GERMAN MILLS CREEK GEOMORPHIC SYSTEMS MASTER PLAN
EVALUATION OF ALTERNATIVES (PHASE 3)
APPENDIX F

Prepared for:
CITY OF TORONTO

Prepared by:
MATRIX SOLUTIONS INC., A MONTROSE ENVIRONMENTAL COMPANY

Version 1.0
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APPENDIX F
Evaluation of Alternatives (Phase 3)

APPENDIX F

EVALUATION OF ALTERNATIVES AND PREFERRED OPTIONS

1 INTRODUCTION

This material within this technical appendix provide additional details and insight into Phase 3 of the GSMP that defines and evaluates the alternative solutions, with the selection of the preliminary preferred alternative. Alternative solutions were then developed to specifically address erosion concerns based on the identification of 11 local erosion mitigation project areas. Concept drawings for each alternative are included within Appendix F-1. To support the evaluation and selection of the preferred alternative, tree removals were estimated (Appendix F-2), and an infrastructure review was completed to aid in evaluating potential modifications to the sewer network (Appendix F-3). The full evaluation tables (scoring and descriptive) for each alternative are included in Appendix F-4, and concept drawings for the preferred alternative in Appendix F-5.

Following the evaluation, the preliminary preferred alternative solutions were presented to stakeholders, including the public and regulatory agencies (Toronto and Region Conservation Authority [TRCA]), to arrive at the final preferred alternative solutions in Phase 4 of the GSMP (refer to Main Document). The following sub-appendices are included:

APPENDIX F-1 Concept Drawings for Design Alternatives
APPENDIX F-2 Tree Removals
APPENDIX F-3 WSP German Mills Geomorphic Systems Master Plan Infrastructure Review
APPENDIX F-4 Evaluation of Alternatives
APPENDIX F-5 Concept Drawings for Preferred Alternative

APPENDIX F-2
Tree Removals

TABLE F-2a Summary of Tree Removal and Compensation Numbers by Corridor Width and Alternative

Project	Corridor Width 24 m				Corridor Width 18 m			
	Footprint Area (m^2)	Tree Removal	Onsite Plantings	Offsite Compensation	Footprint Area (m^2)	Tree Removal	Onsite Plantings	Offsite Compensation
Project 1								
Alternative 2	2,530	140	130	280	2,240	100	110	180
Alternative 3	3,270	170	170	340	2,940	130	150	240
Alternative 4	4,010	220	200	450	3,540	170	180	330
Project 2								
Alternative 2	2,990	100	150	140	1,890	70	100	100
Alternative 3	4,590	160	230	230	3,040	110	150	170
Alternative 4	6,260	220	320	340	3,680	120	190	180
Project 3								
Alternative 2	2,440	80	120	110	1,570	60	80	90
Alternative 3	2,630	80	130	120	1,740	60	90	100
Alternative 4	3,560	130	180	200	1,920	70	100	110
Project 4								
Alternative 2	1,930	60	100	90	1,000	30	50	40
Alternative 3	4,610	190	230	330	2,370	90	120	140
Alternative 4	5,030	190	260	320	2,790	100	140	170
Project 5								
Alternative 2	3,000	100	150	140	1,670	60	80	80
Alternative 3	3,880	130	200	200	2,330	80	120	130
Alternative 4	3,980	140	200	210	2,360	80	120	130
Project 6								
Alternative 2	2,490	80	130	120	1,600	50	80	70
Alternative 3	3,970	140	200	220	2,490	80	130	130
Alternative 4	4,440	160	230	240	3,050	110	160	160
Project 7								
Alternative 2	1,390	50	70	70	1,080	40	50	60
Alternative 3	3,500	120	180	170	1,840	60	90	100
Alternative 4	4,260	140	220	210	2,370	80	120	130
Project 8								
Alternative 2	1,180	90	60	220	1,070	90	50	210
Alternative 3	1,240	100	60	230	1,070	90	50	210
Alternative 4	1,220	100	60	230	1,030	80	50	200

Project	Corridor Width 24 m				Corridor Width 18 m			
	Footprint Area (m^2)	Tree Removal	Onsite Plantings	Offsite Compensation	Footprint Area (m^2)	Tree Removal	Onsite Plantings	Offsite Compensation
Project 9								
Alternative 2	510	40	30	100	540	50	30	110
Alternative 3	3,250	290	170	710	1,190	90	60	220
Alternative 4	3,250	260	170	610	1,990	140	100	310
Project 10								
Alternative 2	1,130	20	60	0	710	10	40	0
Alternative 3	1,740	40	90	30	1,550	40	80	30
Alternative 4	2,100	60	110	70	1,570	40	80	40
Project 11								
Alternative 2	0	0	0	0	0	0	0	0
Alternative 3	1,070	30	50	20	810	20	40	30
Alternative 4	1,420	40	70	40	820	20	40	30
Project 12								
Alternative 2	530	20	30	30	50	0	0	0
Alternative 3	540	20	30	30	160	10	10	10
Alternative 4	630	20	30	40	160	10	10	10

Note:
All numbers rounded to the nearest multiple of 10.

TABLE F-2b Summary of Excess Soil Volumes by Corridor Width and Alternative

Project	Corridor Width 24 m				Corridor Width 18 Metres			
	Footprint Area (m^2)	Earth Works (m^3)	50% Excess Soil (m^3)	Clean Soil Cost (millions)	Footprint Area (m^2)	Earth Works (m^3)	50% Excess Soil (m^3)	Clean Soil Cost (millions)
Project 1								
Alternative 2	2,530	3,802	1,901	$0.10	2,240	3,361	1,680	$0.08
Alternative 3	3,270	4,907	2,454	$0.12	2,940	4,405	2,202	$0.11
Alternative 4	4,010	6,019	3,009	$0.15	3,540	5,315	2,657	$0.13
Project 2								
Alternative 2	2,990	4,491	2,246	$0.11	1,890	2,828	1,414	$0.07
Alternative 3	4,590	6,880	3,440	$0.17	3,040	4,564	2,282	$0.11
Alternative 4	6,260	9,390	4,695	$0.23	3,680	5,515	2,758	$0.14
Project 3								
Alternative 2	2,440	3,656	1,828	$0.09	1,570	2,352	1,176	$0.06
Alternative 3	2,630	3,952	1,976	$0.10	1,740	2,604	1,302	$0.07
Alternative 4	3,560	5,347	2,674	$0.13	1,920	2,883	1,442	$0.07
Project 4								
Alternative 2	1,930	2,896	1,448	$0.07	1,000	1,504	752	$0.04
Alternative 3	4,610	6,917	3,458	$0.17	2,370	3,556	1,778	$0.09
Alternative 4	5,030	7,544	3,772	$0.19	2,790	4,181	2,090	$0.10
Project 5								
Alternative 2	3,000	4,498	2,249	$0.11	1,670	2,501	1,250	$0.06
Alternative 3	3,880	5,814	2,907	$0.15	2,330	3,493	1,747	$0.09
Alternative 4	3,980	5,967	2,984	$0.15	2,360	3,536	1,768	$0.09
Project 6								
Alternative 2	2,490	3,739	1,870	$0.09	1,600	2,407	1,204	$0.06
Alternative 3	3,970	5,948	2,974	$0.15	2,490	3,738	1,869	$0.09
Alternative 4	4,440	6,653	3,326	$0.17	3,050	4,577	2,289	$0.11
Project 7								
Alternative 2	1,390	2,079	1,040	$0.05	1,080	1,618	809	$0.04
Alternative 3	3,500	5,255	2,627	$0.13	1,840	2,767	1,383	$0.07
Alternative 4	4,260	6,391	3,195	$0.16	2,370	3,549	1,774	$0.09
Project 8								
Alternative 2	1,180	1,766	883	$0.04	1,070	1,610	805	$0.04
Alternative 3	1,240	1,866	933	$0.05	1,070	1,610	805	$0.04
Alternative 4	1,220	1,828	914	$0.05	1,030	1,538	769	$0.04
Project 9								
Alternative 2	510	768	384	$0.02	540	813	407	$0.02
Alternative 3	3,250	4,869	2,434	$0.12	1,190	1,790	895	$0.04
Alternative 4	3,250	4,879	2,439	$0.12	1,990	2,992	1,496	$0.07
Project 10								
Alternative 2	1,130	1,692	846	$0.04	710	1,059	530	$0.03
Alternative 3	1,740	2,616	1,308	$0.07	1,550	2,325	1,163	$0.06
Alternative 4	2,100	3,148	1,574	$0.08	1,570	2,362	1,181	$0.06

