siphon (updated design drawing).eml> <image001.jpg>





Page 249 of 413 to/à Page 252 of 413

Withheld pursuant to/removed as

s.16

FW: Parks Use Permit 102714 Amendment Application re: temporary siphon

Thursday, October 12, 2017
2:28 PM

Subject	FW: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Dalziel, Rod ENV:EX
To	Hirner, Joanna ENV:EX
Sent	Wednesday, August 16, 2017 4:00 PM
Attachments	 2015 Chapman ...  2017-08-09 MOE Park ...  RE Parks Use Permi...  2017-08-08 Park use p...

Hello Joanna,

We have received another amendment application from the SCRD to utilize the siphon system at Chapman Lake. Again giving us very little notice as this should have been submitted back in the early spring. I have had a crack at reviewing their application using feedback we provided last time (Aug 2015) and from feedback for the trenching amendment. I haven't heard yet but I expect there is an expected quick turnaround on this PUP application and I am on AL from Aug 25th to Sept 4th.

So if you have a little time could you do a quick review. It doesn't appear much has changed from the approved application in 2015 but we did rush approving that one.

All files associated with SCRD PUP are stored at V:\1_PPA Files\S Coast Region\Major Projects\SCRD Chapman Lake\PUP 102714 Chapman Lake\PUP amendment

Sorry,

Rod Dalziel

Sunshine Coast Area Supervisor

BC Parks - South Coast Region - Ministry of Environment

PO Box 950, 6451 Sechelt Inlet Road, Sechelt, BC V0N 3A0

Desk (604) 885-6755 Mobile (604) 741-1967 Fax (604) 885-2445

Rod.Dalziel@gov.bc.ca

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From: Coupar, Meghan FLNR:EX

Sent: Thursday, August 10, 2017 11:22 AM

To: Dalziel, Rod ENV:EX

Cc: Aikman, Jennie S ENV:EX

Subject: FW: Parks Use Permit 102714 Amendment Application re: temporary siphon

Importance: High

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Meghan Coupar

Parks Permit Clerk

FrontCounter BC - South Coast Regional Office

South Coast, Haida Gwaii/South Island Sections

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From: Aikman, Jennie S ENV:EX

Sent: Thursday, August 10, 2017 9:26 AM

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Subject: FYI: Parks Use Permit 102714 Amendment Application re: temporary siphon

Importance: High

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Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.

Thanks.

Jennie

Jennie Aikman

Regional Director, South Coast Region

BC Parks | Ministry of Environment

Office phone: (604) 924-2227

Cell phone: (778) 875-8494

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From: Michael Day [<mailto:Michael.Day@scrd.ca>]

Sent: Wednesday, August 9, 2017 10:48 AM

To: Aikman, Jennie S ENV:EX

Cc: Rosenboom, Remko FLNR:EX; Janette Loveys

Subject: Parks Use Permit 102714 Amendment Application re: temporary siphon

Dear Jennie,

Re: Parks Use Permit 102714 Amendment Application

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I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and followed up again today. Chris August, Implementation and Compliance Manager, has verbally expressed his willingness to provide a letter of support for the temporary siphon application. I have received some assurance a letter of support will be provided by Monday, August 14th.

I will also be forwarding the PUP amendment application to Squamish First Nation under separate cover.

If you have any questions or concerns, please contact me directly at:

E-mail: michael.day@scrd.ca

Office: +1 (604) 885-6810

Mobile: **s.16**

Best Regards,

Michael Day, P. Eng. I General Manager, Infrastructure Services and Regional Engineer

Infrastructure Services | Sunshine Coast Regional District

1975 Field Road, Sechelt, BC, V0N 3A1

Phone: 604.885.6810

Fax: 604.885.7909

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Ministry of
Environment

Land Use / Occupancy Park Use Permit Application

Only applications that are considered by BC Parks to be compatible with the conservation and recreation objectives identified for the park(s), protected area(s), conservancy(ies) and recreation area(s) (collectively 'parks') involved in the proposal will be evaluated.

All applications must include completed application form, map, attachments (as indicated below) and non-refundable application fee (plus applicable taxes). Please make payment by VISA/MasterCard/American Express or by cheque, made payable to the Minister of Finance.

INFORMATION REGARDING APPLYING FOR A PARK USE PERMIT AVAILABLE AT:

<http://www.frontcounterbc.gov.bc.ca/Start/parks/>

Application Type:

- ☐ New
☐ Renewal (Authorization #)
☒ Amendment (Authorization #) 102714

Requested Period of Use (Inclusive): From 08/09/2017 to 11/30/2018
mm/dd/yy mm/dd/yy

PART 1. NAME(S) AND MAILING ADDRESS

Applicant Name:

FULL LEGAL NAME of Individual(s), Company or Society, Ministry or Government Agency:

SUNSHINE COAST REGIONAL DISTRICT

Contact Name for Company or Ministry Applicants: Michael Day, P.Eng

☐ BC Incorporation ☐ BC Registration ☐ Society Act # _____

Age: _____ 19 or over ☒ Yes ☐ No

Legal Mailing Address:

1975 Field Road

City/Town: Sechelt

Province: BC Postal code: V0N 3A1

Contact Information:

Daytime Phone: 604 885 6810

Cell: s.16

Fax: _____

Email Address: Michael.Day@scrd.ca

Billing Address (if different from legal mailing add.):

City/Town: _____

Province: _____ Postal code: _____

Contact Information:

Daytime Phone: _____

Cell: _____

Fax: _____

Email Address: _____

Preferred method of contact: ☐ Phone ☐ Cell Phone ☐ Regular mail ☒ Email

<p>Do you hold a Crown Land Tenure: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide file number(s): _____</p>	<p>Have you previously held a Park Use Permit or Resource Use Permit: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide file number(s): _____</p>
---	---

PART 2: PURPOSE, LOCATION, AREA

Name of Park(s):
Tetrehedron Provincial Park

Purpose (Summary of Proposed Activity):
Please select all that apply

- ☐ Aquaculture and mariculture
- ☐ Alternative power project
- ☐ Grazing
- ☐ Meteorological or hydrological station
- ☐ Seismic and gravity station
- ☐ Navigation Aid
- ☐ Trapping
 - ☐ Trapline cabin
- ☐ Forestry Activities
- ☐ Mining, sand and gravel quarry
- ☐ Restoration/habitat enhancement project
- ☐ Roads and Trails
- ☐ Rights-of-way

- ☐ Privately owned structure
 - ☐ Cabin
 - ☐ Private moorage
 - ☐ Other: _____
- ☐ Provincially owned structure
- ☐ Communication sites
- ☐ Hydro transmission/distribution lines
- ☐ Pipelines (gas or oil)
- ☐ Telephone Booths
- ☐ Telephone lines
- ☒ Water impoundment (dam or dyke)
- ☒ Waterline/sewer

Location of Proposed Activities:

- 1) Is the activity proposed for any frontcountry* areas? ☐ Yes ☒ No
 **"Frontcountry" means an area within one kilometre of either side of the centreline of a park road or a highway.
- 2) Are the activities selected above the same for all parks listed on the application? ☒ Yes ☐ No
- If 'No', please indicate which park(s) each activity is proposed for (if not enough space, please provide an attachment):

