

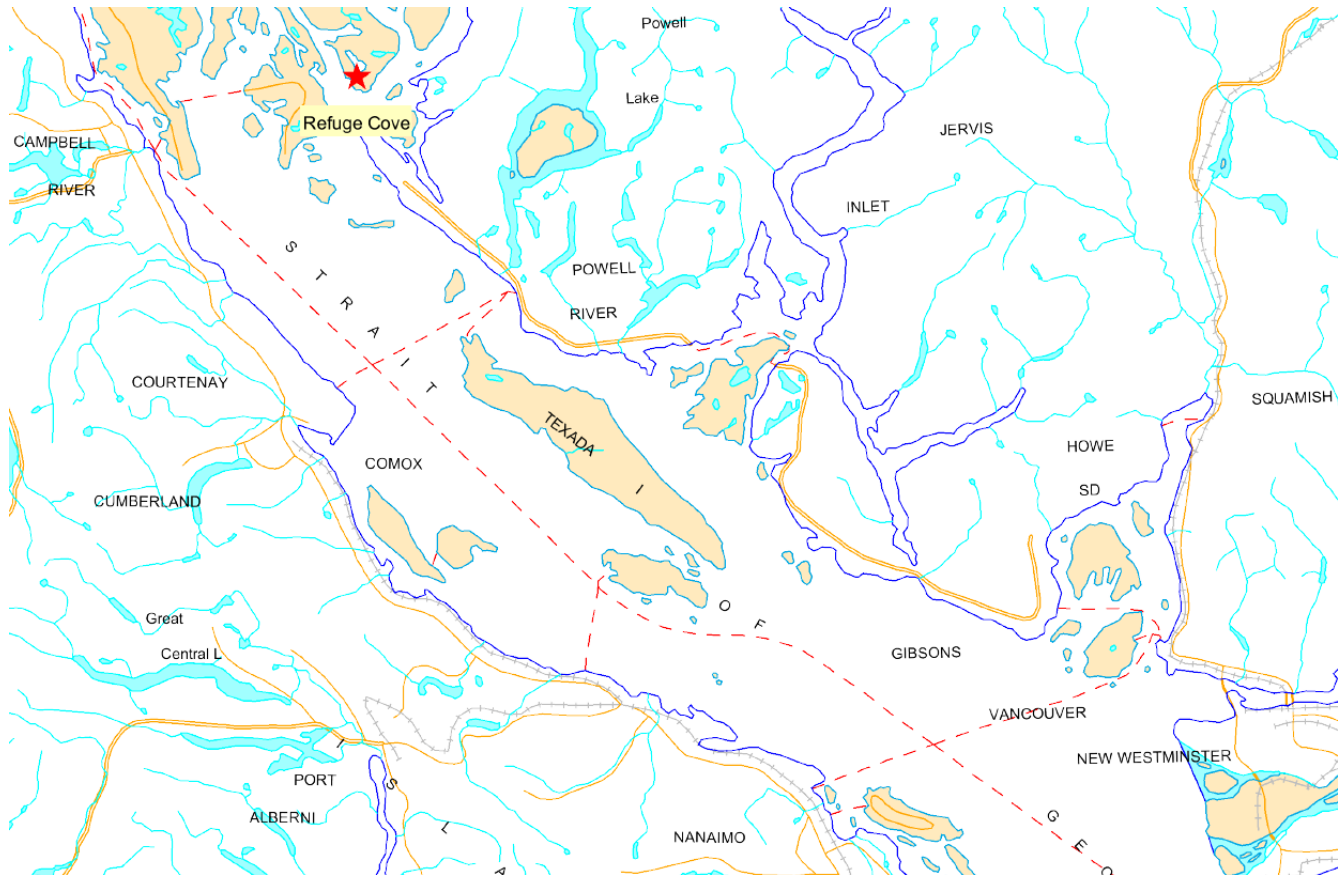
Refuge Cove Spawning Platform – Conceptual Design & Cost Estimate

Target Species – Chum/Coho (Sockeye)

Location – Refuge Cove, West Redonda Island, Desolation Sound

Lat: 50° 7'46.99"N

Long: 124°50'24.83"W



Concept

Develop a spawning platform adjacent to the channel that drains Refuge Lagoon to Refuge Cove, with upwelling flow of fresh water sourced from Refuge Lagoon. Use spawning gravel that currently exists at the site – estimated volume of 60 m³. Minimize site disturbance by running the water-supply pipe from the lagoon to the spawning platform along the alignment of an old road on the right bank of the stream. Design criteria for the spawning platform are to be consistent with those used at Hicks Creek (Mission area). Specifically:

