APPENDIX

I

Cost Estimates

APPENDIX

I-1 2019 Costing

Langtry Storage Tank						
	Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	With Contingency (%15)
PIPES	Inlet Pipe though Box Culvert (1.2 x 2.4 m)	Length (m)	210	$ 4,254	$ 893,397	
	Outlet Pipe (0.6 m diam.)	Length (m)	60	$ 486	$ 29,172	
	Inlet Headwall (OPSD 804.040)	N/A	1	$ 24,310	$ 24,310	
	Outlet Headwall (OPSD 804.040)	N/A	1	$ 6,078	$ 6,078	
				Sub-Total	**$ 952,957**	**$ 1,095,900**
	Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	
TANK	Tank Excavation	Volume (m^3)	95000	$ 43	$ 4,041,558	
	Base Material	Tonne (t)	12540	$ 30	$ 381,061	
	Concrete Bottom (pour-in-place)	Volume (m^3)	5700	$ 486	$ 2,771,354	
	Exterior Walls (rebar & concrete)	Volume (m^3)	984	$ 1,945	$ 1,913,207	
	Interior Walls (rebar & concrete)	Volume (m^3)	984	$ 1,945	$ 1,913,207	
	Precast Top	Volume (m^3)	5700	$ 2,431	$ 13,856,771	
	Pumps	Unit	2	$ 91,163	$ 182,326	
	Access Port	Unit	2	$ 18,233	$ 36,465	
				Sub-Total	**$ 25,095,950**	**$ 28,860,342**
	Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	
Erosion and Sedimentation Controls	Sediment Fence	Length (m)	1070	$ 24	$ 26,012	
	Mud Mat	lump sum	1	$ 9,724	$ 9,724	
	Creek Diversion Pumping	lump sum	1	$ 6,078	$ 6,078	
	Check Dams	Unit	5	$ 3,039	$ 15,194	
	Sediment Trap	Unit	1	$ 6,078	$ 6,078	
	Clearing & Grubbing	lump sum	1	$ 16,409	$ 16,409	
				Sub-Total	**$ 79,494**	**$ 91,418**
	Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	
MISCELLANEOUS	Storm Outlet to be Removed	Unit	1	$ 6,078	$ 6,078	
	Mobilization	Unit	1	$ 24,310	$ 24,310	
	Dewatering	Unit	1	$ 12,155	$ 12,155	
	Landscaping (Seeding)	Area (m^2)	20080	$ 34	$ 683,406	
				Sub-Total	**$ 725,949**	$ 834,841
				Grand Total	**$ 26,854,350**	**$ 30,882,502**
Notes:	Unit costs include supply & installation					

Taplow Creek Flow Diversion to Fourteen Mile Creek						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Excavation	Based on Section A-A [1]	Volume (m^3)	5551	$ 43	$ 236,161	
	Based on Section C-C [1]	Volume (m^3)	30398	$ 43	$ 1,293,197	
	Based on Section D-D [1]	Volume (m^3)	8764	$ 43	$ 372,844	
Grading	Based on Section D-D [1]	Volume (m^3)	8970	$ 24	$ 218,057	
				Sub Total	**$ 2,120,259**	**$ 2,438,297**
Erosion and Sedimentation Controls	Silt Fence	Length (m)	3290	$ 24	$ 79,980	
	Clearing and Grubbing	lump sum	1	$ 36,465	$ 36,465	
	Mud Mat	each	3	$ 9,724	$ 29,172	
	Creek Diversion Pumping	lump sum	1	$ 60,775	$ 60,775	
	Check Dams	each	20	$ 3,039	$ 60,775	
	Sediment Trap	each	2	$ 6,078	$ 12,155	
				Sub Total	**$ 279,323**	**$ 321,222**
Culvert	14 Mile - CN Spur Line (8.5 x 4.0)	Length (m)	17	$ 32,800	**$ 557,600**	**$ 641,240**
				Sub Total	**$ 557,600**	**$ 641,240**
Miscellaneous	Landscaping Section A-A [1] - Imported Topsoil and Seed	Area (m^2)	2436	$ 34	$ 82,907	
	Landscaping Section C-C [1] - Imported Topsoil and Seed	Area (m^2)	13440	$ 34	$ 457,419	
	Landscaping Section D-D [1] - Imported Topsoil and Seed	Area (m^2)	11760	$ 34	$ 400,242	
	Mobilization and Access	lump sum	1	$ 60,775	$ 60,775	
	Dewatering A-A	lump sum	1	$ 18,233	$ 18,233	
	Dewatering C-C	lump sum	1	$ 182,326	$ 182,326	
	Dewatering D-D	lump sum	1	$ 182,326	$ 182,326	
				Sub Total	**$ 1,384,228**	**$ 1,591,862**
				Total	**$ 4,341,410**	**$ 4,992,622**

