



## **Appendix 'L'**

### **Alternative Cost Estimates & Visualizations**

**Belfountain Dam and Headpond Class EA**  
**Alternative D2H2: Rehabilitate the Dam and Headpond**  
**Conceptual Cost Estimate**

ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$150,000	\$150,000
<b>Subtotal General</b>					<b>\$210,000</b>
<b>Dam</b>					
4	Install shear anchors	EA	10	\$10,000	\$100,000
5	Mitigate south abutment seepage (pressure grouting)	LS	1	\$50,000	\$50,000
6	Rehabilitation work (concrete, south abutment & north retaining wall toe erosion)	LS	1	\$50,000	\$50,000
7	Rehabilitate north retaining wall (anchoring)	LS	1	\$50,000	\$50,000
<b>Subtotal Dam</b>					<b>\$250,000</b>
<b>Headpond</b>					
8	Sediment removal and disposal	m <sup>3</sup>	10000	\$40	\$400,000
9	Rehabilitation of existing retaining walls	m	100	\$1,000	\$100,000
10	Restoration of south shoreline	m	175	\$300	\$52,500
<b>Subtotal Headpond</b>					<b>\$552,500</b>
<b>Subtotal</b>					<b>\$1,012,500</b>
11	Engineering, Environmental, Landscaping Design (10%)				\$101,250
12	Contingency (30%)				\$303,750
13	HST (13%)				\$184,275
<b>Total</b>					<b>\$1,601,775</b>

**ITEM NO. ASSUMUPTIONS**

- |    |                                                                                                                                                                                                                                                                                                                                                           |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Allowance                                                                                                                                                                                                                                                                                                                                                 |
| 2  | Allowance                                                                                                                                                                                                                                                                                                                                                 |
| 3  | Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage sediment removal. Alternative is dredging. Both options costly.                                                                                                                                                                                 |
| 4  | Unit cost of achors installed as part of investigation by Terraprobe (2013)                                                                                                                                                                                                                                                                               |
| 5  | Allowance. Work is completed while headpond is dewatered                                                                                                                                                                                                                                                                                                  |
| 6  | Allowance                                                                                                                                                                                                                                                                                                                                                 |
| 7  | 5 anchors, 6 m long, \$1500/m                                                                                                                                                                                                                                                                                                                             |
| 8  | Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). 14,000 m3 total sediment, assume 4000 m3 can be left in place. |
| 9  | Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced                                                                                                                                                                                                                                                          |
| 10 | Plantings, trail work, etc                                                                                                                                                                                                                                                                                                                                |

**Belfountain Dam and Headpond Class EA**  
**Alternative D2H3: Rehabilitate the Dam and Expand the Tableland**  
**Conceptual Cost Estimate**

ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$150,000	\$150,000
<b>Subtotal General</b>					<b>\$210,000</b>
<b>Dam</b>					
4	Install shear anchors	EA	10	\$10,000	\$100,000
5	Rehabilitate south abutment	LS	1	\$50,000	\$50,000
6	Rehabilitation work (concrete, south abutment & north retaining wall toe erosion)	LS	1	\$50,000	\$50,000
7	Rehabilitate north retaining wall (anchoring)	LS	1	\$50,000	\$50,000
<b>Subtotal Dam</b>					<b>\$250,000</b>
<b>Headpond</b>					
8	Sediment removal and disposal	m <sup>3</sup>	8000	\$40	\$320,000
9	Rehabilitation of existing retaining walls	m	100	\$500	\$50,000
10	Restoration of south shoreline	m	175	\$300	\$52,500
11	Fill borrow	m <sup>3</sup>	1000	\$15	\$15,000
12	Topsoil & seed	m <sup>2</sup>	600	\$10	\$6,000
13	New concrete retaining wall (4 m high)	m <sup>3</sup>	200	\$1,500	\$300,000
<b>Subtotal Headpond</b>					<b>\$743,500</b>
<b>Subtotal</b>					<b>\$1,203,500</b>
14	Engineering, Environmental, Landscaping Design (10%)				\$120,350
15	Contingency (30%)				\$361,050
16	HST (13%)				\$219,037
<b>Total</b>					<b>\$1,903,937</b>