PART 3: DETAILED PROPOSAL

Please attach a detailed proposal description that addresses the following (A-D):

- A.** Please describe the proposed activity and provide the following information:
 - a) Purpose of the land use or occupancy;
 - b) Details of the existing uses, vegetation cover, wildlife present, water resources, geology, and historical/cultural significance of the proposed site and adjacent area;
 - c) Location and size of all proposed and current improvements (facilities/structures);
 - d) If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes;
 - e) Construction schedule (if applicable) for proposed new permanent and/or temporary facilities;
 - f) Photographs of the site and area adjacent to the proposed land use/occupancy;
 - g) Proposed site and adjacent area description and mapping in terms of its current legal status;
 - h) Type of transportation and access route to the proposed site(s); and
 - i) The initial 5 year operational plan related to this proposal.
- B.** List all experiences of the applicant and/or others involved in this proposal in previous park use permits including the name, number, date and location of the permit(s).
- C.** Describe expected or potential impacts on the park's environmental, cultural, recreational values changes including, but not limited to:
 - a) Habitat for vegetation and wildlife, particularly listed species or species at risk;
 - b) Any watercourses or water bodies (diversions, flows, potential siltation, etc.)
 - c) Special features such as unique geological formations;
 - d) Access to the park, and the area of the park under consideration;
 - e) aesthetics and visual values;
 - f) Cultural values, including traditional use of the area by First Nations;
 - g) Park visitors and local communities, including public health and safety and recreational use or enjoyment of the park;and actions that will be taken to mitigate identified impacts on the park(s).
- D.** Provide maps of the proposed application area, including (if required):
 - a) General Location Map: A map(s) of the individual protected areas within the application, drawn to 1:50 000 to 1:250 000 (or larger if required to encompass boundaries of permit area) scale that illustrates at a landscape level scale the general location of the area under application, including boundaries of the proposed permit area and major landmarks, travel/access routes.
 - b) Permit Area Map: Where the land use/occupancy utilizes improvements or structures, a more detailed map(s) of the proposed permit area(s) within each park, drawn to 1:20 000 to 1:50 000 scale showing the exact proposed boundaries of the permit area, including the area (in hectares) as well as any watercourses or other identifying features (trails, facilities, roads, etc.). The permit area map must clearly identify the location of travel/access routes, and specific activity site(s). If applicable, the location and construction description of any temporary facilities or the use of existing facilities within the permit area, as well as the location and size of all proposed improvements must also be included.
 - c) Detailed Site Map: Where the operation proposes to use any existing or to construct any new improvements, a detailed site map at 1:1 000 to 1:5 000 scale must be submitted identifying the location of all improvements (buildings, structures, roads, power lines, fences, docks, etc.) in relation to the boundaries of the permit area.

PART 4: APPLICATION CERTIFICATION

All applications must be complete. Incomplete applications will not be processed until information is submitted. All of the following must be attached to or enclosed with this application form:

- **completed application form, including attached management plan;**
- **map(s) to standards detailed in application requirements;**
- **attachments as indicated below; and**
- **non-refundable application fee (plus applicable taxes).**

Upon submission of a complete application and application fee, allow 140 days to evaluate proposals. Applications requiring additional steps, or supplying insufficient information may delay evaluation. BC Parks reserves the right to deny any application. The information you provide will be subject to the *Freedom of Information and Protection of Privacy Act*. The submission of this form does not in any manner convey any rights to use or occupy land within a park, protected area, recreation area or conservancy.

- Businesses must either be licensed to do business in BC, or if licensed/incorporated outside of British Columbia (considered to be 'extra-provincial companies') must be in compliance with section 375 of the *Business Corporations Act* to operate in British Columbia.
- Extraprovincial societies must be registered under the *Society Act* in British Columbia in order to hold a park use permit or resource use permit. An extraprovincial society is a society or association formed outside British Columbia, and includes a branch of that society or association.

Additional costs and requirements:

Upon evaluation of the proposal it may be determined that additional costs and requirements must be provided prior to issuance of the permit, such as financial guarantees, or survey and inspection costs (as per Section 21 of the *Park Act*).

Commercial General Liability (CGL) insurance in the amount of \$2 million per occurrence may be required as a minimum for parks, protected areas, conservancies and recreation areas. Applications will be assessed to determine whether additional types of insurance, such as aviation liability or marine liability, may also be required.

Additional information on insurance is available at

http://www.env.gov.bc.ca/pasb/applications/process/park_use.html#insurance

THE APPLICANT HEREBY CERTIFIES THAT ALL THE INFORMATION PROVIDED IN THIS APPLICATION IS TRUE AND CORRECT.

Signature of Applicant or Authorized Signatory of Applicant: _____

Date: 2017-08-09

Interest will be charge on all overdue accounts, the interest rate charged is 3% + the prime lending rate of the principal banker to the Province as established each 3 month quarter starting Oct 1st.

Send completed application and proposal description to:
Ministry of Forests, Lands, and Natural Resource Operations
FrontCounter BC

For additional information on how or where to submit your application, please call the FrontCounter BC Contact Centre or visit the website to determine an office nearest you:

Call FrontCounter BC toll free at: **1-877-855-3222**

FrontCounter BC Website: <http://www.frontcounterbc.ca/locations/index.html>

PLEASE RETAIN A COPY OF THIS APPLICATION FOR YOUR RECORDS

First Nations Consultations

Consulting with First Nations

The Province of British Columbia's legal duty to consult with First Nations arises from section 35 of the *Canadian Constitution Act*, which recognizes and affirms aboriginal and treaty rights. The duty to consult arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right or title and contemplates conduct that might adversely affect it. Consultation with First Nations will be guided by principles of good faith, and meaningful dialogue with the intent to fully understand the nature and scope of the aboriginal right, the potential to adversely affect that aboriginal right, and address those potential impacts to an aboriginal right while balancing societal interests.

Agreements with First Nations

In many locations, the Province has agreements with First Nations. These agreements may be referred to as Collaborative Management Agreements, Reconciliation Protocol Agreements, Memorandum of Understanding or simply Working Agreements. In some cases the Province and Canada have entered into a treaty with a First Nation, which contains certain provisions regarding treaty rights within parks and protected areas. Modern treaties contain provisions to address those treaty rights in the management of parks and protected areas where a treaty right exists.

These agreements apply to a variety of parks and protected areas and conservancies and include obligations by the Province to discuss operational delivery of programs in addition to information associated with applications for park use permits with a First Nation. These discussions provide the First Nation and the Province with an opportunity to raise any questions or concerns associated with a park use permit application and/or the proposed activity in relation to aboriginal rights or title.

Important Considerations for Park Use Permit Applications

Applicants for park use permits should be aware of the Province's consultation obligations with First Nations and associated time requirements to seek meaningful consultation. There may be occasions when BC Parks may require additional, detailed information to allow for the necessary review of an application. It is important that applicants provide the necessary, detailed information as requested on the application form in order to avoid a longer than anticipated period of time to evaluate the application.