Fourteen Mile Creek Flow Diversion to Bronte Creek						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Pipe Diversion	Microtunnelling, including pipe (2.1 m diameter)	Length (m)	920	$ 11,547	$ 10,623,525	
	Microtunnelling, including pipe (2.25 m diameter)	Length (m)	200	$ 11,547	$ 2,309,462	
	Open cut, including pipe (1.2 m x 2.4 m box)	Length (m)	10	$ 4,254	$ 42,543	
	Jacking Pit and Shaft - 33 m deep	lump sum	1	$ 3,008,378	$ 3,008,378	
	Jacking Pit and Shaft - 21 m deep	lump sum	1	$ 1,914,422	$ 1,914,422	
	Jacking Pit and Shaft - 11.5 m deep	lump sum	1	$ 1,048,374	$ 1,048,374	
	Cast-in-place MH - 33m deep	lump sum	1	$ 275,768	$ 275,768	
	Cast-in-place MH - 21 m deep	lump sum	1	$ 175,489	$ 175,489	
	Cast-in-place MH - 11.5 m deep	lump sum	1	$ 96,101	$ 96,101	
	Inlet Headwall	each	1	$ 24,310	$ 24,310	
	Outlet Headwall	each	1	$ 6,078	$ 6,078	
				Sub Total	**$ 19,524,449**	**$ 22,453,116**
Erosion and Sedimentation Controls	Silt Fence	Length (m)	80	$ 24	$ 1,945	
	Clearing and Grubbing	lump sum	1	$ 5,470	$ 5,470	
	Mud Mat	each	1	$ 11,820	$ 11,820	
	Creek Diversion Pumping	lump sum	1	$ 2,431	$ 2,431	
				Sub Total	**$ 21,665**	**$ 24,915**
Miscellaneous	Mobilization and Access	lump sum	1	$ 303,877	$ 303,877	
	Landscaping - Imported Top Soil and Seed	Area (m^2)	1	$ 41	$ 41	
	Dewatering	lump sum	1	$ 121,551	$ 121,551	
				Sub Total	**$ 425,469**	**$ 489,289**
				Total	**$ 19,971,583**	**$ 22,967,320**
Notes: 1 - Section number for Creek Works (ref. Appendix C)						
				Grand Total	**$ 23,755,393**	**$ 27,318,702**

Culvert Upgrades						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Culverts (New Sizing)	McCraney - Lakeshore (14.64 x 3.96)	Length (m)	24	$ 70,499	$ 1,687,402	$ 1,940,513
	CNR (9.0 x 2.4)	Length (m)	15	$ 1,215,506	$ 18,232,594	$ 20,967,483
				Sub-Total	**$ 19,919,996**	$ 22,907,995
				Grand Total	**$ 19,919,996**	**$ 22,907,995**