**ITEM NO. ASSUMUPTIONS**

- 1 Allowance
- 2 Allowance
- 3 Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage sediment removal. Alternative is dredging. Both options costly.
- 4 Unit cost of achors installed as part of investigation by Terraprobe (2013)
- 5 Allowance. Work is completed while headpond is dewatered
- 6 Allowance
- 7 5 anchors, 6 m long, \$1500/m
- 8 Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). 14,000 m3 total sediment, assume 6000 m3 can be left in place or used as backfill.
- 9 Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced. Relatively lower cost as portion of wall where new tableland is proposed is proposed to remain in place but no longer structural.
- 10 Plantings, trail work, etc
- 11 Tableland area 525 m2, 3.5 m fill depth. 1000 m3 from borrow, balance from sediment. Higher than market rate due to site location
- 12 Typical
- 13 Concrete volume: 70 m long wall, 4 m high, 0.3 m wide, cantilever base of similar geometry

Belfountain Dam and Headpond Class EA					
Alternative D2H4: Rehabilitate the Dam and Convert Headpond to Wetlands					
Conceptual Cost Estimate					
ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$150,000	\$150,000
<b>Subtotal General</b>					<b>\$210,000</b>
<b>Dam</b>					
4	Install shear anchors	EA	10	\$10,000	\$100,000
5	Rehabilitate south abutment	LS	1	\$50,000	\$50,000
6	Rehabilitation work (concrete, south abutment & north retaining wall toe erosion)	LS	1	\$50,000	\$50,000
7	Rehabilitate north retaining wall (anchoring)	LS	1	\$50,000	\$50,000
<b>Subtotal Dam</b>					<b>\$250,000</b>
<b>Headpond</b>					
8	Sediment removal and disposal	m <sup>3</sup>	8000	\$40	\$320,000
9	Rehabilitation of existing retaining walls	m	100	\$1,000	\$100,000
10	Restoration of south shoreline	m	180	\$300	\$54,000
11	Berm separating wetland from headpond c/w erosion control	m <sup>3</sup>	1000	\$15	\$15,000
12	Wetland Plantings	LS	1	\$20,000	\$20,000
<b>Subtotal Headpond</b>					<b>\$509,000</b>
<b>Subtotal</b>					<b>\$969,000</b>
13	Engineering, Environmental, Landscaping Design (10%)				\$96,900
14	Contingency (30%)				\$290,700
15	HST (13%)				\$176,358
<b>Total</b>					<b>\$1,532,958</b>

**ITEM NO. ASSUMUPTIONS**

- 1 Allowance
- 2 Allowance
- 3 Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage sediment removal. Alternative is dredging. Both options costly.
- 4 Unit cost of achors installed as part of investigation by Terraprobe (2013)
- 5 Allowance. Work is completed while headpond is dewatered
- 6 Allowance
- 7 5 anchors, 6 m long, \$1500/m
- 8 Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). 14,000 m3 total sediment, assume 6000 m3 can be left in place or used in wetlands.
- 9 Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced
- 10 Plantings, trail work, etc
- 11 1000 m3 borrow, balance from sediment
- 12 Allowance

