
APPENDIX G

Cost Analysis



Benchmark Cost Calculation Sheet



Alternative 1: Landform Barrier
Project Location Community of Thunder Bay, Town of Fort Erie
Project Name Six Mile Creek Flooding EA
Project Type New Berm for Flood Mitigation
Description Properties Flanking Shirley Road and Bethune Street
Prepared By Montrose Environmental
Date 01-Apr-25

Six Mile Creek Flooding EA - Input Parameters			Unit
Bottom Elevation (Avg)	175.50	m	1:5-year Lake Surge + 300mm
Top Elevation	176.30	m	
Berm Length	425	m	
Berm Rise	0.8	m	
Top Width	1.5	m	
Bottom Width	4.7	m	

Section 1	MAJOR CONSTRUCTION ITEMS	Estimated Quantity	Unit	Estimated Unit Cost	Total
	Removals/Abandonments	425	m	\$ 100.00	\$ 42,500
	Clearing and Grubbing	425	m	\$ 250.00	\$ 106,250
	Earthworks	1054	m ³	\$ 75.00	\$ 79,050
	Toe Drainage and Ditching	425	m	\$ 250.00	\$ 106,250
	Shirley Road Culvert	1	ea	\$ 30,000.00	\$ 30,000
	Bethune Street Culvert	1	ea	\$ 30,000.00	\$ 30,000
	Outlets for Local Drainage and Backwater Prevention	2	EA	\$ 50,000.00	\$ 100,000
	Soft Area Restoration	2017.5	m ²	\$ 10.00	\$ 20,175
	Reinforced Earth Surface Restoration	1008.75	m ²	\$ 10.00	\$ 10,088
	Armouring Surface Restoration	201.75	m ²	\$ 50.00	\$ 10,088
	Tree Planting	100	ea	\$ 500.00	\$ 50,000
	Shrub Planting	500	ea	\$ 40.00	\$ 20,000
	Barriers and Fencing	425	m	\$ 250.00	\$ 106,250
SUBTOTAL	MAJOR CONSTRUCTION ITEMS				\$ 710,650

Section 2	OTHER CONSTRUCTION ITEMS	Estimated Quantity	Factor	Total
	Minor Items	\$ 710,650	10%	\$ 71,100
	Traffic Control	\$ 710,650	1%	\$ 7,200
	Erosion/Sediment Control	\$ 710,650	2%	\$ 14,300
	Access and Staging	\$ 710,650	2%	\$ 14,300
	General Items	\$ 710,650	2%	\$ 14,300
SUBTOTAL	OTHER CONSTRUCTION ITEMS			\$ 121,200

Section 3	SOFT COSTS	Estimated Quantity	Factor	Total
	Property Acquisition (Easements)	\$ 250,000	1	\$ 250,000
	Engineering Study/Investigations	\$ 831,850	20%	\$ 166,370
	Engineering Design/Approvals	\$ 831,850	20%	\$ 166,370
	Engineering CA&Inspection	\$ 831,850	10%	\$ 83,185
	Contingency	\$ 831,850	15%	\$ 124,778
SUBTOTAL	SOFT COSTS			\$ 790,703

Section 4	CONTEXT ADJUSTMENTS FACTORS	Quantity	Factor	Total
N	Greenfield Area			
N	Brownfield Area			
N	Urban Area			
Y	Semi-Urban Area	\$ 831,850	8.0%	\$ 66,548
N	Rural Area			
N	Utilities Present			
N	Private Surface Features			
N	Naturalized Area			
N	Railway Area			
N	Regional Influence Area			
N	Provincial Influence Area			
N	Cost Sharing Applicable			
SUBTOTAL	CONTEXT ADJUSTMENTS FACTORS			\$ 66,548

Six Mile Creek Flooding EA - GRAND TOTAL (excl HST) \$ 1,689,101

Benchmark Cost Calculation Sheet



Alternative 2: Road Right-of-Way Barrier with Property Purchase

Project Location	Community of Thunder Bay, Town of Fort Erie
Project Name	Six Mile Creek Flooding EA
Project Type	New Berm for Flood Mitigation
Description	Shirley Road and Bethune Street
Prepared By	Montrose Environmental
Date	01-Apr-25

Six Mile Creek Flooding EA - Input Parameters

		Unit	
Bottom Elevation (Avg)	175.70	m	1:5-year Lake Surge + 300mm
Top Elevation	176.30	m	
Road Length	275	m	
Road Raise	0.6	m	
Top Width	8	m	
Bottom Width	10.4	m	