Notes: Costs include supply & installation

Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	With Contingency ($)
South of Pinegrove					
Fill	Volume (m^3)	451	$ 35	$ 15,788	$ 18,156
Landscaping	Area (m^2)	501	$ 28	$ 14,034	$ 16,139
Tree Removal	E.A.	17	$ 400	$ 6,835	$ 7,860
Fence removal	Linear foot(ft.)	411	$ 15	$ 6,165	$ 7,089
Fence reinstatement	Linear foot(ft.)	452	$ 60	$ 27,125	$ 31,194
			Sub Total	**$ 69,946**	$ 80,437
West of Glen Oak Drive					
Fill	Volume (m^3)	1173	$ 35	$ 41,063	$ 47,222
Landscaping	Area (m^2)	1984	$ 28	$ 55,563	$ 63,898
Tree Removal	E.A.	68	$ 400	$ 27,060	$ 31,119
Fence removal	Linear foot(ft.)	1627	$ 15	$ 24,408	$ 28,069
Fence reinstatement	Linear foot(ft.)	1790	$ 60	$ 107,396	$ 123,505
			Sub Total	**$ 255,490**	$ 293,813
East of Glen Oak Drive					
Fill	Volume (m^3)	600	$ 35	$ 20,987	$ 24,135
Landscaping	Area (m^2)	1014	$ 28	$ 28,381	$ 32,638
Tree Removal	E.A.	35	$ 400	$ 13,822	$ 15,895
Fence removal	Linear foot(ft.)	831	$ 15	$ 12,467	$ 14,337
Fence reinstatement	Linear foot(ft.)	914	$ 60	$ 54,856	$ 63,084
			Sub Total	**$ 130,513**	$ 150,089
South of Speers Road					
Fill	Volume (m^3)	5506	$ 35	$ 192,723	$ 221,631
Landscaping	Area (m^2)	2786	$ 28	$ 78,019	$ 89,722
Tree Removal	E.A.	95	$ 400	$ 37,996	$ 43,696
Fence removal	Linear foot(ft.)	2285	$ 15	$ 34,273	$ 39,414
Fence reinstatement	Linear foot(ft.)	2513	$ 60	$ 150,800	$ 173,420
			Sub Total	**$ 493,811**	$ 567,883
South of Bridge					
Fill	Volume (m^3)	2913	$ 35	$ 101,942	$ 117,234
Landscaping	Area (m^2)	1704	$ 28	$ 47,701	$ 54,856
Tree Removal	E.A.	58	$ 400	$ 23,231	$ 26,716
Fence removal	Linear foot(ft.)	1397	$ 15	$ 20,954	$ 24,097
Fence reinstatement	Linear foot(ft.)	1537	$ 60	$ 92,199	$ 106,029
			Sub Total	**$ 286,027**	$ 328,931
South of Warminster					
Fill	Volume (m^3)	1057	$ 35	$ 36,996	$ 42,545
Landscaping	Area (m^2)	807	$ 28	$ 22,602	$ 25,992
Tree Removal	E.A.	28	$ 400	$ 11,007	$ 12,658
Fence removal	Linear foot(ft.)	662	$ 15	$ 9,929	$ 11,418
Fence reinstatement	Linear foot(ft.)	728	$ 60	$ 43,686	$ 50,239
			Sub Total	**$ 124,219**	$ 142,851
			Grand Total	**$ 1,360,005**	$ 1,564,006

Table 4.1 – Recommended Alternative Preliminary Cost Summary		
Recommended Alternative	**Total Cost ($M)**	**With Contingency ($M)**
Fourteen Mile Creek Flow Diversion to Bronte Creek	$ 19.97	$ 22.97
Taplow Creek Flow Diversion to Fourteen Mile Creek/Spur Line Culvert Upgrade	$ 4.34	$ 4.99
Langtry Park Off-line Storage Tank	$ 26.85	$ 30.88
Culvert Upgrades along Fourteen Mile Creek	$ 19.92	$ 22.91
On-line Storage	$ 2.43	$ 2.80
Berming and Landscaping at Glen Oaks and Main Branch	$ 1.36	$ 1.56
Total	**$ 74.87**	**$ 86.11**