Project	Corridor Width 24 m				Corridor Width 18 Metres			
	Footprint Area (m^2)	Earth Works (m^3)	50% Excess Soil (m^3)	Clean Soil Cost (millions)	Footprint Area (m^2)	Earth Works (m^3)	50% Excess Soil (m^3)	Clean Soil Cost (millions)
Project 11								
Alternative 2	0	0	0	$0.00	0	0	0	$0.00
Alternative 3	1,070	1,610	805	$0.04	810	1,213	606	$0.03
Alternative 4	1,420	2,124	1,062	$0.05	820	1,223	612	$0.03
Project 12								
Alternative 2	530	798	399	$0.02	50	69	34	$0.00
Alternative 3	540	816	408	$0.02	160	243	121	$0.01
Alternative 4	630	940	470	$0.02	160	243	121	$0.01

Note:
Offsite disposal of clean soil unit cost assumed to be $50/$m^3$.

APPENDIX F-3
WSP German Mills GSMP Infrastructure Review

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
3450 Harvester Road, Suite 100
T: 905-335-2353
www.woodplc.com

Memo

To: **Roger Phillips., Ph.D., P.Geo., Matrix Solutions Inc.** **Date:** **29 May 2022**

From: **Sophie Packer, P.Eng., Wood E&IS**

CC: **Brian Bishop, P.Eng., Wood E&IS**

Ref: **WW21011051**

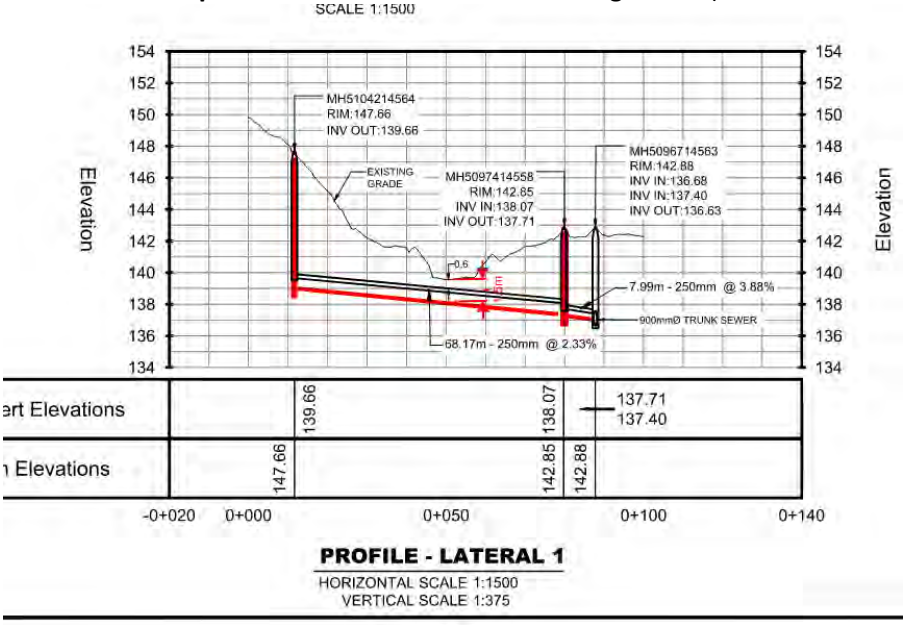
Re: **German Mills GSMP Alternatives Development – Infrastructure Review**

Wood has reviewed the plan and profile drawings of the existing channel and infrastructure network within the project limits and has identified two locations where infrastructure improvements may be used to mitigate risk to Toronto Water infrastructure.

For Lateral 1 at approximately STA 0+470

This lateral is currently at risk of being exposed in the future with a cover of approximately 0.6m. To remove this risk, cover must be increased to an acceptable level. The two infrastructure-based solutions are as follows:

Infrastructure Option #1: Lower Lateral in same alignment (not recommended)



There are multiple ways that lowering the lateral may be done. The profile above shows a lowering across the two manholes directly adjacent to the channel, though an additional manhole may be installed to shorten the overall length of open cut lowering. While the current sanitary lateral capacity and flows are unknown, it is most conservative to maintain the existing slope though this may be examined if the alternative is carried through detailed design.

Pros:

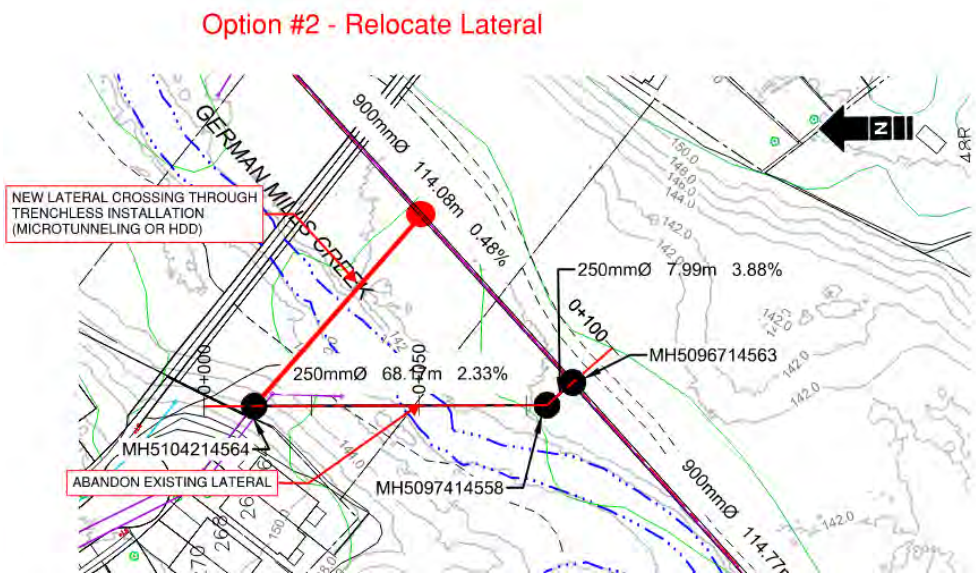
- Maintain the connection to trunk sewer, avoiding having to make a new connection