- Flow of upwelling water – 0.121L/s/m²
- Depth of spawning gravel – 0.45 m
- Depth of water over surface of spawning gravel 0.3 – 0.4 m
- Spawning gravel to be underlain by pea gravel, within which diffuser pipes will be embedded. Depth of cover over crown of diffuser pipes ~0.25 m; depth below diffuser pipes ~0.1 m. Pea gravel to consist of clean, poorly-graded material with a D₁₀ > ~10-15 mm and a uniformity coefficient C_u ~ 1.6.
- Create refuge pits around the perimeter of the platform to prevent predation.

The size of the spawning platform, and hence, the required upwelling flow and the required amount of pea gravel, will be governed by the amount of spawning gravel already available on-site¹. For the available spawning-gravel volume of about 60 m³, a platform with a gravel surface area of about 130 m² could be created. For a 130 m² spawning platform, an upwelling flow of about 16 L/s (250 USgpm) would be required. Additional material requirements for creating such a spawning platform would be:

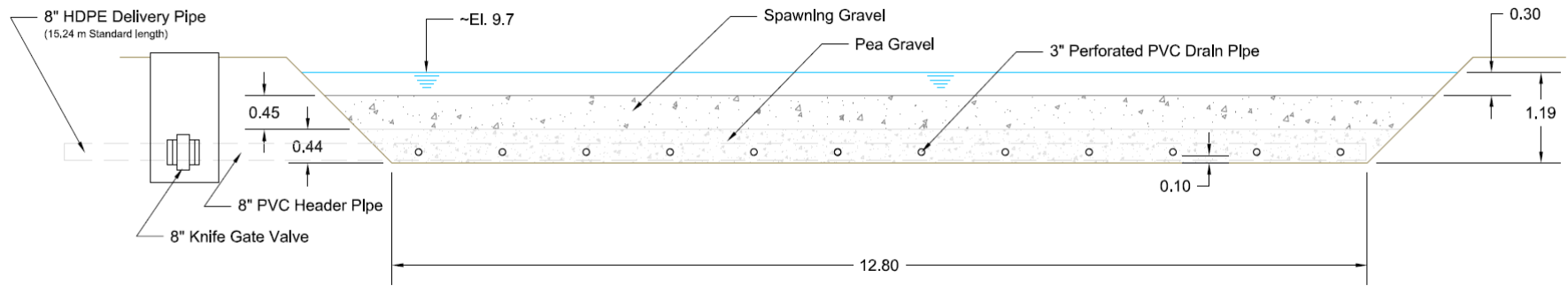
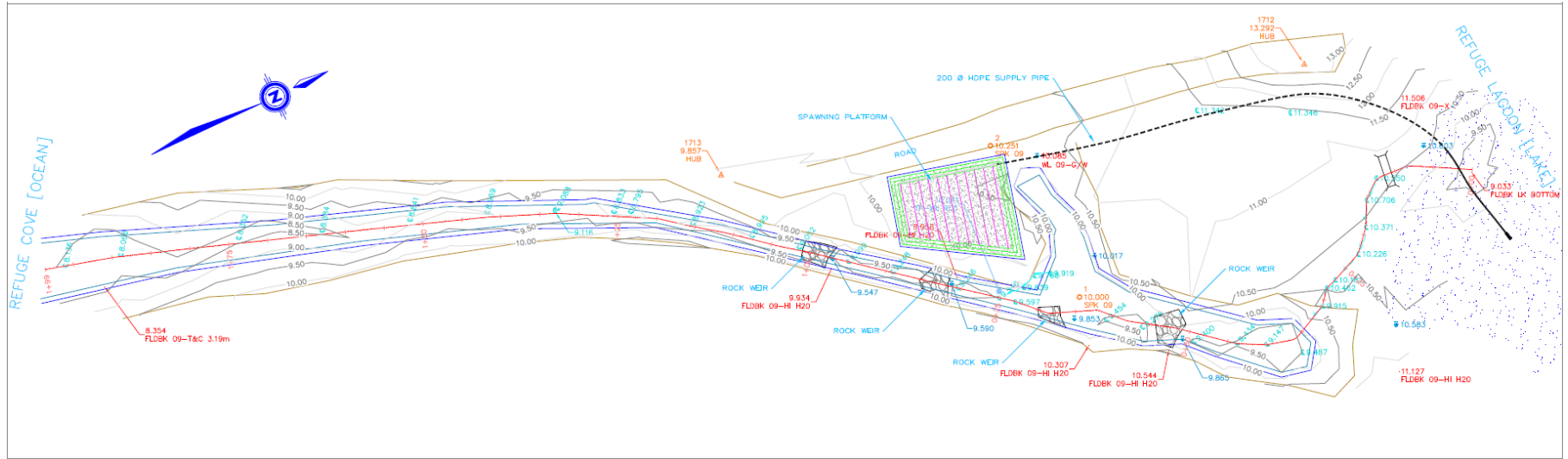
- 76.2 m - 200 mm Ø SDR 32.5 HDPE pipe w/ end of one segment capped, end of another segment w/ stub-end flange adaptor & backing flange
- 4 - 200 mm Ø victaulic couplings for HDPE pipe
- 16-18 m - 200 mm Ø PVC header pipe c/w end cap & Flange-end fitting
- 100 m – 75 mm Ø perforated PVC drain pipe
- 1 - 200 mm Ø knife gate valve
- Valve chamber (CSP)
- 1 - stainless steel intake screen
- 55 m³ pea gravel