Table 5.1 – Estimated Total Cost (with Contingency) and Flood Risk Benefits (Reduced and Removed Risk - Scenarios 1, 2, 3)				
Scenario	**Cost**	**Storm Event**	**Properties**	**Buildings**
Scenario 1 – Combined (full alternatives), including Taplow Creek to Fourteen Mile diversion channel, Fourteen Mile Creek Flow Diversion to Bronte Creek, culvert upgrades, Langtry Park Storage Tank, and Berming/Landscaping Upgrades	$ 86.11	10-Year	92	11
		100-Year	110	39
		Regional	176	157
Scenario 2 – Taplow Creek to Fourteen Mile Creek Diversion channel, culvert upgrades, On-Line Structure, and Berming/Landscaping Upgrades	$ 29.46	10-Year	9	10
		100-Year	109	42
		Regional	176	166
Scenario 3 – Langtry Park Storage Tank only, with culvert upgrades, and no diversion channel	$ 53.79	10-Year	101	9
		100-Year	131	56
		Regional	116	70

Table 5.2 – Unitary Costs per Relieved Building by Scenario			
Scenario	**Cost ($M)**	**Total Regional Storm Buildings Relieved**	**Cost per Building ($k)**
Scenario 1	$ 86.11	333	259
Scenario 2	$ 29.46	342	86
Scenario 3	$ 53.79	186	289

APPENDIX

I-2 2023 Costing

Langtry Storage Tank

	Item	Unit of Measure	Estimated Quantity	Unit Cost ($)	Total Cost ($)	With Contingency (%15)
PIPES	Inlet Pipe though Box Culvert (1.2 x 2.4 m)	Length (m)	210	$ 4,254	$ 893,397	
	Outlet Pipe (0.6 m diam.)	Length (m)	60	$ 486	$ 29,172	
	Inlet Headwall (OPSD 804.040)	N/A	1	$ 24,310	$ 24,310	
	Outlet Headwall (OPSD 804.040)	N/A	1	$ 6,078	$ 6,078	
				Sub-Total	**$ 952,957**	**$ 1,095,900**
TANK	**Item**	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	
	Tank Excavation	Volume (m^3)	95000	$ 43	$ 4,041,558	
	Base Material	Tonne (t)	12540	$ 30	$ 381,061	
	Concrete Bottom (pour-in-place)	Volume (m^3)	5700	$ 486	$ 2,771,354	
	Exterior Walls (rebar & concrete)	Volume (m^3)	984	$ 1,945	$ 1,913,207	
	Interior Walls (rebar & concrete)	Volume (m^3)	984	$ 1,945	$ 1,913,207	
	Precast Top	Volume (m^3)	5700	$ 2,431	$ 13,856,771	
	Pumps	Unit	2	$ 91,163	$ 182,326	
	Access Port	Unit	2	$ 18,233	$ 36,465	
				Sub-Total	**$ 25,095,950**	**$ 28,860,342**
Erosion and Sedimentation Controls	**Item**	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	
	Sediment Fence	Length (m)	1070	$ 24	$ 26,012	
	Mud Mat	lump sum	1	$ 9,724	$ 9,724	
	Creek Diversion Pumping	lump sum	1	$ 6,078	$ 6,078	
	Check Dams	Unit	5	$ 3,039	$ 15,194	
	Sediment Trap	Unit	1	$ 6,078	$ 6,078	
	Clearing & Grubbing	lump sum	1	$ 16,409	$ 16,409	
				Sub-Total	**$ 79,494**	**$ 91,418**
MISCELLANEOUS	**Item**	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	
	Storm Outlet to be Removed	Unit	1	$ 6,078	$ 6,078	
	Mobilization	Unit	1	$ 24,310	$ 24,310	
	Dewatering	Unit	1	$ 12,155	$ 12,155	
	Landscaping (Seeding)	Area (m^2)	20080	$ 34	$ 683,406	
				Sub-Total	**$ 725,949**	$ 834,841
				Grand Total	**$ 26,854,350**	**$ 30,882,502**
Notes:	Unit costs include supply & installation					