Park Use Permit application (temporary amendment) – Sunshine Coast Regional District – Siphon at Chapman Lake

Part 3:

Section A – Proposed Activity

a. Purpose of Land use or occupancy

The purpose of this amendment to Park Use Permit 102714 (PUP) held by the Sunshine Coast Regional District (SCRD) is to increase the available late summer water supply from Chapman Creek through the installation of a temporary siphon system in Chapman Lake, which is located in the Tetrahedron Provincial Park.

Chapman Creek is the primary water supply to the Regional Water System on the Sunshine Coast and supplies water to approximately 23,000 people. In two out of the last five years, this water supply has become nearly depleted due to prolonged periods of drought and increased water demand during the summer season. To alleviate potential acute water shortage in 2017 and 2018, the SCRD is seeking approval from BC Parks (and the Ministry of Forests, Lands and Natural Resource Operations), to access an additional five meters of water storage (1 million cubic meters) in Chapman Lake should doing so become necessary.

In the immediate term, the SCRD is proposing to have the necessary permits in place to allow the temporary installation of a siphon in the event that the region experience another water shortage from a prolonged period of drought. The main drivers behind this request for a temporary amendment to the SCRD's PUP are:

- Meeting increased environmental flow targets for Chapman Creek established by the Ministry of Forests Lands and Natural Resource Operations (FLNRO) to facilitate fish migration as per recommendations from a fisheries biologist and requirements under the *Water Sustainability Act*;
- Uncertainties in short term weather projections: recent climate studies suggest that prolonged periods of drought in the South Coast could occur more frequently but shorter term weather forecasts of precipitation are highly unreliable; and
- Meeting increased summer season water demand (water use nearly doubles in the summer season from irrigation and tourism).

In order to both reduce demand and increase water supply from sources other than Chapman Creek, the SCRD is implementing demand and supply management in accordance with the Comprehensive Regional Water Plan (CRWP), including such measures as water metering, well protection measures, and groundwater resource investigation.

Also in accordance with the CRWP and outside of the scope of this amendment application, the SCRD is also in the process of obtaining approvals to deepen the channel in Chapman Lake which will permanently enhance redundancy in the water system. This is an essential measure in the medium term prior to the construction of long term source development projects specified in the SCRD's CRWP are constructed.

b. Details of existing uses, vegetation cover, wildlife present, water resources, geology, and historical and cultural significance

Existing uses

The existing uses for the proposed area within this PUP amendment application are for water impoundment and a helicopter pad.

Vegetation Cover

Vegetation Overview

Forest cover around Chapman Lake and the upper Chapman Creek watershed consists of Mountain Hemlock (*Tsuga mertensiana*), Yellow Cedar (*Chamaecyparis nootkatensis*) and Pacific Silver (Amabilis) fir (*Abies amabilis*), while lower elevations in Tetrahedron Provincial Park contain Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*; Triton 2006). The canopy formed by the tree cover varies from relatively open to dense. Throughout the park, semi-open meadows, marsh complexes, and areas of dense shrub [e.g., blueberry (*Vaccinium* sp.)] are also found.

The mid and lower reaches of the Chapman Creek watershed, outside the park boundaries, fall within the Coastal Western Hemlock biogeoclimatic zone (CWHm), and are characterized by forests dominated by Douglas fir (*Pseudotsuga menziesii* var. *menziesii*), Western Hemlock, Western Red Cedar and a variety of understory shrub species. Widespread logging and associated disturbance and revegetation have resulted in a change in forest composition from old-growth conifer forests to communities with a higher proportion of broadleaved trees. Much of the riparian zone in the mid and lower reaches of Chapman Creek now consists of alder stands. The park is situated within the Southern Pacific Ranges ecosection and Coastal Western Hemlock/Mountain Hemlock biogeoclimatic zones. The park contains one of the oldest undisturbed forests in Canada with stands containing trees over 1,000 years. Semi-open meadows, marsh complexes and dense understorey (e.g. blueberry) are characteristic of the park, which also contains ten lakes.

Riparian Vegetation

Riparian vegetation surveys were completed in 1998 as part of impact assessment from the 5 m lake depth to 5 m above the high water level. The riparian area is largely forested to the high water level with several smaller areas where shrubs and/or herbaceous species predominate. The four habitat types identified include forest, shrub land, wet meadow and wetland/aquatic. Forest vegetation consisted of Mountain Hemlock and Amabilis Fir with some Yellow Cedar. The shrub layer was dominated by Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*) with the herb layer consisting of moss. Meadow and wetland areas contained a graduation from one to the other with an increase in soil moisture. Meadow areas tended to be moist due to subsurface drainage from hillslope areas. Vegetation growth within the lake that was less than 2 m in depth was considered part of the wetland habitat.

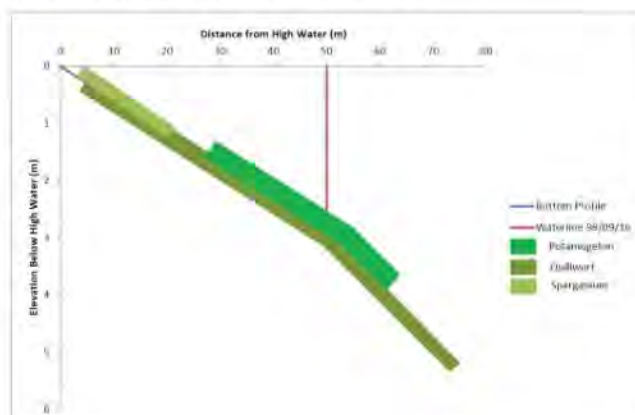
Comment (RD1): Why no mention of surveys from 2016 IA anywhere in this application?

Aquatic Vegetation

Aquatic vegetation transects were conducted in Chapman Lake during late summer of 1998. Aquatic plants surveyed were limited to submergent species; however, water levels in the lake were below normal high water levels. The dominant species inventoried consisted of bristle-like quillwort (*Isoetes echinospora*) and was observed growing on suitable substrates throughout the lake. Dominant plant species typically occur between the 1 m and 4 m below the high water level. Narrow-leaved bur-reed (*Sparganium sp.*) and pondweed (*Potamogeton sp.*) were observed on the exposed or shallow lake areas, particularly at the east end of the lake. Figure 1 illustrates the zonation of aquatic vegetation in Chapman Lake from the survey transects for the study completed in 1998.

The main disturbance to aquatic vegetation during operations was identified as desiccation due to drying; however, it was noted that drying stress is already present seasonally in the littoral zone where most of the aquatic vegetation occurs and the dominant plant (quillwort) appeared to be very tolerant to desiccation under existing water level fluctuations in the reservoir. It is likely that the reduced growing season caused by existing drawdown leads to increased thermal drying stress on bur-reed and pondweed and abundance levels were low.

Figure 1. Zonation of Aquatic Vegetation in Chapman Lake



Source: Whitehead 1999.

Sensitive Species

A list of plant species potentially within the study area was compiled using the BC Conservation Data Centre database. The same search categories as above were used to compile the information. Table 1 provides a summary of the resulting species, including the BC designation and Species at Risk statuses. A total of seven sensitive BC species were identified, with no SARA listed species results.