Section 1	MAJOR CONSTRUCTION ITEMS	Estimated Quantity	Unit	Estimated Unit Cost	Total
	Removals/Abandonments	275	m	\$ 100.00	\$ 27,500
	Clearing and Grubbing	275	m	\$ 250.00	\$ 68,750
	Earthworks	1518	m ³	\$ 50.00	\$ 75,900
	Toe Drainage and Ditching	275	m	\$ 250.00	\$ 68,750
	Shirley Road Culvert	1	ea	\$ 30,000.00	\$ 30,000
	Hard Area Restoration	2880	m ²	\$ 125.00	\$ 360,000
	Reinforced Earth Surface Restoration	1440	m ²	\$ 10.00	\$ 14,400
	Armouring Surface Restoration	288	m ²	\$ 50.00	\$ 14,400
	Tree Planting	100	ea	\$ 500.00	\$ 50,000
	Shrub Planting	600	ea	\$ 40.00	\$ 24,000
	Barriers and Fencing	275	m	\$ 250.00	\$ 68,750
SUBTOTAL	MAJOR CONSTRUCTION ITEMS				\$ 802,450

Section 2	OTHER CONSTRUCTION ITEMS	Estimated Quantity	Factor	Total
	Minor Items	\$ 802,450	10%	\$ 80,300
	Traffic Control	\$ 802,450	1%	\$ 8,100
	Erosion/Sediment Control	\$ 802,450	2%	\$ 16,100
	Access and Staging	\$ 802,450	2%	\$ 16,100
	General Items	\$ 802,450	2%	\$ 16,100
SUBTOTAL	OTHER CONSTRUCTION ITEMS			\$ 136,700

Section 3	SOFT COSTS	Estimated Quantity	Factor	Total
	Property Acquisition (Allowance)	\$ 2,327,500	1	\$ 2,327,500
	Engineering Study/Investigations	\$ 939,150	5%	\$ 46,958
	Engineering Design/Approvals	\$ 939,150	10%	\$ 93,915
	Engineering CA&Inspection	\$ 939,150	10%	\$ 93,915
	Contingency	\$ 939,150	15%	\$ 140,873
SUBTOTAL	SOFT COSTS			\$ 2,703,160

Section 4	CONTEXT ADJUSTMENTS FACTORS		Quantity	Factor	Total
N	Greenfield Area				
N	Brownfield Area				
N	Urban Area				
Y	Semi-Urban Area		\$ 939,150	8.0%	\$ 75,132
N	Rural Area				
N	Utilities Present				
N	Private Surface Features				
N	Naturalized Area				
N	Railway Area				
N	Regional Influence Area				
N	Provincial Influence Area				
N	Cost Sharing Applicable				
SUBTOTAL	CONTEXT ADJUSTMENTS FACTORS				\$ 75,132

Six Mile Creek Flooding EA - GRAND TOTAL (excl HST)	\$ 3,717,442
---	--------------

Benchmark Cost Calculation Sheet



Alternative 3: Property Purchase

Project Location Community of Thunder Bay, Town of Fort Erie
Project Name Six Mile Creek Flooding EA
Project Type New Berm for Flood Mitigation
Description Property Purchase and Demolition of at-Risk Properties
Prepared By Montrose Environmental
Date 01-Apr-25