Taplow Creek Flow Diversion to Fourteen Mile Creek						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Excavation	Based on Section A-A [1]	Volume (m^3)	5551	$ 43	$ 236,161	
	Based on Section C-C [1]	Volume (m^3)	30398	$ 43	$ 1,293,197	
	Based on Section D-D [1]	Volume (m^3)	8764	$ 43	$ 372,844	
Grading	Based on Section D-D [1]	Volume (m^3)	8970	$ 24	$ 218,057	
				Sub Total	**$ 2,120,259**	**$ 2,438,297**
Erosion and Sedimentation Controls	Silt Fence	Length (m)	3290	$ 24	$ 79,980	
	Clearing and Grubbing	lump sum	1	$ 36,465	$ 36,465	
	Mud Mat	each	3	$ 9,724	$ 29,172	
	Creek Diversion Pumping	lump sum	1	$ 60,775	$ 60,775	
	Check Dams	each	20	$ 3,039	$ 60,775	
	Sediment Trap	each	2	$ 6,078	$ 12,155	
				Sub Total	**$ 279,323**	**$ 321,222**
Culvert	14 Mile - CN Spur Line (8.5 x 4.0)	Length (m)	17	$ 32,800	**$ 557,600**	**$ 641,240**
				Sub Total	**$ 557,600**	**$ 641,240**
Miscellaneous	Landscaping Section A-A [1] - Imported Topsoil and Seed	Area (m^2)	2436	$ 34	$ 82,907	
	Landscaping Section C-C [1] - Imported Topsoil and Seed	Area (m^2)	13440	$ 34	$ 457,419	
	Landscaping Section D-D [1] - Imported Topsoil and Seed	Area (m^2)	11760	$ 34	$ 400,242	
	Mobilization and Access	lump sum	1	$ 60,775	$ 60,775	
	Dewatering A-A	lump sum	1	$ 18,233	$ 18,233	
	Dewatering C-C	lump sum	1	$ 182,326	$ 182,326	
	Dewatering D-D	lump sum	1	$ 182,326	$ 182,326	
				Sub Total	**$ 1,384,228**	**$ 1,591,862**
				Total	**$ 4,341,410**	**$ 4,992,622**

Fourteen Mile Creek Flow Diversion to Bronte Creek						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Pipe Diversion	Microtunnelling, including pipe (2.1 m diameter)	Length (m)	920	$ 11,547	$ 10,623,525	
	Microtunnelling, including pipe (2.25 m diameter)	Length (m)	200	$ 11,547	$ 2,309,462	
	Open cut, including pipe (1.2 m x 2.4 m box)	Length (m)	10	$ 4,254	$ 42,543	
	Jacking Pit and Shaft - 33 m deep	lump sum	1	$ 3,008,378	$ 3,008,378	
	Jacking Pit and Shaft - 21 m deep	lump sum	1	$ 1,914,422	$ 1,914,422	
	Jacking Pit and Shaft - 11.5 m deep	lump sum	1	$ 1,048,374	$ 1,048,374	
	Cast-in-place MH - 33m deep	lump sum	1	$ 275,768	$ 275,768	
	Cast-in-place MH - 21 m deep	lump sum	1	$ 175,489	$ 175,489	
	Cast-in-place MH - 11.5 m deep	lump sum	1	$ 96,101	$ 96,101	
	Inlet Headwall	each	1	$ 24,310	$ 24,310	
	Outlet Headwall	each	1	$ 6,078	$ 6,078	
				Sub Total	**$ 19,524,449**	**$ 22,453,116**
Erosion and Sedimentation Controls	Silt Fence	Length (m)	80	$ 24	$ 1,945	
	Clearing and Grubbing	lump sum	1	$ 5,470	$ 5,470	
	Mud Mat	each	1	$ 11,820	$ 11,820	
	Creek Diversion Pumping	lump sum	1	$ 2,431	$ 2,431	
				Sub Total	**$ 21,665**	**$ 24,915**
Miscellaneous	Mobilization and Access	lump sum	1	$ 303,877	$ 303,877	
	Landscaping - Imported Top Soil and Seed	Area (m^2)	1	$ 41	$ 41	
	Dewatering	lump sum	1	$ 121,551	$ 121,551	
				Sub Total	**$ 425,469**	**$ 489,289**
				Total	**$ 19,971,583**	**$ 22,967,320**
				Grand Total	**$ 23,755,393**	**$ 27,318,702**