Table 1. Sensitive Plant Species in the Sunshine Coast Forest District

Common Name	Scientific Name	Species Type	BC Status	SARA Status
elegant Jacob's-ladder	<i>Polemonium elegans</i>	Dicot	Blue	
Kamchatka spike-rush	<i>Eleocharis kamtschatica</i>	Monocot	Blue	
poison oak	<i>Toxicodendron diversilobum</i>	Dicot	Blue	
Roell's brotherella	<i>Brotherella roellii</i>	Nonvascular plant	Red	
slimleaf onion	<i>Allium amplexans</i>	Monocot	Blue	
small spike-rush	<i>Eleocharis parvula</i>	Monocot	Blue	
snow bramble	<i>Rubus nivalis</i>	Dicot	Blue	

A search was also conducted in the BC Conservation Data Centre database for terrestrial ecological communities in the area surrounding Chapman Lake. Criteria used to focus the search results was applied using the regional and forest districts for the Sunshine Coast filters. In addition, the biogeoclimatic zone of Coastal Western Hemlock, subzone very wet maritime and montane (CHWvm2) variant filters were applied. Table 2 below provides the results of the ecological community database search of the area, which includes BC sensitive species status.

Table 2. Sensitive Ecological Community Plant Species in the Sunshine Coast, Coastal Western Hemlock Biogeoclimatic Zone (CHWvm2)

Common Name	Scientific Name	BC Status	Endemic
Amabilis fir - Sitka Spruce / devil's club	<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	Blue	
Amabilis fir - Western Red cedar / salmonberry Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Yellow	
amabilis fir - western red cedar / three-leaved foamflower Very Wet Maritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Wet Maritime	Yellow	
Sitka sedge / peat-mosses	<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Red	Y
Sitka willow / Sitka sedge	<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Blue	Y
western redcedar - western hemlock / sword fern	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	Blue	
western redcedar - yellow-cedar / spleenwort-leaved goldthread	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Coptis asplenifolia</i>	Yellow	
western redcedar - yellow-cedar / skunk cabbage	<i>Thuja plicata</i> - <i>Xanthocyparis nootkatensis</i> / <i>Lysichiton americanus</i>	Yellow	
western hemlock - amabilis fir / deer fern	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i>	Blue	
western hemlock - amabilis fir / Alaskan blueberry	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Vaccinium alaskaense</i>	Yellow	
western hemlock - lodgepole pine / grey reindeer	<i>Tsuga heterophylla</i> - <i>Pinus contorta</i> / <i>Cladonia rangiferina</i>	Yellow	Y
western hemlock - western redcedar / salal Very Wet Maritime	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	Blue	Y
yellow-cedar / peat-mosses	<i>Xanthocyparis nootkatensis</i> / <i>Sphagnum</i> spp.	Yellow	

Wildlife Resources

Wildlife values within the Chapman Creek watershed are not well known and information is limited. The watershed appears to support populations of Columbian black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), cougar (*Puma concolor*) and other furbearing animals. Other wildlife known to use the watershed include: waterfowl, gulls, shorebirds, raptors, upland game birds, woodpeckers, a variety of songbirds, small mammals, amphibians and reptiles. Species recorded in Tetrahedron Provincial Park include: mountain goat (*Oreamnos americanus*), coyote (*Canis latrans*), mink (*Mustela vison*), marten (*Martes Americana*), river otter (*Lontra canadensis*) and bobcat (*Lynx rufus*), a variety of rodents, rock ptarmigan (*Lagopus muta*), woodpecker, grouse, ravens (*Corvus corax*), and marbled murrelets (*Brachyramphus marmoratus*; MELP 1997). It is thought that many of the larger animals tend to be transient users wildlife corridors to pass through the park. Hunting is prohibited within the park; however, the lower reaches of the watershed provide recreational hunting opportunities. There are no approved Wildlife Habitat Areas in the assessment area. There is a lack of emergent vegetation (e.g., cattail, bulrush) within the high water perimeter of Chapman Lake, however, some limited opportunities for nesting birds is available in this area.

Comment [RD2]: Why no fish values section?

Sensitive Wildlife Species

A list of sensitive wildlife species potentially found in the study area was compiled using the BC Conservation Data Centre database. The search categories used to compile the information included a search of the Sunshine Coast Forest District and refining the search results using the Coastal Western Hemlock and Mountain Hemlock biogeoclimatic zones. Habitat types used to further filter survey results included forest, grassland/shrub, lakes, riparian, stream/river and wetland. BC Red listed species include any plant, animal or plant community that is extirpated, endangered or threatened and Blue listed species are considered to be of special concern in BC, but are not extirpated, endangered or threatened. The Species at Risk Act, Schedule 1, is federal government legislation enacted to protect extirpated, endangered and threatened species and species of special concern across Canada. A total of 45 sensitive BC wildlife species were identified, with 16 SARA listed species results.

Water Resources

The Chapman Creek watershed (Watershed Code: 900-120400) is located approximately 5 km east of Sechelt, BC and provides approximately 85% of the drinking water and fire protection for more than 21,000 residents between Langdale and Earl's Cove, including the District of Sechelt. Water storage is provided by both Chapman and Edwards Lakes which are located on the Tetrahedron Plateau in Tetrahedron Provincial Park. A control structure on Edwards Lake allows water to be released when required to augment flows in Chapman Creek.

Comment [DB3]: I think the number mentioned earlier in the report was 10k.

Comment [RD4]: Why did we receive a reviewed unedited copy?

Chapman Creek flows south from the Tetrahedron Plateau for approximately 24 km and discharges into the Strait of Georgia. Chapman Creek watershed is approximately 73 km² in area and the drinking water intake is located approximately 175 m above sea level and 7.5 km upstream of the mouth of Chapman Creek. Approximately 65 km² of the Chapman Creek watershed is located above the SCRD water intake.

Chapman Lake

Chapman Lake lies at an elevation of 976 m above sea level in steeply sloping terrain; surrounding ridgetops and peaks typically reach more than 1,500 m elevation. The lake has a surface area of 31.2 ha and a maximum depth of approximately 30 m, making it the largest lake in the Chapman Creek watershed. The catchment area of the lake is 6.58 km², and the lake is fed by 2 main streams, both of which enter at the east end of the lake. The lake volume at the high water level is approximately 3.7 million m³ with an average outflow rate of 0.476 m³/s. Based on these data, the average retention time of water in the lake is approximately 90 days. The short retention time reflects the high level of precipitation in the watershed. Outflow from the lake is controlled by a concrete dam and valve located on the west side of the lake and operated by the SCRD. During a typical year, water stored behind the dam is allowed to overflow naturally until there is a need to supplement the flows to Chapman Creek, at which time the dam is opened to release stored water from the reservoir. The annual lake level variation is currently between 1.5 m to 3 m.