Cons:

- Maximum lowering is limited as elevation at trunk sewer connection must be maintained and a minimum self-cleansing velocity must be maintained through the lateral.
- Maintenance structure upstream or downstream may not be able to accommodate additional depth of sewer lateral and may need replacement as well.
- Use of existing alignment prevents use of typical trenchless applications and will require open cut of full area, would require significant efforts for shoring/slope stabilization, in water works, dewatering/diversion, permitting.

High level cost estimate: $100,000-140,000 of construction cost, excluding the cost of in-water/diversion works.

Infrastructure Option #2: Relocate lateral crossing



Pros:

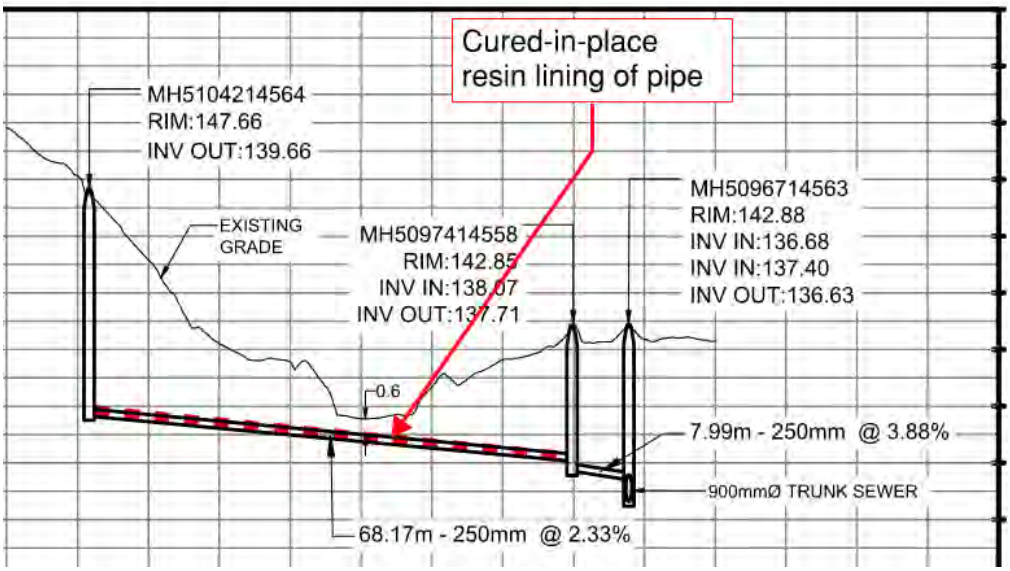
- Trenchless installation can be performed, would have lower overall impact and will avoid in-water works.
- A more advantageous crossing location can be identified based on channel profile

Cons:

- Trenchless shafts will still be significant size and depth in order to cross, will still require specialized shoring and slope stabilization
- Will require a new maintenance hole at receiving location and still may require maintenance hole replacement at existing manhole if depth cannot be accommodated by current structure

High level cost estimate: $80,000-120,000 of construction cost using trenchless installation techniques.

Infrastructure Option #3: Trenchless rehabilitation of existing lateral (CIPP/SIPP)



Pros:

- Relatively low cost/impact/time required to perform
- Will lend structural strength to pipe and provide some protection should cover be compromised further in the future
- Will prevent infiltration/exfiltration of existing pipe

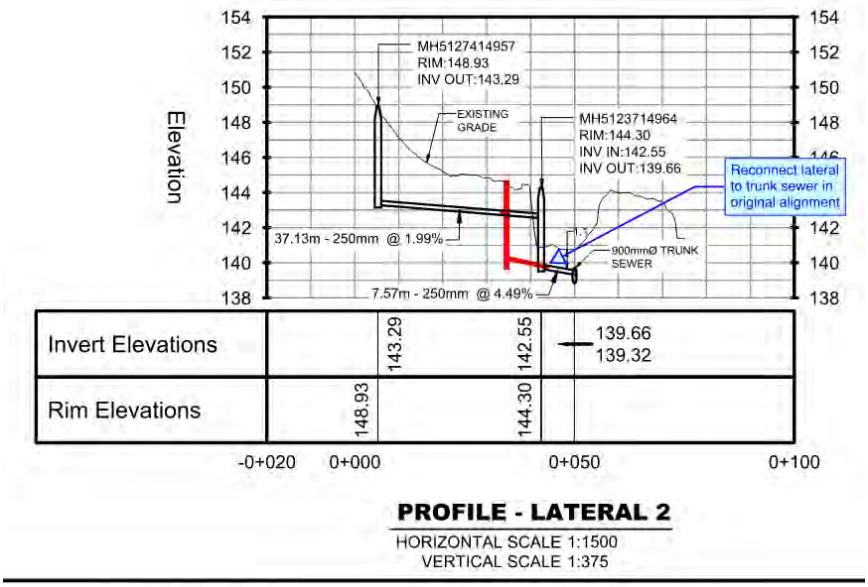
Cons:

- Does not eliminate risk, only provides mitigation. Cover will not be increased and pipe is still at risk of exposure over time.

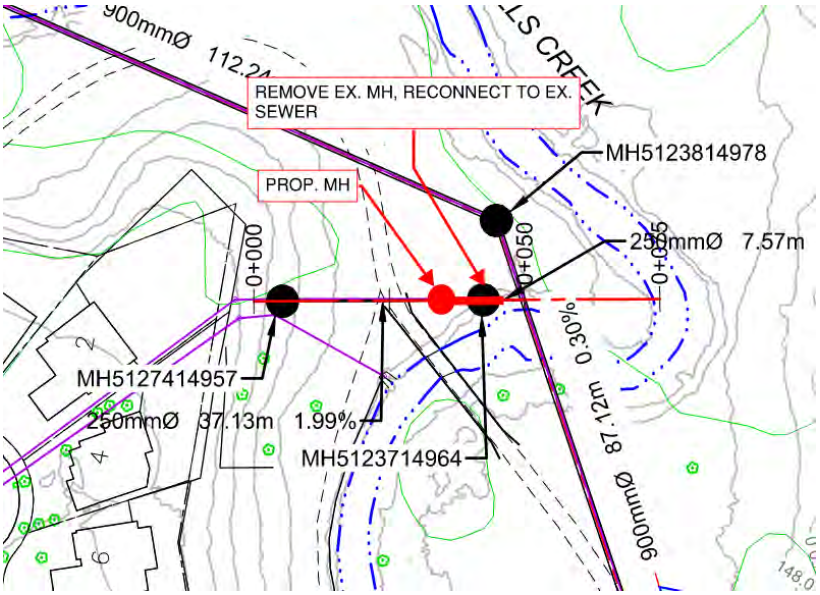
High level cost estimate: $40,000-60,000 of construction cost

For Lateral 2 @ approximately STA 0+970

Infrastructure Option #1: Remove and relocate manhole farther back in same alignment as shown, connect to downstream lateral as long as it is good condition.



