Infrastructure **It was moved and seconded**

347/15 THAT Infrastructure Services Committee recommendation No. 1 of September 3, 2015 be received, adopted and acted upon as follows:

Recommendation No. 1 *Drought Mitigation Options*

THAT the General Manager Infrastructure Services' report dated August 25, 2015 titled Drought Mitigation Options be received;

AND THAT the SCRD move forward with the design and approval process for the Deepen Channel option, recognizing that the system will only be utilized during periods of drought and until the long term source development projects specified in the Comprehensive Regional Water Plan are constructed;

AND FURTHER THAT the design, engineering and environmental impact assessment of the Deepen Channel option be presented to the Board for consideration.

Director Lewis opposed.

CARRIED

SCRD STAFF REPORT

DATE: August 25, 2015

TO: Infrastructure Services Committee – September 3, 2015

FROM: Bryan Shoji, General Manager Infrastructure Services

RE: **CHAPMAN LAKE DROUGHT MITIGATION OPTIONS**

RECOMMENDATION(S)

THAT the General Manager Infrastructure Services' report dated August 25, 2015 titled "Chapman Lake Drought Mitigation Options" be received for consideration.

BACKGROUND

As the Environment Canada forecast is for this record breaking drought to continue into the fall, this report serves as an update to the July 17, 2015, staff report on the water supply situation and provides background on the short and long term water supply options adopted in the Comprehensive Regional Water Plan for discussion purposes.

DISCUSSION

Current Water Supply Status

As of August 24th, the Chapman Water System was at 32% total storage capacity. The community has been incredibly responsive to the Stage 4 outdoor water use restrictions and daily consumption has dropped to less than 11 million litres per day (ML/d), with a low of 10.2 ML/d. Average Stage 1 consumption was 22 ML/d.

Based on current consumption rates and with no rain, it is projected that our current water storage will be depleted by mid to late September. We cannot provide a definitive date, as the volume of water released from our reservoirs is also dependent on inflow from tributary streams within the Chapman Creek catchment. Flow from these tributary streams are also diminishing as the drought continues.

Emergency Back-up System

Staff are proceeding with the construction of a siphon system at Chapman Lake. Support has been received from the Sechelt First Nation and formal approval received from the Provincial Water Management Branch. We are expecting formal Parks Use Permit amendment approval from the Ministry of Environment shortly.

The Short Term Use of Water approval from the Province under the Water Act permits the maximum diversion of an additional 1,000,000 m^3 of water from Chapman Lake, which is equivalent to an additional drawdown of approximately 5 metres from current levels and within the limits assessed in the 1999 Environmental Impact Assessment.

The emergency supply system will consist of five 200mm diameter siphons. Pipe material should be arriving August 26th, installation logistics and procedures have been specified, and helicopters and install crew are on standby. We are all systems go and will do everything possible to have the siphons operational as soon as possible.

The siphon system is designed to provide enough capacity to maintain Stage 4 consumption levels and base environmental flows in the Creek. Stage 4 restrictions will remain in place until adequate rainfall is received to replenish lake levels.

Should this back-up system fail, the last resort option is to seek emergency approval from the Province to fly pumps into Chapman Lake.

Comprehensive Regional Water Plan Actions

The Comprehensive Regional Water Plan (CRWP) was adopted by the Board in 2013 following an extensive public process. The CRWP projects future water needs based on current land use policies and identifies infrastructure and management measures required to meet those needs over a 25 year planning horizon. The CRWP balances Supply Side Management (expansion) and Demand Side Management (conservation) practices.

The SCRD is already moving forward with the primary Demand Side Management action through the universal metering program. As noted in the CRWP, this program is projected to reduce the maximum day water demand, which sets the design criteria for infrastructure capacity, by 25% and provide a $7 million life cycle cost savings over the 25 year period. However, the universal metering program is not projected to be completed until 2017.

As noted, the CRWP also specifies a series of Supply Side Management actions to be carried out in parallel with the conservation program. The following table lists the CRWP source water supply actions with their original planned completion date and cost estimate.

Action	Target Year	Cost Estimate
Obtain permits for floating pump station or alternative system	2014	$20,000
Construction of floating pump station or alternative system	2015	$660,000
Groundwater test drilling program	2016-2017	$300,000
Obtain property rights for construction of engineered lake	2021	$50,000

Short Term Source Water Supply Actions

Due to the severity of the drought situation, it is evident that the short term source water supply actions need to be addressed now in order to prevent water supply shortages in future drought years.