Sketches illustrating the proposal are on the following page.

Two cost estimates have been developed; one assumes that there is about 25 m³ of spawning gravel available on-site that can be used in the development, the other assumes that all material will have to be brought in. Tables itemizing the estimates are contained in Tables on the pages following the sketches.

As can be seen from the estimates, the availability of spawning gravel on-site is an almost negligible consideration in the cost of the proposal. The difference in the total cost (\$64,400 vs. \$59,500) is less than 10% - essentially within the accuracy limits within which the cost can be estimated.

¹ Initial estimate of the quantity of spawning gravel available on-site was 60 m³ based on field measurements. Subsequent inquiries led to a revised estimate of the amount of gravel available of about 25 m³. For cost estimating purposes, the size of spawning platform remained at 130 m², as anything smaller would not likely have any significant impact.



Refuge Cove Spawning Platform – Cost Estimate Assuming that All Material Has to be Brought In

Material				
Item	Unit	Unit Rate	Quantity	Cost
Spawning Gravel - on-site	m ³		0	\$0.00
Spawning Gravel - fob site	m ³	\$159.68	60	\$9,580.80
Pea Gravel - fob site	m ³	\$159.68	55	\$8,782.40
200 mm Ø HDPE Pipe	m	\$15.58	76	\$1,184.08
200 mm Ø HDPE Flange	ea	\$165.00	1	\$165.00
200 mm Ø HDPE Blank	ea	\$225.00	1	\$225.00
200 mm Ø Couplings	ea	\$325.00	4	\$1,300.00
200 mm Ø PVC Pipe	m	\$37.93	18	\$682.74
200 mm Ø PVC Flange	ea	\$71.42	1	\$71.42
200 mm Ø PVC Cap	ea	\$41.29	1	\$41.29
200 mm Ø Gate Valve	ea	\$481.00	1	\$481.00
75 mm Ø Perf. PVC Pipe	m	\$2.66	100	\$266.00
1 m CSP Valve Chamber	m	\$129.29	3	\$387.87
1 m Fibreglass M/H lid	ea	\$845.00	1	\$845.00
Intake Screen	ea	\$2,900.00	1	\$2,900.00
Barge	ea	\$1,125.00	1	\$1,125.00
Freight (Truck)	ea	\$1,000.00	1	\$1,000.00
			Subtotal	\$29,037.60

Equipment				
Item	Unit	Unit Rate	Quantity	Cost
MOB/DEMOB	ea	\$1,125.00	2	\$2,250.00
Loader	Hr	\$80.25	10	\$802.50
20T Ex	Hr	\$215.76	20	\$4,315.20
Air Track Drill	Hr	\$188.50	10	\$1,885.00
Misc. Rental/Purchase	L/S	\$1,000.00	1	\$1,000.00
			Subtotal	\$10,252.70