Belfountain Dam and Headpond Class EA					
Alternative D4H5: Lower the spillway & backfill headpond & construct channel					
Conceptual Cost Estimate					
ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$100,000	\$100,000
<b>Subtotal General</b>					<b>\$160,000</b>
<b>Dam</b>					
4	Install shear anchors	EA	8	\$10,000	\$80,000
5	Rehabilitate south abutment	LS	1	\$50,000	\$50,000
6	Rehabilitation work (concrete, south abutment & north retaining wall toe erosion)	LS	1	\$50,000	\$50,000
7	Rehabilitate north retaining wall (anchoring)	LS	1	\$50,000	\$50,000
8	Lower spillway crest	LS	1	\$100,000	\$100,000
<b>Subtotal Dam</b>					<b>\$330,000</b>
<b>Headpond</b>					
9	Sediment removal and disposal	m <sup>3</sup>	2000	\$50	\$100,000
10	Fill borrow	m <sup>3</sup>	9000	\$10	\$90,000
11	Construct natural channel	m	150	\$1,000	\$150,000
12	Rehabilitation of existing retaining walls	m	100	\$500	\$50,000
13	Restoration of south shoreline	m	180	\$300	\$54,000
14	Floodplain planting and seeding	m <sup>2</sup>	3500	\$15	\$52,500
15	Headpond pedestrian bridge (20 m span)	LS	1	\$120,000	\$120,000
<b>Subtotal Headpond</b>					<b>\$616,500</b>
<b>Subtotal</b>					<b>\$1,106,500</b>
16	Engineering, Environmental, Landscaping Design (10%)				\$110,650
17	Contingency (30%)				\$331,950
18	HST (13%)				\$201,383
<b>Total</b>					<b>\$1,750,483</b>

**ITEM NO. ASSUMPTIONS**

- 1 Allowance
- 2 Allowance
- 3 Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage backfilling. Cost savings for fill placement vs. sediment removal due to expected reduction in construction duration
- 4 Unit cost of achors installed as part of investigation by Terraprobe (2013). Assume reduced number of anchors due to reduced spillway
- 5 Allowance. Work is completed while headpond is dewatered
- 6 Allowance
- 7 5 anchors, 6 m long, \$1500/m
- 8 50 m3 concrete/masonry removal, 1000/m3; Pour new cap, \$1500/m3
- 9 Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). Cost premium over other alternatives due to reduced volume. 14,000 m3 total sediment, assume 12,000 m3 can be left in place.
- 10 Headpond area 4500 m2, 2 m fill depth average.
- 11 Significant rock assumed (conservative)
- 12 Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced. Relatively lower cost as backfill will reduce loads on wall.
- 13 Plantings, trail work, etc
- 14 Typical
- 15 Prefabricated steel span plus abutments. Pedestrian and small vehicle loads only.

Belfountain Dam and Headpond Class EA					
Alternative D4H6: Lower the spillway, backfill headpond & construct channel and offline pond					
Conceptual Cost Estimate					
ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$150,000	\$150,000
<b>Subtotal General</b>					<b>\$210,000</b>
<b>Dam</b>					
4	Install shear anchors	EA	8	\$10,000	\$80,000
5	Rehabilitate south abutment	LS	1	\$50,000	\$50,000
6	Rehabilitation work (concrete, south abutment & north retaining wall toe erosion)	LS	1	\$50,000	\$50,000
7	Rehabilitate north retaining wall (anchoring)	LS	1	\$50,000	\$50,000
8	Lower spillway crest	LS	1	\$100,000	\$100,000
<b>Subtotal Dam</b>					<b>\$330,000</b>
<b>Headpond</b>					
9	Sediment removal and disposal	m <sup>3</sup>	8000	\$40	\$320,000
10	New 3 m +/- retaining wall	m <sup>3</sup>	300	\$1,500	\$450,000
11	Fill borrow	m <sup>3</sup>	5000	\$10	\$50,000
12	Construct natural channel	m	150	\$1,000	\$150,000
13	Rehabilitation of existing retaining walls	m	100	\$500	\$50,000
14	Restoration of south shoreline	m	175	\$300	\$52,500
15	Headpond pedestrian bridge (20 m span)	LS	1	\$120,000	\$120,000
<b>Subtotal Headpond</b>					<b>\$1,192,500</b>
<b>Subtotal</b>					<b>\$1,732,500</b>
16	Engineering, Environmental, Landscaping Design (10%)				\$173,250
17	Contingency (30%)				\$519,750
18	HST (13%)				\$315,315
<b>Total</b>					<b>\$2,740,815</b>