Comment [RD5]: Engineering diagram states top of dam at 974m

Chapman Lake Water Quality

Whitehead (1999) reported the results of limited water quality monitoring on Chapman Lake. Parameters measured included Secchi disc transparency, temperature and dissolved oxygen. The Secchi disk indicated clear water with a reading at 6.5 metres. Temperature and dissolved oxygen results ranged from 16°C at the surface to 7°C at depth and from 16 mg/l at the surface to 6.5 mg/l at depth, and indicated the lake was stratified with a thermocline between 2 m and 3 m. During the monitoring program gas bubbles were observed throughout the lake and particularly at the east end in the shallower areas. Based on the smell of hydrogen sulphide it was concluded the gas bubbles were originating from anaerobic decomposition originating in the lake sediments.

Comment [DB6]: Check number. This is a little high for the elevation and temperature

Chapman Lake Water Quantity

A water demand and supply analysis under changing climatic conditions was conducted on the Chapman water system on the Sunshine Coast. The study assessed the impacts of climate change on water consumption and water supply within the Chapman watershed. Historic temperature, precipitation and discharge data were collected to determine historic trends. The impacts from Pacific Decadal Oscillations and El Niño Southern Oscillations on climate and discharge were analyzed to determine the impacts of climate change.

The results from this study indicated that climate patterns on the Sunshine Coast have changed over the last 50 years, with annual average temperatures increasing by approximately 2°C and average total annual precipitation decreasing by 24 mm. Climate trends were determined to impact the available water supply as temperatures and snowpack elevation were increasing. This increased temperatures and diminishing snow pack is causing the snow to melt earlier and more rapidly during the spring season and existing streamflow regime in Chapman Creek is shifting towards a more rain dominated regime, which would change the entire water holding dynamic of the watershed. Discharge data further showed that peak discharge occurred earlier in the spring, which affects summer base flows when demand for domestic distribution and environmental services was highest. Climate conditions during the summer season were also determined to be impacting supply as the increasing temperatures were assumed to cause the snowpack to be depleted earlier in the summer season and the decreasing trends in precipitation were resulting in less recharge to storage reservoirs.

The increases in temperature and decreases in precipitation trends were shown to be correlated to water consumption during the summer season when water supplies are the most limited. The significant correlation between water consumption and temperature and precipitation identifies how climate change may impact water consumption behaviors on the Sunshine Coast.

Sunshine Coast climate is characterized by cool and wet winters and warm and dry summers (Figure 3). The summer season is the critical time of year for water supply, as this is when water demand is highest and available water supply is most limited. Trends over the last 50 years are suggesting that summer temperatures are increasing (Figure 4) and total summer precipitation is decreasing (Figure 5).

Figure 2. Annual average total monthly precipitation and average monthly temperature in Gibsons, BC (1962 to 2013)

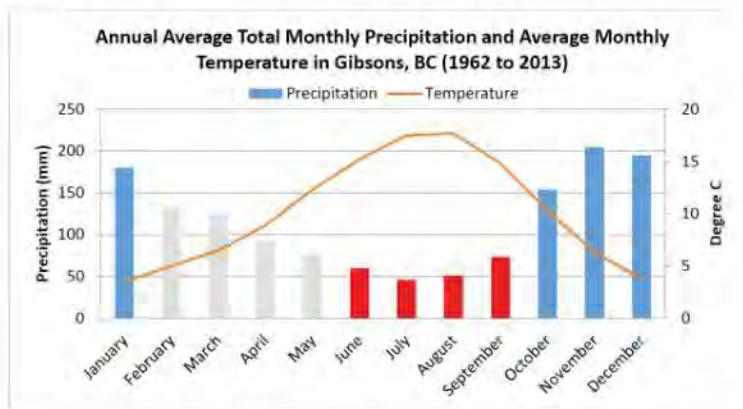
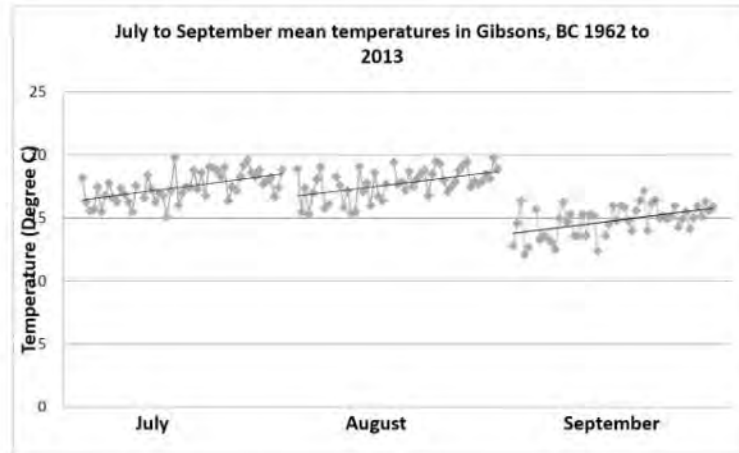
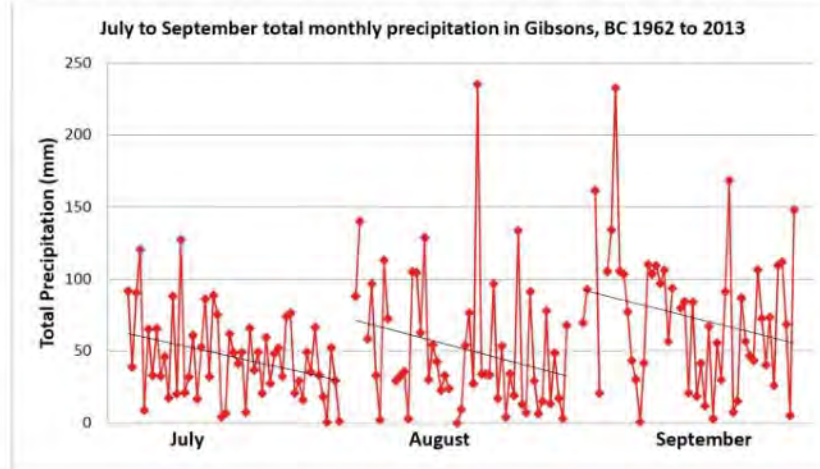


Figure 3. Historic monthly mean temperatures for July to September collected in Gibsons, BC from 1962 to 2013



*
*

Figure 4: Historic monthly total monthly precipitation for July to October collected in Gibsons, BC from 1962 to 2013



As part of the study, a sensitivity analysis was completed and identified that the total water consumption during the summer could regularly exceed the equivalent to the available water supply in the next 10 years if water demand does not change, snow pack continues to decrease in the winter, summer temperatures increase by an average 1 or 2 °C, and prolonged droughts become more common.

Geology

Chapman Lake lies within an area of granite rock of the late Jurassic and early Cretaceous ages (156 to 114 million years old), characterised as quartz diorite. Coastal watersheds underlain by rock types such as quartz diorite tend to be slightly acidic due to the low buffering capacity of these rocks and the natural low pH of rainfall.

The dominant soil-types within the Chapman watershed contain large concentrations of organically combined iron and aluminium in their subsoils. In poorly-drained soils on the Tetrahedron Plateau organic matter is not broken down as quickly as in areas of well-drained soils, which means that organic and clay colloids, and aluminium and iron compounds are common elements in the water supply and characterize the natural water quality in this area.