PROFILE - LATERAL 2
HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:375



Pros:

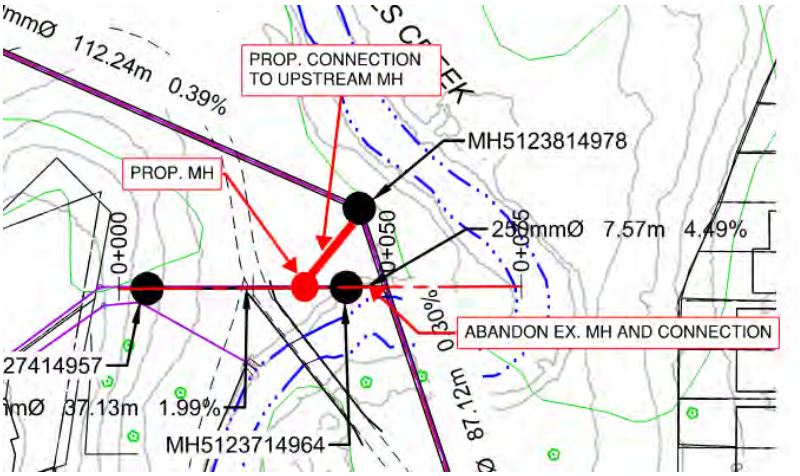
- Maintain the existing junction connection to trunk sewer, avoiding having to make a new connection
- Shorter length of work

Cons:

- Will require in-water works to make connection.
- Greater requirements for dewatering/diverting channel for works, erosion/sediment control and permitting

High level cost estimate: $60,000-80,000 of construction cost excluding the cost of in-water/diversion works.

Infrastructure Option #2: Abandon existing exposed manhole, provide a new manhole upstream and connect to storm lateral in an alternate alignment outside of the channel.



Pros:

- Avoids in-water works
- If connection is made at upstream manhole MH5123814978, it will allow for easier access for maintenance of lateral compared to junction.
- Full lateral will be less at risk to future channel movement

Cons:

- Will require a new connection to trunk sewer
- Greater length of disturbance

High level cost estimate: $80,000-100,000 of construction cost

Each of these options presented is only for preliminary design considerations and must be studied in greater detail should they be considered for detailed design.

Sincerely,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Sophie Packer, P.Eng
Municipal Engineer

MEMO

TO:	Roger Phillips., Ph.D., P.Geo.
COMPANY:	Matrix Solutions Inc.
FROM:	Roy Behrendt, Sophie Packer, Brian Bishop
DATE:	September 30, 2022; Revised December 9, 2022
CC:	Natasha Cyples, Matrix Solutions Inc.
PROJECT NO.:	WW21011051
SUBJECT:	Addendum #1 to May 29, 2022 Memo - German Mills GSMP Alternatives Development – Infrastructure Review

1 INTRODUCTION

This memo has been prepared as an addendum to the May 29, 2022 memo, titled "German Mills GSMP Alternatives Development – Infrastructure Review". The May 29, 2022 memorandum included a high-level review of a number of potential alternatives for sewer works or adjustments to the existing sewer infrastructure, which may be in potential conflict with the creek. The purpose of this addendum is to update the original assessment with a refined recommended concept for both sites, with additional details and a preliminary cost estimate.

Further to feedback received on both the May 29, 2022 memo, and an interim version of this addendum, WSP has further reviewed the plan and profile drawings of the existing channel and infrastructure network at the two identified locations where infrastructure improvements may be used to mitigate risk to Toronto Water infrastructure. A preliminary review of options such as lowering, lining, realignment, and combinations thereof, has resulted in a proposed preferred solution for remediation of the risks at the two identified locations: Goldenwood Road (approximately STA 0+470) and Saddletree Drive (approximately STA 0+970).

2 DESCRIPTION OF WORKS

Goldenwood Road Local Sewer Lowering (approximately STA 0+470)

This lateral is currently at risk of being exposed in the future with a cover of approximately 0.6 m. To remove this risk, cover must be increased to an acceptable level. The proposed infrastructure-based solution includes lowering and realigning the sewer, with a new upstream manhole and a refined lowered connection at the trunk in order to accommodate the proposed new lowered lateral under the creek. It is assumed that a full dewatering of the creek will be required to allow for the open cut operation, for approximately one week.

Refer to the attached Figure 1 at the end of the memo for an illustration of the proposed conceptual solution.

Saddletree Drive Local Sewer Alignment Revisions (approximately STA 0+970)

The manhole is currently at risk and partially exposed. To remove this risk, the manhole is proposed to be removed and a new lateral be connected to the next upstream existing manhole. It is assumed that a short-term dewatering of the creek will be required at the location of the manhole, for the removal operation.

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Refer to the attached Figure 2 at the end of the memo for an illustration of the proposed conceptual solution.

3 PRELIMINARY COST ESTIMATE

A preliminary cost estimate has been developed for the proposed preferred solutions for the two locations.

The following is a list of assumptions:

- This is a planning-level preliminary construction cost estimate.
- The infrastructure works are completed in isolation and in advance of any proposed channel improvement
- The preliminary cost estimate is only for construction – the estimate excludes other typical project costs (e.g. engineering, design, permitting, permits and approvals, contract administration, and observation)
- The unit costs have been based on recent (2021-2022) area projects, and should be inflated for 2023 any further timing periods.
- The cost estimate excludes applicable taxes
- It has been assumed that both of the works at the two locations will be put in a single contract.

The preliminary costing has been separated into three sections in the following tables: General, Goldenwood Road, and Saddletree Drive.