The first item listed, floating pump station or alternative system, is intended to be a temporary short term solution that would only be used during periods of severe drought, and involves constructing a purpose built system to access additional water from Chapman Lake below the current limit of 3 metres. This option was discussed at the September 4, 2014, Infrastructure Services Committee meeting and eventually directed to the 2016 budget process for consideration, as per the following resolution that was adopted at the January 22, 2015, regular Board meeting.

048/15 THAT a revised Drought Mitigation Project scope and budget estimate be brought forward to a future Infrastructure Services Committee meeting for 2016 budget consideration;

AND THAT the Sechelt Indian Band be engaged with respect to land acquisition discussions for an engineered lake within the Lehigh Construction Aggregates mining site.

It was recognized at the time that deferring the work by one year would place the water supply at risk for one additional summer, however, 2014 was a relatively uneventful summer with only Stage 2 restrictions and Edwards Lake secondary supply not being required. It is also noted that the SCRD has only called Stage 2 restrictions 4 times in the history of the service (2009, 2012, 2013 and 2014), and Stage 3 and 4 restrictions once (2012) prior to this year, and that the remote lake monitoring and control work that was completed in 2013 and 2015 has greatly enhanced the efficiency in which the lake discharge is regulated.

A draft report on Chapman Lake drawdown options has been completed by Opus Dayton Knight that investigated four options: 1) Floating Pump Station, 2) Siphon, 3) Deepen Existing Channel, and 4) Micro tunnel new outlet. The following table provides a summary of the cost implications.

Option	Capital Cost	Annual Operating	LCC
1. Floating Pump Station	$700,000	$57,000	$2,930,000 (A)
2. Siphon	$1,060,000	$40,000	$2,700,000 (A)
3. Deepen Channel	$2,200,000	$5,000	$3,160,000 (B)
4. Micro Tunnelling	$3,450,000	$5,000	$5,790,000 (A)

(A) Based on new dam construction in year 2038
(B) Based on new dam construction in year 2016

All four projects fit within the parameters carried out by the detailed environmental impact assessment that was carried out in 1999 and received regulatory approval at that time.

The siphon system has the lowest Life Cycle Cost (LCC), but is not recommended due to unreliability and the need to be staffed during operation. The floating pump station has the benefit of requiring the least capital cost and construction impact to the environment, however, the operation of such a system would require continuous monitoring, will impact site aesthetics and generate some noise, and require built in redundancy. The Deepen Channel option would be more disruptive during construction, however, the environmental impact would be very localized and contained, and the operation would require no additional monitoring than what is already in place, would not require redundancy as flow would be by gravity, and the final structure would appear very similar to what is in place today. The micro tunneling option is not recommended based on cost and construction risk.

As the LCC is quite comparable between the Floating Pump Station and the Deepen Channel options, Opus Dayton Knight recommend that the SCRD put forward both options for discussion with approval authorities and the Sechelt Nation. Either option would require further environmental impact assessment prior to approvals being received.

Although Opus Dayton Knight are recommending that we move forward with both options, the Infrastructure Services Department recommends that we move forward with the Deepen Channel option as it will provide the least operational risk and provide a more focused and streamlined approach to the environmental impact assessment and approval processes.

Longer Term Source Water Supply Actions

The Groundwater Test Drilling program involves a detailed investigation to determine if there is adequate groundwater in the Chapman aquifer to meet the long term supply needs. This project is slated to come forward to the 2016 budget process for consideration, as per the CRWP. Even if the drilling program identifies adequate ground water sources, it will take several more years to obtain approvals and construct the wells and supply system.

The Engineered Lake Option is also specified to meet the longer term supply needs and currently slated for consideration in the year 2021. This option was selected over several other source development options, including: raising the Chapman dam, Clowhom Lake, Sakinaw Lake, and Rainy River, following a complex matrix evaluation that included environmental, operations, customer service, social, and construction criteria. Board direction has already been received to enter into land rights negotiations in order to move the Engineered Lake project forward.

CONCLUSION

The SCRD adopted the Comprehensive Regional Water Plan in 2013 following an extensive public process. The CRWP outlines a comprehensive plan to address short and long term water supply needs in order to meet the land use policies and projections specified in the region's Official Community Plans. Due to this year's record breaking drought, it is evident that the short term water supply actions need to be moved forward now in order to meet the service levels desired by the community.

It is recommended that the SCRD move forward with the design and approval process for the Deepen Channel option, recognizing that the system will only be utilized during periods of drought and until the long term source development projects specified in the CRWP are constructed.