Historical and Cultural Significance

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shishálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded....within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

c. Location and size of all proposed and current improvements

Location

The location of the proposed permit area is outlined in the Figure below.

Figure 5. Proposed amended permit area at Chapman Lake



Siphon Design

The siphon consists of five parallel 200 mm HDPE pipes that are 255 m in length. The siphon will run over the existing dam structure from Chapman Lake into Chapman Creek. The inlet will be installed at an elevation of 963 m which is approximately 11 m below the top of the dam and will reach into the lake approximately 180 m from the existing dam. The inlets will be secured and anchored in place using concrete blocks and buoys. The outlet of the pipe will be located approximately 50 meters downstream of the existing dam at an approximate elevation of 965 m. Refer to attached engineering design drawings.

Siphon Construction

The installation of the siphon system will involve transportation of pre-fused sections of HDPE pipe to Chapman Lake via helicopter. The installation process will begin with laying the outlet pipe (with attached gate valve) then will proceed with laying the subsequent lengths of that pipe, ending with the inlet pipe (with attached check valve and buoy). The sections of pipe will be bolted together at Chapman Lake and the inlet pipe will be tied-off to lake bed anchor blocks. This process will be duplicated for a second complete siphon length. Once the first two pipe lengths are assembled and in place, the

pump/vacuum and blow-off ports will be constructed at the high point of each pipe. The siphons will be primed and commissioned as soon as possible after completion of construction. The operation of the first two siphons will be monitored for 24 hours by the SCRD Siphon Technicians. If the operation of the first two siphon lengths is considered to be a success, the remaining lengths will be constructed through the same process as the previous two. For construction details, refer to the [Detailed Construction Plan](#).

Comment [RD7]: Where is this?

If the siphon is considered to be unsuccessful after 24 hours of operation, alternative options will be considered in consultation with First Nations, BC Parks, and MFLNRO.

d. If applicable, details of the physical changes to the site that would be required to meet the needs of the proposal and the proposed mitigation of such changes

The physical changes and the proposed mitigation strategies are outlined in the table below.

Table 3. Physical changes and proposed mitigation measures from the proposed works

Physical changes	Proposed mitigation
Lake bed disturbance from machine activity when assembling the pipes	Operating the machine in the upper areas of the exposed lake bed where the ground cover is compacted and disturbance is minimal. In sensitive areas where lake grasses are present or ground conditions are softer, ¾" plywood will be placed on the ground to form a track and reduce any significant disturbance from a machine.
Excavating benches where necessary within the lake bed for the level placement of the lock blocks	An excavator will be used to dig out a flat area for placement of the lock blocks. The area to be disturbed will be sized according to the size of the lock blocks to minimize disturbance. This work will occur when the lake level is below the location where the lock block will be placed to minimize any sedimentation into the lake.
Soil disturbance from machine activity	Machine access routes will be flagged at predetermined locations and routes in advance to minimize vegetation disturbance and to concentrate all disturbance from the machine into a small of an area as possible.

e. Construction Schedule (if applicable) for proposed new permanent and/or temporary facilities

A project of this nature has numerous variables that impact timing (e.g. weather, water demand etc.). The dates for the construction schedule are unknown until it is realized that the siphon is needed, which is when the water supply has approximately 30 days remaining.

From when the decision is made to install the siphon, construction and commissioning are estimated at 35 days of which approximately eight days will be in channel/lake work.

f. Photographs of the site and area adjacent to the proposed land use/occupancy

Figure 6. The proposed site at Chapman Lake showing the proposed alignment of the siphon lines and the sensitive aquatic grassy area to be protected as detailed in Table 3.



Figure 7. Site plan at Chapman Lake showing the camp area, access pad, proposed alignment of the siphon pipes, and general assembly area.

Copyright

g. Type of transportation and access route to the proposed site

Helicopter will be the primary mode of transport to and from the proposed site.

h. Initial five year operational plan

Because this is a short term plan, there is no intention of operating this siphon system for five years. Once the siphons are operational, the operational plan will consist of having at least one person on site at all times to ensure that the siphons are in operation and to also address any issues with operation in a timely manner.

Section B – Experiences of the Applicant

Park Use Permit - The SCRD has held a Park Use Permit (PUP) for the purposes of maintaining water impoundment infrastructure at Chapman and Edwards Lake and a helicopter pad at Chapman Lake in Tetrahedron Park since the park was established. The SCRD's PUP was renewed February 1, 2014 and the current PUP No. 102714 is valid until January 31, 2024

Constructing waterworks – The Sunshine Coast Regional District's waterworks crew consist of staff members who have been installing waterworks infrastructure for over 30 years.

Environmental management/monitoring – The SCRD has personal on staff who have extensive experience in environmental management, including experience in designing, implementing and monitoring Environmental Monitoring Plans.

Section C – Potential Impacts

s.13

a. Impacts and mitigation measures on vegetation, wildlife and watercourses

Table 4. Impacts and mitigation measures on vegetation, wildlife, and watercourses

Introduction of invasive plants	All machines and equipment to be used for this project will be cleaned and inspected prior to being used at the lake for the construction and operation of the siphon. This strategy is intended to prevent the spread or introduction of invasive plants through the transport of machines and equipment.
Soil and vegetation disturbance from temporary camp to be used during installation and operation of the siphon	The periphery of areas required for accommodation, staging and construction will be marked with flagging. All personnel who will be working on site will be directed during orientation to concentrate all of the activity and foot traffic to select areas only.
Disturbance to Wildlife	<p>All wildlife observations and encounters will be recorded. This will include any instances where wildlife activity is disturbed from personnel working at the site.</p> <p>Minimizing attractants to wildlife will be achieved through sound waste management. Food waste or any other waste that may attract wildlife will be contained in a lockable bear-proof container. The waste generated from the site will be removed on an as needed basis. A portable toilet will be available and all human waste will be collected in the toilet and flown off site as needed.</p>
Disturbance from a petrochemical spill	<p>To mitigate the impacts from any potential petrochemical spill, all machinery with hydraulics will use vegetable oil wherever possible. A spill kit will be on stand-by to contain any spills should they occur and spill response training will be provided to operators and staff. While fueling equipment, containment will be maintained by using soaker cloth under the area of where the filling is occurring. The pumps used for priming the siphons will be housed in containment boxes lined with plastic.</p> <p>In the event of a spill, the spill will be reported to the Spills Reporting Line and the Lead Environmental Monitor (EM) will be contacted and will provide mitigation advice. Depending on the severity of the spill the EM will be brought to the site as soon as possible to oversee mitigation measures. An onsite staff or operator will be required to record the causes of the spill, the response undertaken and the apparent effects of the spill.</p>
Disturbance from erosion and sediment laden run-off	The risk of erosion and sedimentation is highest when periods of intense rainfall coincide with active construction. These risks will be minimized by ensuring the construction takes place during dry conditions. The exposed lake bed on the south side of the outlet channel will be where the assembly and moving of the pipe will occur and the setting of lock blocks to anchor the pipe. Construction activity will occur on the most compacted ground accessible below the high

	water mark where the substrate consists of a shallow layer of sandy loam above glacial till and bedrock. This area is considered to be stable and the risk that planned activities will result in a rise in creek turbidity over the background level is considered to be low.
--	--

s.13

b. Impacts to watercourses or water bodies

Refer to Table 3.