Table 1 - General

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
1.01	Bonds and Insurance	LS	1	5,000.00	5,000.00
1.02	Mobilization and Demobilization	LS	2	20,000.00	40,000.00
1.03	Access road and laydown area	LS	2	25,000.00	50,000.00
1.04	Noise and Vibration Monitoring and Pre-condition survey	LS	2	5,000.00	10,000.00
1.05	CCTV Sanitary Sewer Report	LS	2	3,000.00	6,000.00
1.06	Restoration to existing conditions – includes channel restoration and site re-naturalization	LS	2	40,000.00	80,000.00
				Subtotal	$ 191,000.00

Table 2 - Goldenwood Road Works

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
2.01	Erosion and Sediment control and Tree Protection	L.S.	1	$ 25,000.00	$ 25,000.00
2.02	Temporary creek dam	L.S.	1	$ 40,000.00	$ 40,000.00
2.03	3 x 200 mm trash pumps for duration of creek excavation (120 hrs x 3 pumps) including hoses, fuel and operator	hr.	360	$ 100.00	$ 36,000.00
2.04	Remove and dispose of MH_4558	L.S.	1	$ 10,000.00	$ 10,000.00
2.05	Remove and dispose of MH_4564	L.S.	1	$ 10,000.00	$ 10,000.00
2.06	1200 mm dia. Drop MH, 10m deep, including frame and cover (replaces MH_4564)	L.S.	1	$ 50,000.00	$ 50,000.00
2.07	Modify existing MH_4563 and connect new lateral invert at sewer main springline	L.S.	1	$ 20,000.00	$ 20,000.00
2.08	250 mm (estimated) dia. PVC Pipe (by open cut)	m	70	$ 650.00	$ 45,500.00
2.09	Temporary sanitary bypass pumping	L.S.	1	$ 25,000.00	$ 25,000.00
2.10	Temporary sanitary sewer protection treatment over sewer under channel	m	40	$ 1,500.00	$ 60,000.00
				Subtotal	$ 321,500.00

Table 3 - Saddletree Drive Works

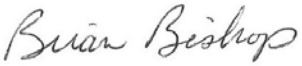
ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
3.01	Erosion and Sediment control and Tree Protection	L.S.	1	$ 25,000.00	$ 25,000.00
3.02	Temporary creek dam	L.S.	1	$ 40,000.00	$ 40,000.00
3.03	3 x 200 mm trash pumps for removal of MH_4964 (24 hrs x 3 pumps) including hoses, fuel and operator	hr.	72	$ 100.00	$ 7,200.00
3.04	Remove and dispose of MH_4964	L.S.	1	$ 5,000.00	$ 5,000.00
3.05	Remove existing 7.6m pipe stub from MH_4964 to sewer main and install waterproof cap at main.	L.S.	1	$ 20,000.00	$ 20,000.00
3.06	Modify Ex MH_4957 to accommodate new 250 mm sewer pipe, adjust benching, plug old outlet with concrete	L.S.	1	$ 15,000.00	$ 15,000.00
3.07	Core and connect to existing MH_4978 with new drop pipe (internal drop pipe if space permits)	L.S.	1	$ 25,000.00	$ 25,000.00
3.08	250 mm (estimated) dia. PVC Pipe (by open cut)	m	40	$ 600.00	$ 24,000.00
3.09	Temporary sanitary bypass pumping	L.S.	1	$ 25,000.00	$ 25,000.00
				Subtotal	$ 186,200.00

The total estimated cost for the combined works would be $698,700.

This excludes engineering, study, design, permitting and permit costs, contract administration, construction observation/inspection, contingencies and taxes.

We trust that the foregoing addendum memo provides additional information and preliminary costing information for the conceptual preferred alternative designs at the two crossings.

Yours sincerely,



Brian Bishop, M.Eng., P.Eng.
Senior Associate, Water Resources
WSP E&I Canada Limited

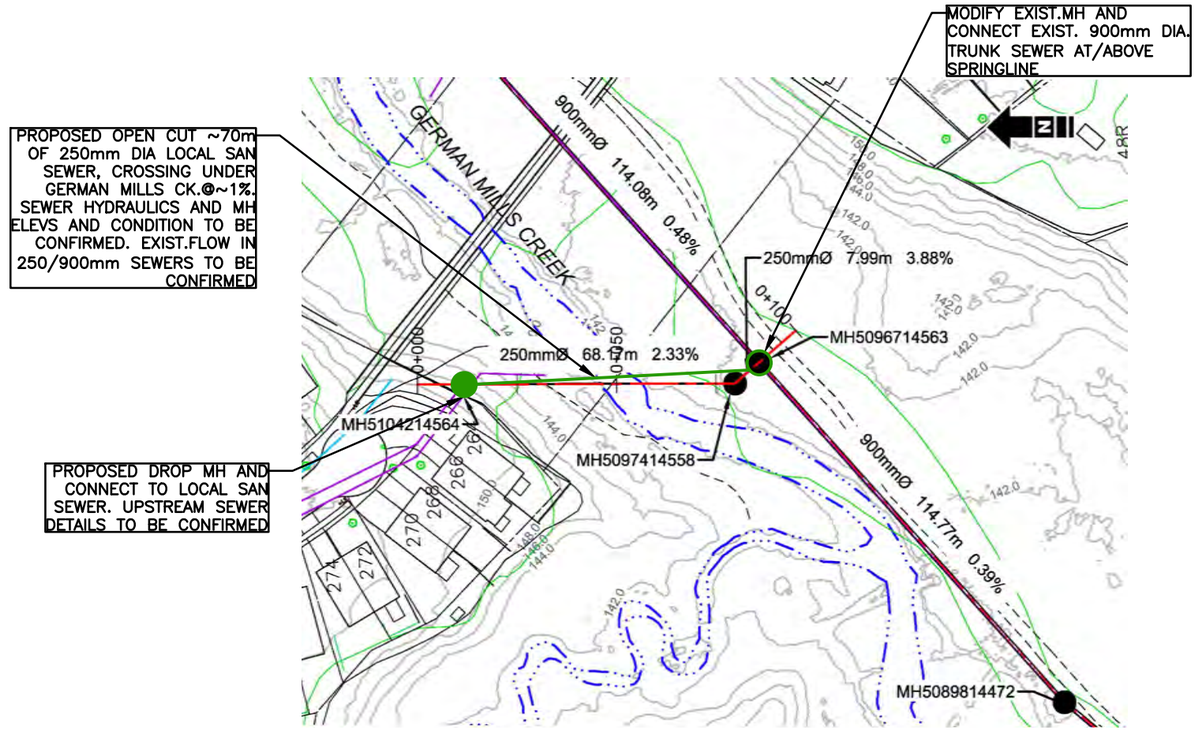
Roy Behrendt, C.E.T.
Project Manager, Municipal Engineering
WSP E&I Canada Limited

RB/SP/BB/bb
Attach.