Notes: 1 - Section number for Creek Works (ref. Appendix C)

Culvert Upgrades						
	Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency (%15)**
Culverts (New Sizing)	McCraney - Lakeshore (14.64 x 3.96)	Length (m)	24	$ 70,499	$ 1,687,402	$ 1,940,513
	CNR (9.0 x 2.4)	Length (m)	15	$ 1,215,506	$ 18,232,594	$ 20,967,483
				Sub-Total	**$ 19,919,996**	$ 22,907,995
				Grand Total	**$ 19,919,996**	**$ 22,907,995**

Notes: Costs include supply & installation

South of Pinegrove					
Item	**Unit of Measure**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**With Contingency ($)**
Fill	Volume (m^3)	451	$ 43	$ 19,190	$ 23,988
Landscaping	Area (m^2)	501	$ 34	$ 17,058	$ 21,322
Tree Removal	E.A.	17	$ 400	$ 6,835	$ 7,860
Fence removal	Linear foot(ft.)	411	$ 15	$ 6,165	$ 7,089
Fence reinstatement	Linear foot(ft.)	452	$ 60	$ 27,125	$ 31,194
			Sub Total	**$ 76,372**	$ 87,828
North of Rebecca Street					
Fill	Volume (m^3)	547	$ 43	$ 23,288	$ 29,110
Landscaping	Area (m^2)	1028	$ 34	$ 34,987	$ 43,734
Tree Removal	E.A.	35	$ 400	$ 14,018	$ 16,121
Fence removal	Linear foot(ft.)	843	$ 15	$ 12,644	$ 14,541
Fence reinstatement	Linear foot(ft.)	927	$ 60	$ 55,635	$ 63,981
			Sub Total	**$ 140,573**	$ 161,659
South of Speers Road					
Fill	Volume (m^3)	3140	$ 43	$ 133,586	$ 166,983
Landscaping	Area (m^2)	2791	$ 34	$ 94,995	$ 118,744
Tree Removal	E.A.	95	$ 400	$ 38,061	$ 43,770
Fill	Volume (m3)	2289	$ 15	$ 34,331	$ 39,481
Landscaping	Area (m2)	2518	$ 60	$ 151,058	$ 173,716
			Sub Total	**$ 452,031**	$ 519,836
South of Bridge					
Fill	Volume (m^3)	2696	$ 43	$ 114,674	$ 143,342
Landscaping	Area (m^2)	2396	$ 34	$ 81,546	$ 101,932
Tree Removal	E.A.	82	$ 400	$ 32,673	$ 37,574
Fill	Volume (m3)	1965	$ 15	$ 29,471	$ 33,891
Landscaping	Area (m2)	2161	$ 60	$ 129,672	$ 149,122
			Sub Total	**$ 388,035**	$ 446,240
South of Rebecca Street					
Fill	Volume (m^3)	1305	$ 43	$ 55,518	$ 69,398
Landscaping	Area (m^2)	1160	$ 34	$ 39,480	$ 49,350
Tree Removal	E.A.	40	$ 400	$ 15,818	$ 18,191
Fill	Volume (m3)	951	$ 15	$ 14,268	$ 16,408
Landscaping	Area (m2)	1046	$ 60	$ 62,779	$ 72,196
			Sub Total	**$ 187,863**	$ 216,043
			Grand Total	**$ 1,244,875**	$ 1,556,094