c. Special features

N/A

d. Impacts on Park access

Access to the park will not be impacted from the proposed works.

e. Impacts to aesthetics and visual values

The location of the proposed works is not visible from any trails with the park and therefore is expected to have no impacts to landscape aesthetics or visual values (see also section g).

f. Impacts on cultural values including traditional use by First Nations

There were no available records of archaeological, historical and cultural heritage values at Chapman Lake. Chapman Lake lies within the traditional aboriginal territory of the shishálh Nation. An assessment by Global Village Research Consultants (1998) confirmed the *'no sites recorded...within a 9 to 10 mile vicinity of Chapman Lake and the upper drainage of Chapman Creek'*. AECOM recently reviewed the BC archaeological site database for any newly recorded sites in the project area and no new records have been added.

g. Impacts to park users

Although no park trails intersect with the proposed location for the works, park users who are on any nearby trails may be impacted when the siphon pipes, equipment, or personnel are being transported by helicopter. This potential disturbance to park users will be mitigated through notification of schedule of works to BC parks and appropriate signage within the park to notify users of the works.

Figure 5. General location of Chapman Lake
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Page 14: [1] Comment [RD10]	Dalziel, Rod ENV:EX	2017-08-16 3:44:00 PM
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Within the temporary camp area, the area subject to previous disturbance during the original construction. The footprint of the construction area needs to be very carefully managed and minimized in order to protect sensitive values. Site clearing should be kept to a minimum and limited to previously disturbed areas.

Page 14: [2] Comment [RD16]	Dalziel, Rod ENV:EX	2017-08-16 3:46:00 PM
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Equipment and machinery to be involved in project; BC Parks would like construction plans to identify the amount and types of equipment/machinery that will be involved in the project and where it will be placed on site.

Re: Parks Use Permit 102714 Amendment Application re: temporary siphon

Friday, October 13, 2017
11:10 AM

Subject	Re: Parks Use Permit 102714 Amendment Application re: temporary siphon
From	Dalziel, Rod ENV:EX
To	Hirner, Joanna ENV:EX
Sent	Friday, August 18, 2017 8:40 AM

Thanks, Joanna. s.22

Rod Dalziel
Sunshine Coast Area Supervisor
BC Parks

> On Aug 18, 2017, at 8:30 AM, Hirner, Joanna ENV:EX <Joanna.Hirner@gov.bc.ca> wrote:

>

> Hi Rod,

s.22 and was out in the field earlier this week so haven't had a chance to review. I did speak to Jennie and she advised that you could just use my feedback and comments from last time. I'm sorry that is the best I can do. Hopefully some miracle rain will appear like it did two years ago so they won't need the siphon.

> Thanks!

> Joanna

>

> Sent from my iPhone

>

>> On Aug 16, 2017, at 4:01 PM, Dalziel, Rod ENV:EX <Rod.Dalziel@gov.bc.ca> wrote:

>>

>> Hello Joanna,

>>

>> We have received another amendment application from the SCRD to utilize the siphon system at Chapman Lake. Again giving us very little notice as this should have been submitted back in the early spring. I have had a crack at reviewing their application using feedback we provided last time (Aug 2015) and from feedback for the trenching amendment. I haven't heard yet but I expect there is an expected quick turnaround on this PUP application and s.22

>>

>> So if you have a little time could you do a quick review. It doesn't appear much has changed from the approved application in 2015 but we did rush approving that one.

>>

>> All files associated with SCRD PUP are stored at V:\1_PPA Files\S

>> Coast Region\Major Projects\SCRD Chapman Lake\PUP 102714 Chapman

>> Lake\PUP amendment

>>

>> Sorry,

>> Rod Dalziel

>> Sunshine Coast Area Supervisor

>> BC Parks - South Coast Region - Ministry of Environment

>> • PO Box 950, 6451 Sechelt Inlet Road, Sechelt, BC V0N 3A0

>> • Desk (604) 885-6755 Mobile (604) 741-1967 Fax (604) 885-2445

>> • Rod.Dalziel@gov.bc.ca<mailto:Rod.Dalziel@gov.bc.ca>

>> Visit the BC Parks website @ bcparks.ca<http://bcparks.ca/>

>> [cid:image002.png@01D316A8.8022FDD0]

>>
>> [cid:image005.jpg@01D316A8.D3E93830]
>> BC Parks has recently launched new speciality plates! Get your BC Parks licence plate today<<http://www.icbc.com/vehicle-registration/licence-plates/Pages/bc-parks-plates.aspx>>.
>>
>> From: Coupar, Meghan FLNR:EX
>> Sent: Thursday, August 10, 2017 11:22 AM
>> To: Dalziel, Rod ENV:EX
>> Cc: Aikman, Jennie S ENV:EX
>> Subject: FW: Parks Use Permit 102714 Amendment Application re:
>> temporary siphon
>> Importance: High
>>
>> Hi Rod,
>>
>> Currently SCRD has an open Amendment job under Authorization #102714 from 2016 that is with you to Conduct Technical Review and Draft Permit (T #349679). The 2016 Amendment is for the "Installation of gravity fed water withdrawal system to access additional water from Chapman Lake to provide water to SCRD system during a drought."
>>
>> Could you please advise if the Amendment Application for 2017 is for the same purpose as 2016 and if so can it be added to the existing Amendment Job (T #349679)?
>>
>> Thanks,
>>
>> Meghan Coupar
>> Parks Permit Clerk
>> FrontCounter BC - South Coast Regional Office South Coast, Haida
>> Gwaii/South Island Sections
>> Tel: (604) 586-4439 Fax: (604) 586-4434 Toll Free: 1-877-855-3222 Our
>> Vision: Economic prosperity and environmental sustainability
>> *****
>> How Did We Do?
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>> Or visit us at:
>> www.frontcounterbc.gov.bc.ca<<http://www.frontcounterbc.gov.bc.ca/>>
>> *****
>>
>>
>> From: Aikman, Jennie S ENV:EX
>> Sent: Thursday, August 10, 2017 9:26 AM
>> To: Dalziel, Rod ENV:EX; Coupar, Meghan FLNR:EX
>> Subject: FYI: Parks Use Permit 102714 Amendment Application re:
>> temporary siphon
>> Importance: High
>>
>> Hello Rob and Meghan,
>>
>> We have received the attached PUP amendment application from the SCRD.
>>
>> Meghan, I will direct Michael to submit this directly to Front Counter BC, but I wanted you to be aware that this is coming as this permit amendment is a high priority.
>>
>> Thanks.
>> Jennie