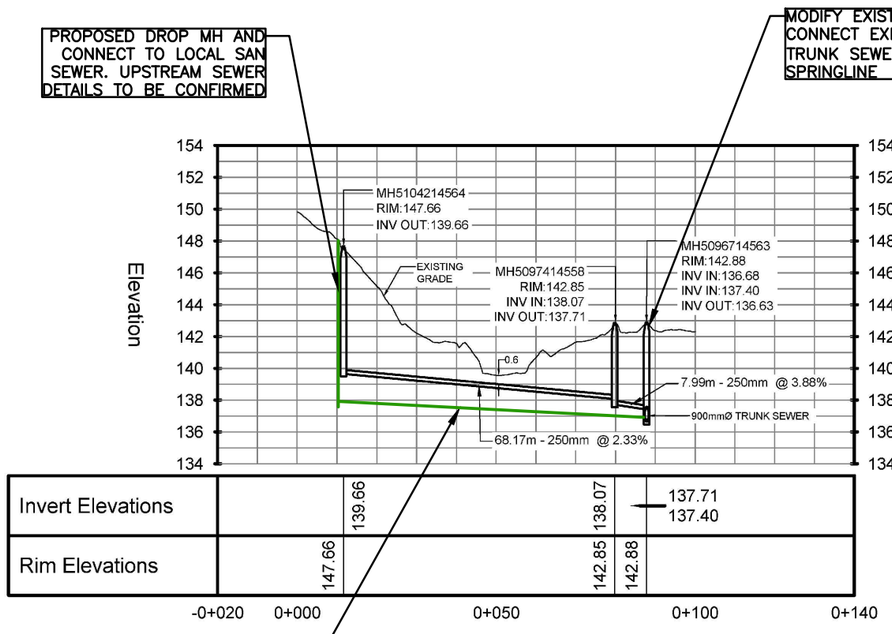
Attachments

Figure 1 – Goldenwood Road Local Sewer Lowering

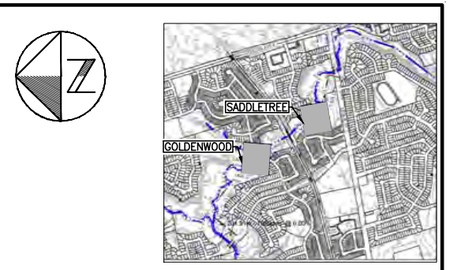
Figure 2 – Saddletree Drive Local Sewer Alignment



PLAN-LATERAL1
SCALE 1:750



PROFILE-LATERAL1
HORIZONTAL SCALE 1:750
VERTICAL SCALE 1:375



KEYMAP
NOT TO SCALE

LEGEND

- LOT LINE
- RIVER SHORELINE
- TRAIL
- VEGETATION
- EXISTING CONTOUR (2m INTERVAL)
- GRAVITY SEWER
- WATERMAIN
- ALIGNMENT
- SANITARY SEWER
- MANHOLE

Ref: Base plan from Drawing 32227–522 Drawing 02 Plan and Profile 0+260 to 0+560, Matrix Solutions Inc December 2021