Six Mile Creek Flooding EA - Input Parameters		Unit			
	Bottom Elevation (Avg)		m		
	Top Elevation		m	1:5-year Lake Surge + 300mm	
	Berm Length		m		
	Berm Rise		m		
	Top Width		m		
	Bottom Width		m		
Section 1	MAJOR CONSTRUCTION ITEMS	Estimated Quantity	Unit	Estimated Unit Cost	Total
	Removals/Abandonments	16	EA	\$ 15,000.00	\$ 240,000
	Clearing and Grubbing	0	m	\$ 250.00	-
	Earthworks	0	m ³	\$ 50.00	-
	Toe Drainage and Ditching	0	m	\$ 250.00	-
	Shirley Road Culvert	0	ea	\$ 30,000.00	-
	Bethune Street Culvert	0	ea	\$ 30,000.00	-
	Outlets for Local Drainage and Backwater Prevention	0	EA	\$ 50,000.00	-
	Infrastructure Modifications (i.e. outfalls, local infrastructure etc.)	0	EA	\$ 100,000.00	-
	Soft Area Restoration	0	m ²	\$ 10.00	-
	Reinforced Earth Surface Restoration	0	m ²	\$ 10.00	-
	Armouring Surface Restoration	0	m ²	\$ 50.00	-
	Tree Planting	0	ea	\$ 500.00	-
	Shrub Planting	0	ea	\$ 40.00	-
	Barriers and Fencing	0	m	\$ 250.00	-
SUBTOTAL	MAJOR CONSTRUCTION ITEMS				\$ 240,000
Section 2	OTHER CONSTRUCTION ITEMS	Estimated Quantity	Factor	Total	
	Minor Items	\$ 240,000	10%	\$	24,000
	Traffic Control	\$ 240,000	1%	\$	2,400
	Erosion/Sediment Control	\$ 240,000	2%	\$	4,800
	Access and Staging	\$ 240,000	2%	\$	4,800
	General Items	\$ 240,000	2%	\$	4,800
SUBTOTAL	OTHER CONSTRUCTION ITEMS				\$ 40,800
Section 3	SOFT COSTS	Estimated Quantity	Factor	Total	
	Property Compensation (Allowance)	\$ 4,725,250	1	\$	4,725,250
	Engineering Study/Investigations	\$ 280,800	5%	\$	14,040
	Engineering Design/Approvals	\$ 280,800	10%	\$	28,080
	Engineering CA&Inspection	\$ 280,800	10%	\$	28,080
	Contingency	\$ 280,800	15%	\$	42,120
SUBTOTAL	SOFT COSTS				\$ 4,837,570
Section 4	CONTEXT ADJUSTMENTS FACTORS	Quantity	Factor	Total	
N	Greenfield Area				
N	Brownfield Area				
N	Urban Area				
Y	Semi-Urban Area	\$ 280,800	8.0%	\$	22,464
N	Rural Area				
N	Utilities Present				
N	Private Surface Features				
N	Naturalized Area				
N	Railway Area				
N	Regional Influence Area				
N	Provincial Influence Area				
N	Cost Sharing Applicable				
SUBTOTAL	CONTEXT ADJUSTMENTS FACTORS				\$ 22,464
Six Mile Creek Flooding EA - GRAND TOTAL (excl HST)				\$	5,140,834

Benchmark Cost Calculation Sheet



Alternative 4: Thunder Bay Road Barrier and Backflow Prevention System
Project Location Community of Thunder Bay, Town of Fort Erie
Project Name Six Mile Creek Flooding EA
Project Type New Berm for Flood Mitigation
Description Thunder Bay Road, Existing Bridge Retrofit with Gate Structure and PS
Prepared By Montrose Environmental
Date 01-Apr-25

Six Mile Creek Flooding EA - Input Parameters		Unit	
Bottom Elevation (Avg)	175.67	m	1:5-year Lake Surge + 300mm
Top Elevation	176.30	m	
Road Length	300	m	
Road Raise	0.63	m	
Top Width	9.5	m	
Bottom Width	12.02	m	

Section 1	MAJOR CONSTRUCTION ITEMS	Estimated Quantity	Unit	Estimated Unit Cost	Total
	Removals/Abandonments	300	m	\$ 100.00	\$ 30,000
	Clearing and Grubbing	300	m	\$ 250.00	\$ 75,000
	Earthworks	2034	m ³	\$ 50.00	\$ 101,682
	Toe Drainage and Ditching	300	m	\$ 250.00	\$ 75,000
	Bridge Retrofit Gate Structure	1	ea	\$ 1,500,000.00	\$ 1,500,000
	1 CMS Pump Station	1	ea	\$ 1,000,000.00	\$ 1,000,000
	Hard Area Restoration	3626	m ²	\$ 125.00	\$ 453,250
	Reinforced Earth Surface Restoration	1813	m ²	\$ 10.00	\$ 18,130
	Armouring Surface Restoration	362.6	m ²	\$ 50.00	\$ 18,130
	Tree Planting	100	ea	\$ 500.00	\$ 50,000
	Shrub Planting	800	ea	\$ 40.00	\$ 32,000
	Barriers and Fencing	300	m	\$ 250.00	\$ 75,000
SUBTOTAL	MAJOR CONSTRUCTION ITEMS				\$ 3,428,192

Section 2	OTHER CONSTRUCTION ITEMS	Estimated Quantity	Factor	Total
	Minor Items	\$ 3,428,192	10%	\$ 342,900
	Traffic Control	\$ 3,428,192	1%	\$ 34,300
	Erosion/Sediment Control	\$ 3,428,192	2%	\$ 68,600
	Access and Staging	\$ 3,428,192	2%	\$ 68,600
	General Items	\$ 3,428,192	2%	\$ 68,600
SUBTOTAL	OTHER CONSTRUCTION ITEMS			\$ 583,000

Section 3	SOFT COSTS	Estimated Quantity	Factor	Total
	Property Acquisition (Allowance)	\$ -	1	\$ -
	Engineering Study/Investigations	\$ 4,011,192	5%	\$ 200,560
	Engineering Design/Approvals	\$ 4,011,192	10%	\$ 401,119
	Engineering CA&Inspection	\$ 4,011,192	10%	\$ 401,119
	Contingency	\$ 4,011,192	15%	\$ 601,679
SUBTOTAL	SOFT COSTS			\$ 1,604,477