>>
 >> Jennie Aikman
 >> Regional Director, South Coast Region BC Parks | Ministry of
 >> Environment
 >> Office phone: (604) 924-2227
 >> Cell phone: (778) 875-8494
 >>
 >> BC Parks has recently launched new speciality plates! Get your BC Parks licence plate
 today<<http://www.icbc.com/vehicle-registration/licence-plates/Pages/bc-parks-plates.aspx>>.
 >> [cid:image002.jpg@01D2A301.A3452C40]
 >>
 >>
 >>
 >> From: Michael Day [<mailto:Michael.Day@scrd.ca>]
 >> Sent: Wednesday, August 9, 2017 10:48 AM
 >> To: Aikman, Jennie S ENV:EX
 >> Cc: Rosenboom, Remko FLNR:EX; Janette Loveys
 >> Subject: Parks Use Permit 102714 Amendment Application re: temporary
 >> siphon
 >>
 >> Dear Jennie,
 >>
 >> Re: Parks Use Permit 102714 Amendment Application
 >>
 >> As per CAO Loveys earlier email, please note the attached Parks Use Permit (PUP) Amendment
 application form and associated supporting documents.
 >>
 >> I discussed this proposed temporary PUP amendment with Sechelt Nation staff on August 4th and
 followed up again today. Chris August, Implementation and Compliance Manager, has verbally
 expressed his willingness to provide a letter of support for the temporary siphon application. I have
 received some assurance a letter of support will be provided by Monday, August 14th.
 >>
 >> I will also be forwarding the PUP amendment application to Squamish First Nation under separate
 cover.
 >>
 >> If you have any questions or concerns, please contact me directly at:
 >>
 >> E-mail: michael.day@scrd.ca<<mailto:michael.day@scrd.ca>>
 >> Office: +1 (604) 885-6810
 >> Mobile: +1 s.16
 >>
 >> Best Regards,
 >>
 >> Michael Day, P. Eng. | General Manager, Infrastructure Services and
 >> Regional Engineer Infrastructure Services | Sunshine Coast Regional
 >> District
 >> 1975 Field Road, Sechelt, BC, V0N 3A1
 >> Phone: 604.885.6810
 >> Fax: 604.885.7909
 >>
 >> Visit us: www.scrd.ca<<http://www.scrd.ca>> Follow us on Twitter at
 >> [sunshinecoastrd](https://twitter.com/sunshinecoastrd)<<https://twitter.com/sunshinecoastrd>>
 >> Like us on Facebook<<https://www.facebook.com/sunshinecoastrd>>
 >>
 >> 1967 to 2017 – Celebrating 50 years of service<<http://www.scrd.ca/50th-anniversary>> for the
 community.
 >>

>>

>>

>> This email was scanned by Bitdefender

>> <2015 Chapman Lake Siphon design D-028B5.00 ISSUED FOR REVIEW.PDF>

>> <2017-08-09 MOE Park Use Permit Application re Siphon.pdf>

>> <RE: Parks Use Permit 102714 Amendment Application re: temporary

>> siphon (updated design drawing).eml> <image001.jpg> <image002.png>

>> <2017-08-08 Park use permit application part 3 RD comments.docx>

>> <image005.jpg>

RE: Chapman Lake Siphon applicati

Monday, October 16, 2017
3:24 PM

Subject	RE: Chapman Lake Siphon applicatio
From	Dalziel, Rod ENV:EX
To	Rosenboom, Remko FLNR:EX; Aikman, Jennie S
Cc	Smith, Malissa FLNR:EX; Robinson, Bryan FLN
Sent	Friday, August 18, 2017 9:14 AM

Thanks for the update and comments, Remko. ^{s.22}
s.22 and am working to have the PUP up to Jennie's decision by t

Cheers,

Rod Dalziel

Sunshine Coast Area Supervisor
BC Parks - South Coast Region - Ministry of Environme
PO Box 950, 6451 Sechelt Inlet Road, Sechelt, BC V0N 3
Desk (604) 885-6755 Mobile (604) 741-1967 Fax (604) 885-
Rod.Dalziel@gov.bc.ca
Visit the BC Parks website @ bcparks.ca



BC Parks has recently launched new speciality plates! Get your BC Parks licence p

From: Rosenboom, Remko FLNR:EX
Sent: Friday, August 18, 2017 8:33 AM
To: Aikman, Jennie S ENV:EX
Cc: Dalziel, Rod ENV:EX; Smith, Malissa FLNR:EX; Robinson, Bryan F
Subject: Re: Chapman Lake Siphon applicati

Hi Jennies,

I think that that term will definitely work for t

s.22 James Davies is preparing the document
Robinson will become the SDM in my absence.

I suggest to do a 1 yr term, especially given that BC Parks can only consider issuing emergency circumstances and the anticipation that by next year at the end of the term solution has been found for the current regulatory hurdles. It is very easy to with one more year, if required.

Cheers!
Remko

Manager Water Authorizations

South Coast Natural Resource Region
Ministry of Forests, Lands and Natural Resource Operat

Office: 604-586- 2803

Fax: 604-586-4444

Email: remko.rosenboom@gov.bc.ca

Our Vision: Economic prosperity and environmental sustainc

On Aug 18, 2017, at 8:16 AM, Aikman, Jennie S ENV:EX <Jennie.Aikman@gov.bc.ca>

Hi Remko,

I have included Rod Dalziel in the email as he is leading the PUP application hoping to be able to make a decision on our permit by the end of next week issuance comes shortly before that, I am okay with that and that way we can tenure in the park use permit terms.

What term are you issuing the tenure for

Jennie


From: Rosenboom, Remko FLNR:EX
Sent: Thursday, August 17, 2017 5:39 PM
To: Aikman, Jennie S ENV:EX
Cc: Smith, Malissa FLNR:EX
Subject: Chapman Lake Siphon applicatic

Hi Jennie,

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Cheers,

Remko

<003.jpg>

Manager Water Authorizations

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Ministry of Forests, Lands and Natural Resource Operations and Rural Dev

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Assistant: 604-586-5626

Email: remko.rosenboom@gov.bc.ca

www.gov.bc.ca/water

Our Vision: Economic prosperity and environmental sustainc

RE: Chapman Lake Siphon applicati

Monday, October 16, 2017

3:23 PM

Subject	RE: Chapman Lake Siphon applicatio
From	Dalziel, Rod ENV:EX
To	Rosenboom, Remko FLNR:EX; Aikman, Jennie S
Cc	Smith, Malissa FLNR:EX; Robinson, Bryan FLN
Sent	Friday, August 18, 2017 9:14 AM

Thanks for the update and comments, Remko. ^{s.22}
^{s.22} and am working to have the PUP up to Jennie's decision by t

Cheers,

Rod Dalziel

Sunshine Coast Area Supervisor

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Cheers!

Remko

Manager Water Authorizations

RE: Chapman Lake Siphon applicati

Monday, October 16, 2017
3:25 PM

Subject	RE: Chapman Lake Siphon applicatio
From	Aikman, Jennie S ENV:EX
To	Rosenboom, Remko FLNR:EX; Robinson, Bryan
Cc	Dalziel, Rod ENV:EX; Smith, Malissa FLNR:EX
Sent	Friday, August 18, 2017 12:15 PM

Thank you Remko – we will mirror your term with our PUP. Hope you have a great

Bryan, please keep Rod and I in the loop on your decis

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Cc: Dalziel, Rod ENV:EX; Smith, Malissa FLNR:EX; Robinson, Bryan F
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<image003.jpg>

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