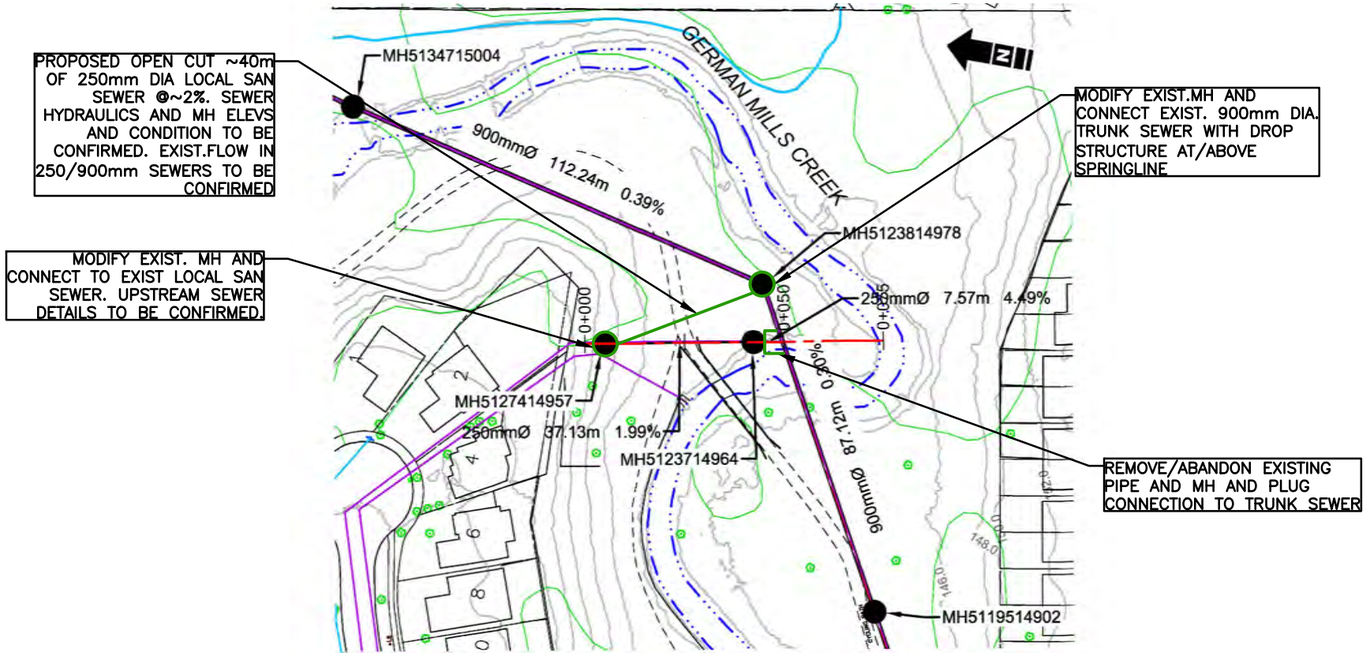
SCALE VALID ONLY FOR 24"x36" VERSION

GERMAN MILLS CREEK GEOMORPHIC MASTER PLAN

CITY OF TORONTO

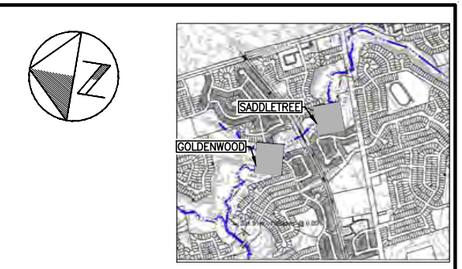
GOLDENWOOD ROAD LOCAL SEWER LOWERING

Scale 1:750 (0, 7.5, 14, 28)
Consultant File No. WW21011051
Figure No. 1



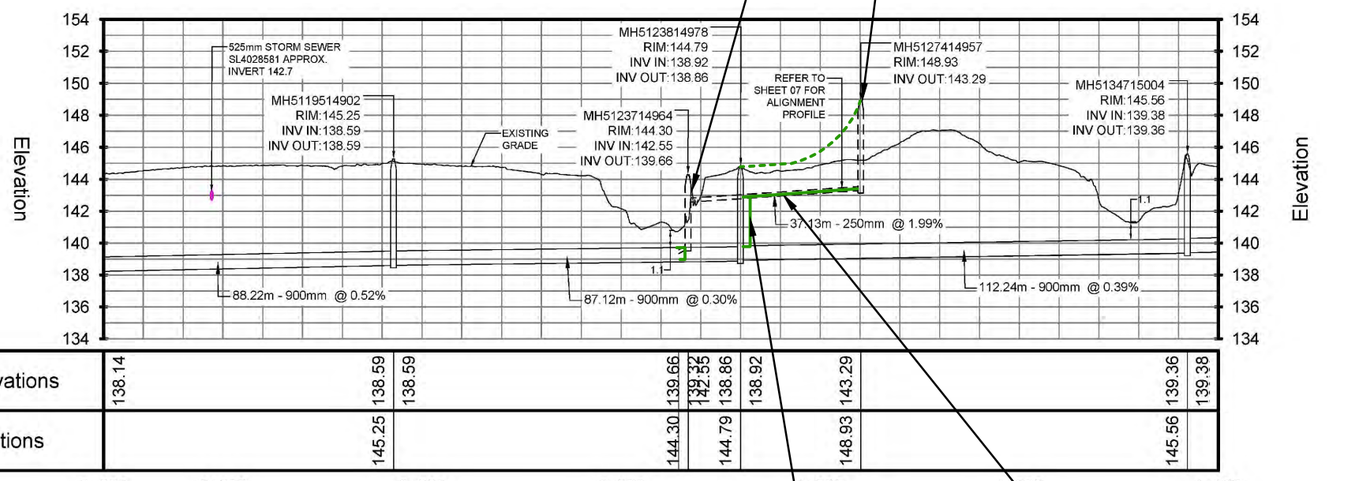
PLAN-LATERAL2

SCALE 1:750



KEYMAP

NOT TO SCALE



PROFILE-LATERAL2

HORIZONTAL SCALE 1:750
VERTICAL SCALE 1:375

LEGEND

- LOT LINE
- RIVER SHORELINE
- TRAIL
- VEGETATION
- EXISTING CONTOUR (2m INTERVAL)
- GRAVITY SEWER
- WATERMAIN
- ALIGNMENT
- SANITARY SEWER
- MANHOLE

Ref: Base plan from Drawing 32227–522 Drawing 04 Plan and Profile 0+820 to 1+000, Matrix Solutions Inc December 2021

SCALE VALID ONLY FOR 24"x36" VERSION

GERMAN MILLS CREEK GEOMORPHIC MASTER PLAN

CITY OF TORONTO

SADDLETREE DRIVE LOCAL SEWER ALIGNMENT

Scale 1:750 (0, 7.5, 14, 28)

Consultant File No. WW21011051

Figure No. 2

Plotted: 2022-12-09
Last Saved: 2022-12-09
Plotted By: shockings
Last Saved By: shockings
File: G:\2021\Projects\WW21011051-GermanMillsCreek EA\11 Reports\WW21011051-Fig 2.dwg

APPENDIX F-4
Evaluation of Alternatives

Project 1

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	3	3	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
		Criteria Subtotal		3.00	8.00	11.00	13.00
		Weighted Score (20% of final score)		4.00	10.67	14.67	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	3	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	2	4	5
		Criteria Subtotal		17.00	21.00	27.00	27.00
		Weighted Score (20% of final score)		9.71	12.00	15.43	15.43
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	3	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	4	2	2
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	2	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	2	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
		Criteria Subtotal		8.00	17.00	15.00	15.00
		Weighted Score (20% of final score)		6.40	13.60	12.00	12.00
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	3	5	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	3	5	4
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	2	4	4
		Criteria Subtotal		7.00	12.00	16.00	14.00
		Weighted Score (20% of final score)		7.00	12.00	16.00	14.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	3	5	4
	Climate Change Adaptation	Ability to satisfy regulatory mandates to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits	5	1	2	4	5
		Criteria Subtotal		8.00	13.00	15.00	13.00
		Weighted Score (20% of final score)		8.00	13.00	15.00	13.00
Score (Maximum of 100 points)				**35.11**	**61.27**	**73.10**	**71.76**

Project 2

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	4	4	3
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
		Criteria Subtotal		3.00	9.00	12.00	12.00
		Weighted Score (20% of final score)		4.00	12.00	16.00	16.00
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	3	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	2	4	5
		Criteria Subtotal		17.00	21.00	27.00	27.00
		Weighted Score (20% of final score)		9.71	12.00	15.43	15.43
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	3	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	4	2	2
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	2	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	2	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
		Criteria Subtotal		8.00	17.00	15.00	15.00
		Weighted Score (20% of final score)		6.40	13.60	12.00	12.00
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	3	4	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	3	5	4
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	2	4	4
		Criteria Subtotal		7.00	12.00	15.00	14.00
		Weighted Score (20% of final score)		7.00	12.00	15.00	14.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	4	5	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	2	4	5
		Criteria Subtotal		8.00	14.00	15.00	12.00
		Weighted Score (20% of final score)		8.00	14.00	15.00	12.00
Score (Maximum of 100 points)				**35.11**	**63.60**	**73.43**	**69.43**

Project 3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	4	4	3
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
		Criteria Subtotal		3.00	9.00	12.00	12.00
		Weighted Score (20% of final score)		4.00	12.00	16.00	16.00
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	4	5	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	4	3
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	3	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	5	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	4	3
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	2	4	5
		Criteria Subtotal		17.00	25.00	30.00	30.00
		Weighted Score (20% of final score)		9.71	14.29	17.14	17.14
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	4
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	4	3	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	2	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	3	2
		Criteria Subtotal		8.00	18.00	18.00	18.00
		Weighted Score (20% of final score)		6.40	14.40	14.40	14.40
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	3	4	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	3	5	4
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
		Criteria Subtotal		7.00	13.00	15.00	14.00
		Weighted Score (20% of final score)		7.00	13.00	15.00	14.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	4	5	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	2	4	5
		Criteria Subtotal		8.00	14.00	15.00	12.00
		Weighted Score (20% of final score)		8.00	14.00	15.00	12.00
Score (Maximum of 100 points)				**35.11**	**67.69**	**77.54**	**73.54**

Project 4

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	4	4	5
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
			Criteria Subtotal	3.00	9.00	12.00	14.00
			Weighted Score (20% of final score)	4.00	12.00	16.00	18.67
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
			Criteria Subtotal	17.00	22.00	26.00	27.00
			Weighted Score (20% of final score)	9.71	12.57	14.86	15.43
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	3	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	2	2
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
			Criteria Subtotal	8.00	21.00	15.00	15.00
			Weighted Score (20% of final score)	6.40	16.80	12.00	12.00
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	4	5	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	3	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
			Criteria Subtotal	7.00	16.00	14.00	13.00
			Weighted Score (20% of final score)	7.00	16.00	14.00	13.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	4	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
		Criteria Subtotal		8.00	17.00	14.00	11.00
		Weighted Score (20% of final score)		8.00	17.00	14.00	11.00
Score (Maximum of 100 points)				**35.11**	**74.37**	**70.86**	**70.10**