Section 4	CONTEXT ADJUSTMENTS FACTORS	Quantity	Factor	Total
N	Greenfield Area			
N	Brownfield Area			
N	Urban Area			
Y	Semi-Urban Area	\$ 4,011,192	8.0%	\$ 320,895
N	Rural Area			
N	Utilities Present			
N	Private Surface Features			
N	Naturalized Area			
N	Railway Area			
N	Regional Influence Area			
N	Provincial Influence Area			
N	Cost Sharing Applicable			
SUBTOTAL	CONTEXT ADJUSTMENTS FACTORS			\$ 320,895

Six Mile Creek Flooding EA - GRAND TOTAL (excl HST)				\$ 5,936,564
--	--	--	--	---------------------

Benchmark Cost Calculation Sheet



Alternative 5: Lake Front Barrier and Backflow Prevention System

Project Location	Community of Thunder Bay, Town of Fort Erie
Project Name	Six Mile Creek Flooding EA
Project Type	New Berm for Flood Mitigation
Description	Lakefront Culverts with Gate Structure and PS
Prepared By	Montrose Environmental
Date	01-Apr-25

Six Mile Creek Flooding EA - Input Parameters		Unit			
	Bottom Elevation (Avg)	173.50	m	1:5-year Lake Surge + 300mm	
	Top Elevation	176.63	m		
	Berm Length	50	m		
	Berm Height	3.13	m		
	Top Width	5	m		
	Bottom Width	17.52	m		
Section 1	MAJOR CONSTRUCTION ITEMS	Estimated Quantity	Unit	Estimated Unit Cost	Total
	Removals/Abandonments	50	m	\$ 100.00	\$ 5,000
	Clearing and Grubbing	50	m	\$ 250.00	\$ 12,500
	Earthworks	1762	m ³	\$ 75.00	\$ 132,164
	Toe Drainage and Ditching	50	m	\$ 250.00	\$ 12,500
	Culvert Structure	1	ea	\$ 850,000.00	\$ 850,000
	Culvert Gate Structure	1	ea	\$ 750,000.00	\$ 750,000
	1.5 CMS Pump Station	1	ea	\$ 1,250,000.00	\$ 1,250,000
	Soft Area Restoration	896	m ²	\$ 25.00	\$ 22,400
	Reinforced Earth Surface Restoration	448	m ²	\$ 10.00	\$ 4,480
	Armouring Surface Restoration	896	m ²	\$ 50.00	\$ 44,800
	Tree Planting	100	ea	\$ 500.00	\$ 50,000
	Shrub Planting	200	ea	\$ 40.00	\$ 8,000
	Barriers and Fencing	50	m	\$ 250.00	\$ 12,500
SUBTOTAL	MAJOR CONSTRUCTION ITEMS				\$ 3,154,344
Section 2	OTHER CONSTRUCTION ITEMS	Estimated Quantity	Factor	Total	
	Minor Items	\$ 3,154,344	10%	\$	315,500
	Traffic Control	\$ 3,154,344	1%	\$	31,600
	Erosion/Sediment Control	\$ 3,154,344	2%	\$	63,100
	Access and Staging	\$ 3,154,344	2%	\$	63,100
	General Items	\$ 3,154,344	2%	\$	63,100
SUBTOTAL	OTHER CONSTRUCTION ITEMS				\$ 536,400
Section 3	SOFT COSTS	Estimated Quantity	Factor	Total	
	Property Acquisition (Easements)	\$ 250,000	1	\$	250,000
	Engineering Study/Investigations	\$ 3,690,744	5%	\$	184,537
	Engineering Design/Approvals	\$ 3,690,744	10%	\$	369,074
	Engineering CA&Inspection	\$ 3,690,744	10%	\$	369,074
	Contingency	\$ 3,690,744	15%	\$	553,612
SUBTOTAL	SOFT COSTS				\$ 1,726,298
Section 4	CONTEXT ADJUSTMENTS FACTORS	Quantity	Factor	Total	
N	Greenfield Area				
N	Brownfield Area				
N	Urban Area				
Y	Semi-Urban Area	\$ 3,690,744	8.0%	\$	295,260
N	Rural Area				
N	Utilities Present				
N	Private Surface Features				
N	Naturalized Area				
N	Railway Area				
N	Regional Influence Area				
N	Provincial Influence Area				
N	Cost Sharing Applicable				
SUBTOTAL	CONTEXT ADJUSTMENTS FACTORS				\$ 295,260
Six Mile Creek Flooding EA - GRAND TOTAL (excl HST)				\$	5,712,301