**ITEM NO. ASSUMPTIONS**

- 1 Allowance
- 2 Allowance
- 3 Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage sediment removal. Alternative is dredging. Both options costly.
- 4 Unit cost of anchors installed as part of investigation by Terraprobe (2013). Assume reduced number of anchors due to reduced spillway
- 5 Allowance. Work is completed while headpond is dewatered
- 6 Allowance
- 7 5 anchors, 6 m long, \$1500/m
- 8 50 m3 concrete/masonry removal, 1000/m3; Pour new cap, \$1500/m3
- 9 Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). 14,000 m3 total sediment. Sediment must be temporarily removed for construction of retaining wall. Portion can be used to backfill channel. Assume 6000 m3 stays on site.
- 10 Concrete volume: 150 m long wall, avg 3 m high, 0.3 m wide, cantilever base of similar geometry
- 11 Channel area 3000 m2, 1.5 m fill depth average (3.5 m at dam reducing to zero)
- 12 Significant rock assumed (conservative)
- 13 Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced. Relatively lower cost as backfill will reduce loads on wall.
- 14 Plantings, trail work, etc
- 15 Prefabricated steel span plus abutments. Pedestrian and small vehicle loads only.

**Belfountain Dam and Headpond Class EA**  
**Alternative D5H7: Decommission the dam & restore natural valley and channel**  
**Conceptual Cost Estimate**

ITEM NO.	ITEM	UNIT	EST. QTY.	UNIT PRICE	TOTAL
<b>General</b>					
1	Mobilization	LS	1	\$30,000	\$30,000
2	Construction Access	LS	1	\$30,000	\$30,000
3	Dewatering & Erosion & Sediment Controls	LS	1	\$150,000	\$150,000
<b>Subtotal General</b>					<b>\$210,000</b>
<b>Dam</b>					
4	Decommission Dam	m <sup>3</sup>	350	\$300	\$105,000
<b>Subtotal Dam</b>					<b>\$105,000</b>
<b>Headpond</b>					
5	Sediment removal and disposal <sup>1</sup>	m <sup>3</sup>	14000	\$35	\$490,000
6	Construct natural channel	m	150	\$1,000	\$150,000
7	Valley restoration and planting	m <sup>2</sup>	3500	\$30	\$105,000
8	Rehabilitation of existing retaining walls	m	100	\$1,000	\$100,000
9	Headpond pedestrian bridge (20 m span)	LS	1	\$120,000	\$120,000
<b>Subtotal Headpond</b>					<b>\$965,000</b>
<b>Subtotal</b>					<b>\$1,280,000</b>
10	Engineering, Environmental, Landscaping Design (10%)				\$128,000
11	Contingency (30%)				\$384,000
12	HST (13%)				\$232,960
<b>Total</b>					<b>\$2,024,960</b>

**ITEM NO. ASSUMPTIONS**

- 1 Allowance
- 2 Allowance
- 3 Lack floodplain area adjacent to headpond may restrict feasibility for fluming resulting in need to stage sediment removal. Alternative is dredging. Both options costly.
- 4 25 m long, 4.8 m high, 2 m wide crest + 1.8/2 m downstream embankment
- 5 Disposal as clean fill. Higher than average unit cost considering logistical issues (remove site; limited access/staging area may allow only 1 truck on site at once) and material issues (possible need to mix with other bulk source to achieve engineering/environmental requirements). 14,000 m<sup>3</sup> total sediment removal. Reduced rate relative to other alternatives due to quantity.
- 6 Significant rock assumed (conservative)
- 7 Typical
- 8 Allowance for concrete rehabilitation, and localized replacement where deterioration is advanced.
- 9 Prefabricated steel span plus abutments. Pedestrian and small vehicle loads only.



**BrookMcIlroy**

**Option D2H2**  
Rehabilitate the Dam  
and Headpond





**BrookMcIlroy**

**Option D4H5**

Lower the Spillway, Backfill the  
Heapond and Construct Channel



**BrookMcIlroy**

**Option D4H6**

Lower the Spillway and Construct  
Channel and Offline Headpond