Dewdney Area Improvement District

SUGGESTED COST-SAVING MEASURES 2015 April 12

Strategy

By following the suggested cost-saving measures below, the average hydro consumption and demand should be much lower than with the 1949 pumps for the same rainfall. Please see the table below.

To minimize hydro costs, pump operation should be minimized by using free drainage by gravity to the lowest stage possible in anticipation of flooding and well in advance.

Water should be removed from the lake at every economical opportunity except for the period between the freshet and after Labour Day when 2.4 mASL is to be maintained for boating.

Slide gate operation

To provide adequate storage in the lake for flood prevention, it should be kept below a nominal 1.7 mASL (subject to revision) to minimize the cost of emergency pumping. Slide gates should therefore be lifted clear asap after Labour Day to allow the flood boxes to remove as much water as possible before autumn and winter rains begin. If, and only if, sunny weather is forecast for the two weeks after Labour Day, this could be delayed by a week, subject to immediately raising the slide gates if heavy rain occurs or is forecast.

Flap control

The least expensive way to maximally drain the lake to prevent flooding is to fully open the flap gates whenever the Fraser is lower than the lake. This measure can increase discharge by up to 40% at low static head, and is almost equivalent to having a fifth flood box, without the million dollar cost.

As part of the Tier 2 project, a beam was installed to permit the flaps to be fully opened by hand, but the labour cost of manually raising and lowering the flaps between two and four times daily (often between midnight and 6 AM) and of predicting those times, would be prohibitive. An automatic winch system is therefore required. The total estimated cost of $9,000 can be included in the pumping station upgrade phase of the recently extended EMBC Tier 3 funding, so DAID's share would be only $3,000. This should be recoverable in one rainy year by reduced hydro costs.

Pump operations (Please see the table below for pumping cost comparisons.)

Pumping cost comparison: 1949 vs 2014		**CBE 2015 January 20**	
Description	**Siphoning**	**Not siphoning**	**1949**
KW	160	240	380
CMS	3.4	2.7	4
KW/CMS	47	89	95
KW-seconds/CM	47	89	95
KWh/CM	0.013	0.025	0.026
KWh/million-CM	13,072	24,691	26,389
$/million-CM	$1,176	$2,222	$2,375
Lake area at 2 mASL; m^2	3,231,787	3,231,787	3,231,787
*Lake depth change metres per million m^3	0.31	0.31	0.31
*Lake depth change feet per million m^3	1.0	1.0	1.0
* assuming no influx of water			

1. **Siphon** To reduce electricity consumption costs, I designed the pump discharges to siphon, and have designed and am building an automatic control system to switch off any pump which has stopped siphoning. This will save the expense of having a pump operator in attendance whenever a pump is running.

2. **Demand charge minimization (See attached table)**
    1. All running 2014 pumps should be siphoning before starting another pump.
    2. Where feasible, pumping should be stopped before the end of the nominal monthly billing period, which has been moved forward from the 23rd of each month to the 18th.
    3. One pump should be run for a long time, as opposed to running several pumps for a short time.

3. **Storage of peak storm flows in Hatzic Lake**

    Because the peak influx to the lake could be as high as 50 CMS (Cubic Metres per Second), while the maximum pumping capacity with all five pumps is 18 CMS, the lake should be kept below 1.7 mASL (subject to revision). If heavy rain occurs, the lake may have to be pumped down in advance. I have designed and am building automatic control systems to stop the pumps gradually if the intake drops below:
    1. 1.0 mASL for the new 2014 pumps (subject to revision), and
    2. 2.4 mASL for the 1949 pumps, until Formed Suction Intakes are installed to permit pumping down to approximately 1.8 mASL.

Sand sales policy for consideration

Selling the annual average sand deposit of 10,000 CM (Cubic Metres) in non-storm years could net $20,000 pa. Storm years such as 2014 could yield $100,000 - the same as the 2015 cost of hydro. Sand can be kept in situ until a buyer is found. A fair arrangement for land-owners seems to be giving them any sand that can't be sold, so that it won't have to be stored long-term at the SRSs (Sand Removal Stations), which would trigger ALC concerns.

Draft sand disposition priorities:
1. Sales to reimburse DAID for the cost of removal so that it doesn't raise taxes
2. Sales to provide revenue to DAID for removing sand from East Hatzic Lake
3. Sand remaining to be disposed of by participating land-owners at their expense for removal

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BC HYDRO	DEMAND & CONSUMPTION CHARGES					as of 2015 April 1			CBE 150411
					---------- $/KW----------			TOTAL	Approximate
Demand	KW	First 35 KW	Next 115 KW	KW over 150 KW	First 35 KW	Next 115 KW	KW over 150 KW		
Rate					0	$5.19	$9.95		
1 pump	240	35	115	90	0	$597	$896	$1,492	$1,500
2 pumps	480	35	115	330	0	$597	$3,284	$3,880	$4,000
3 pumps	720	35	115	570	0	$597	$5,672	$6,268	$6,000
4 pumps	1095	35	115	945	0	$597	$9,403	$10,000	$10,000
5 pumps	1470	35	115	1320	0	$597	$13,134	$13,731	$14,000
Total	4005	35	115	3855	0				
Consumption	KW	KWh	$/KWh	$/hour	$/day				
1949 pump	375	375	$0.09	$34	$810				
2104 no siphon	240	240	$0.09	$22	$518				
2014 siphon	160	160	$0.09	$14	$346				