TABLE 1-5
PRELIMINARY 10-YEAR CAPITAL PLAN RECOMMENDATIONS

Recommendation	Construction Target	10 Year Capital Cost
Demand Management		
Implementation of Stage 2 and Stage 3 water sprinkling restrictions with enforcement	2014-2015	$ 120,000
Install Universal Metering	2014-2015	$ 5,280,000
Metering - Reading, Data Entry, Billing and O&M costs	2014-2023	$ 1,470,000
Assess Futher Demand Management Strategies	2014	$ 40,000
Additional Intensive Demand Mangement Programs	2019	$ 250,000
Water Source		
Obtain permits for floating pump station or alternative system	2014	$ 20,000
Construction of floating pump station or alternative system	2015	$ 660,000
Upkeep of floating pump station or alternative system	2016-2023	$ 320,000
Groundwater test drilling program	2016-2017	$ 300,000
Obtain property rights for construction of man-made lake	2021	$ 50,000
Small Systems: Groundwater Investigation to find suitable additional wells for Eastbourne	2019	$ 100,000
Small Systems: Complete Source to Tap Assessments and Well Protection Plans	2014	$ 100,000
Water Quality		
Initiate Pre-Design Study for Chapman Water Treatment Plant Expansion	2019	$ 100,000
Construction of Chapman Water Treatment Plant Expansion to 37.5 ML/d	2020-2021	$ 6,400,000
Small Systems: Automation of chlorination at the Soames Point Well	2018	$ 30,000
Small Systems: Pre-Design for Treatment Expansion at the Eastbourne Wells	2020	$ 30,000
System Infrastructure		
Chapman Transmission Main Upgrades (see Table 8-3)	2016	$ 2,100,000
Chapman Fire Protection Upgrades (see Table 8-5)	2017-2021	$ 11,000,000
Eliminate dead ends in the Chapman distribution system	2018-2023	$ 900,000
Small Systems: Annual check for interconnectivity	2014-2023	$ 100,000
Small Systems: Fire Protection Upgrades (see Table 9-2)	2016	$ 880,000
Small Systems: Eliminate dead ends	2017-2022	$ 300,000
	TOTAL	**$ 30,550,000**

Overall, the RWSA is well managed. The SCRD management team should be supported in their ongoing work to better the water supply service to the communities it serves.

AECOM

SCRD Chapman Lake Expansion Project

April 20, 2017

shíshálh Nation comments from email to SCRD dated March 16, 2017

No.	Section	Comments	Assigned to:	Response
General Statement		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:		
1		Management: The *shishalh* Nation requires written assurance by the SCRD that the additional drawdown will only be deployed once the SCRD declares Stage 4 restrictions, ***not*** to prevent Stage 4 restrictions. The additional drawdown must not be to facilitate increased growth, development and water consumption. This Water Supply Expansion project should not be leveraged to increase quantity to facilitate increased development and subdivisions. Its purpose needs be clarified: to support existing infrastructure and communities on the coast with water flow, to ensure local communities don't run out of water for emergency and environmental flows. **A written assurance about the purpose of the project and when the additional drawdown capacity will be deployed is required**.	SCRD	SCRD Policy Decision - staff to bring forward report.
2		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.	SCRD/D. Bates	Partial response provided in response to comment #1 from the Water Stewardship. There does need to be a contingency plan for dealing with the 2017 pink salmon return if construction takes place in 2017. A minimum flow of 0.2 cms is required for access. This could change depending on channel morphology changes caused by high flows. It would be prudent that the SCRD work with the FN and DFO to develop a plan. Dave Bates had the discussion with FN that it might make more sense to have DFO facilities take additional eggs in 2017 at Puntledge or Qualicum and then transplant into Chapman. These island hatcheries are the source of the Chapman Pinks. Then if volume must be lowered to facilitate construction, a year class impact could conceivably be compensated for by a transplant. Again the need for discussion with FN.
3		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.	SCRD	SCRD Policy Decision - staff to bring forward report.

shíshálh Nation comments from email to SCRD dated March 16, 2017				
No.	**Section**	**Comments**	**Assigned to:**	**Response**
4		Baseline environmental data and ongoing monitoring: We need to see a written commitment from the SCRD to continue updating the baseline environmental 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.	SCRD	SCRD Policy Decision - staff to bring forward report.
5		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.		SCRD staff will provide Environmental Protection Plans prior to construction.