Labour				
Item	Unit	Unit Rate	Quantity	Cost
Proj. Supervisor	Hr	\$50.00	22	\$1,100.00
P. Eng. Consultant	Hr	\$105.00	0	\$0.00
General Labour	Hr	\$45.00	20	\$900.00
Blaster/Materials	Hr	\$188.50	10	\$1,885.00
			Subtotal	\$3,885.00

Construction Costs (Taxes Extra)	\$43,175.30
Contingency (10%)	\$4,317.53
HST (12%)	\$5,699.14
TOTAL CONSTRUCTION	\$53,191.97

DFO In-Kind To-Date				
Item	Unit	Unit Rate	Quantity	Cost
Eng. Tech.	Day	\$560.00	6	\$3,360.00
Bio. Tech.	Day	\$525.00	0	\$0.00
P. Eng.	Day	\$750.00	4	\$3,000.00
Bio. Tech.	Day	\$635.00	5	\$3,175.00
Room & Board	Day	\$175.00	7	\$1,225.00
4X4 Vehicle	Day	\$110.00	4	\$440.00
			Subtotal	\$11,200.00

TOTAL PROJECT COST	\$64,400.00
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Refuge Cove Spawning Platform – Cost Estimate Assuming that 25 m³ of Spawning Gravel is On-site

Material				
Item	Unit	Unit Rate	Quantity	Cost
Spawning Gravel - on-site	m ³		25	\$0.00
Spawning Gravel - fob site	m ³	\$159.68	35	\$5,588.80
Pea Gravel - fob site	m ³	\$159.68	55	\$8,782.40
200 mm Ø HDPE Pipe	m	\$15.58	76	\$1,184.08
200 mm Ø HDPE Flange	ea	\$165.00	1	\$165.00
200 mm Ø HDPE Blank	ea	\$225.00	1	\$225.00
200 mm Ø Couplings	ea	\$325.00	4	\$1,300.00
200 mm Ø PVC Pipe	m	\$37.93	18	\$682.74
200 mm Ø PVC Flange	ea	\$71.42	1	\$71.42
200 mm Ø PVC Cap	ea	\$41.29	1	\$41.29
200 mm Ø Gate Valve	ea	\$481.00	1	\$481.00
75 mm Ø Perf. PVC Pipe	m	\$2.66	100	\$266.00
1 m CSP Valve Chamber	m	\$129.29	3	\$387.87
1 m Fibreglass M/H lid	ea	\$845.00	1	\$845.00
Intake Screen	ea	\$2,900.00	1	\$2,900.00
Barge	ea	\$1,125.00	1	\$1,125.00
Freight (Truck)	ea	\$1,000.00	1	\$1,000.00
			Subtotal	\$25,045.60

Equipment				
Item	Unit	Unit Rate	Quantity	Cost
MOB/DEMOB	ea	\$1,125.00	2	\$2,250.00
Loader	Hr	\$80.25	10	\$802.50
20T Ex	Hr	\$215.76	20	\$4,315.20
Air Track Drill	Hr	\$188.50	10	\$1,885.00
Misc. Rental/Purchase	L/S	\$1,000.00	1	\$1,000.00
			Subtotal	\$10,252.70

Labour				
Item	Unit	Unit Rate	Quantity	Cost
Proj. Supervisor	Hr	\$50.00	22	\$1,100.00
P. Eng. Consultant	Hr	\$105.00	0	\$0.00
General Labour	Hr	\$45.00	20	\$900.00
Blaster/Materials	Hr	\$188.50	10	\$1,885.00
			Subtotal	\$3,885.00

Construction Costs (Taxes Extra)	\$39,183.30
Contingency (10%)	\$3,918.33
HST (12%)	\$5,172.20
TOTAL CONSTRUCTION	\$48,273.83

DFO In-Kind To-Date				
Item	Unit	Unit Rate	Quantity	Cost
Eng. Tech.	Day	\$560.00	6	\$3,360.00
Bio. Tech.	Day	\$525.00	0	\$0.00
P. Eng.	Day	\$750.00	4	\$3,000.00
Bio. Tech.	Day	\$635.00	5	\$3,175.00
Room & Board	Day	\$175.00	7	\$1,225.00
4X4 Vehicle	Day	\$110.00	4	\$440.00
			Subtotal	\$11,200.00

TOTAL PROJECT COST	\$59,500.00
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