Project 5

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	4	4	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	4	4	4
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to maintain the sites.	5	1	3	4	4
		Criteria Subtotal		3.00	11.00	12.00	12.00
		Weighted Score (20% of final score)		4.00	14.67	16.00	16.00
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	4	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	3	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	3	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
		Criteria Subtotal		17.00	23.00	26.00	27.00
		Weighted Score (20% of final score)		9.71	13.14	14.86	15.43
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	3	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	3	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
		Criteria Subtotal		8.00	21.00	16.00	16.00
		Weighted Score (20% of final score)		6.40	16.80	12.80	12.80
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	4	5	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	3	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
		Criteria Subtotal		7.00	16.00	14.00	13.00
		Weighted Score (20% of final score)		7.00	16.00	14.00	13.00
Technical and Engineering Considerations	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3
	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
		Criteria Subtotal		8.00	16.00	14.00	11.00
		Weighted Score (20% of final score)		8.00	16.00	14.00	11.00
Score (Maximum of 100 points)				**35.11**	**76.61**	**71.66**	**68.23**

Project 6

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	4	4	5
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	4	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to maintain the sites.	5	1	3	4	4
			Criteria Subtotal	3.00	11.00	12.00	14.00
			Weighted Score (20% of final score)	4.00	14.67	16.00	18.67
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	4	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	3	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	3	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	2	3	4
			Criteria Subtotal	17.00	22.00	25.00	26.00
			Weighted Score (20% of final score)	9.71	12.57	14.29	14.86
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	3	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
			Criteria Subtotal	8.00	21.00	17.00	16.00
			Weighted Score (20% of final score)	6.40	16.80	13.60	12.80
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	4	5	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	3	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
			Criteria Subtotal	7.00	16.00	14.00	13.00
			Weighted Score (20% of final score)	7.00	16.00	14.00	13.00
Technical and Engineering Considerations	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3
	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	4	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
			Criteria Subtotal	8.00	17.00	14.00	11.00
			Weighted Score (20% of final score)	8.00	17.00	14.00	11.00
Score (Maximum of 100 points)				**35.11**	**77.04**	**71.89**	**70.32**

Project 7

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	5	5	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	4	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	3	4	4
			Criteria Subtotal	3.00	12.00	13.00	13.00
			Weighted Score (20% of final score)	4.00	16.00	17.33	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	2	1
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	3	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	2	4	5
			Criteria Subtotal	17.00	22.00	25.00	26.00
			Weighted Score (20% of final score)	9.71	12.57	14.29	14.86
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	3	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	2	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
			Criteria Subtotal	8.00	20.00	17.00	16.00
			Weighted Score (20% of final score)	6.40	16.00	13.60	12.80
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	2	4	3	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	5	5	4
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	4	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	2	4	4
			Criteria Subtotal	6.00	16.00	16.00	12.00
			Weighted Score (20% of final score)	6.00	16.00	16.00	12.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
		Criteria Subtotal		8.00	16.00	14.00	11.00
		Weighted Score (20% of final score)		8.00	16.00	14.00	11.00
Score (Maximum of 100 points)				**34.11**	**76.57**	**75.22**	**67.99**

Project 8

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	5	5	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	3	4	4
		Criteria Subtotal		3.00	11.00	13.00	13.00
		Weighted Score (20% of final score)		4.00	14.67	17.33	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	3	3	1
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	3	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	3	3	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
		Criteria Subtotal		17.00	21.00	27.00	26.00
		Weighted Score (20% of final score)		9.71	12.00	15.43	14.86
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	4	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	3	1
		Criteria Subtotal		8.00	21.00	19.00	16.00
		Weighted Score (20% of final score)		6.40	16.80	15.20	12.80
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	2	4	3	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	5	5	4
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	4	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
		Criteria Subtotal		6.00	17.00	16.00	12.00
		Weighted Score (20% of final score)		6.00	17.00	16.00	12.00

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3
	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
		Criteria Subtotal		8.00	16.00	14.00	11.00
		Weighted Score (20% of final score)		8.00	16.00	14.00	11.00
Score (Maximum of 100 points)				**34.11**	**76.47**	**77.96**	**67.99**

Project 9

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	1	5	5	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
			Criteria Subtotal	3.00	10.00	13.00	13.00
			Weighted Score (20% of final score)	4.00	13.33	17.33	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	1
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	3	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
			Criteria Subtotal	17.00	22.00	27.00	26.00
			Weighted Score (20% of final score)	9.71	12.57	15.43	14.86
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	4	3
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	3	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	2	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	3	1
			Criteria Subtotal	8.00	19.00	19.00	16.00
			Weighted Score (20% of final score)	6.40	15.20	15.20	12.80
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	2	4	3	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	3	4	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	4	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
			Criteria Subtotal	6.00	15.00	15.00	13.00
			Weighted Score (20% of final score)	6.00	15.00	15.00	13.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	4	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	4	3
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	2	4	4
		Criteria Subtotal		8.00	16.00	14.00	11.00
		Weighted Score (20% of final score)		8.00	16.00	14.00	11.00
Score (Maximum of 100 points)				**34.11**	**72.10**	**76.96**	**68.99**

Project 10

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	2	4	4	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	1	2	4	4
			Criteria Subtotal	4.00	9.00	12.00	13.00
			Weighted Score (20% of final score)	5.33	12.00	16.00	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	3	4	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	3	4	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	2	1
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
			Criteria Subtotal	17.00	22.00	25.00	26.00
			Weighted Score (20% of final score)	9.71	12.57	14.29	14.86
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	4	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	3	2
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	1	2	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	3	1
			Criteria Subtotal	8.00	20.00	18.00	15.00
			Weighted Score (20% of final score)	6.40	16.00	14.40	12.00
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	2	4	3	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	3	4	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	3	2
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
			Criteria Subtotal	6.00	15.00	14.00	12.00
			Weighted Score (20% of final score)	6.00	15.00	14.00	12.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	4	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	5	3	2
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	4
		Criteria Subtotal		8.00	17.00	13.00	10.00
		Weighted Score (20% of final score)		8.00	17.00	13.00	10.00
Score (Maximum of 100 points)				**35.45**	**72.57**	**71.69**	**66.19**

Project 11

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	2	3	3	4
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	1	3	4	5
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	2	3	4	4
		Criteria Subtotal		5.00	9.00	11.00	13.00
		Weighted Score (20% of final score)		6.67	12.00	14.67	17.33
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	2	4	5	5
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	2	4	5	5
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	4	3	2
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	1	2	4	5
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	1	3	5	4
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	4	3	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	1	3	4	5
		Criteria Subtotal		17.00	24.00	29.00	27.00
		Weighted Score (20% of final score)		9.71	13.71	16.57	15.43
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	2	5	2	2
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	1	5	2	2
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	1	4	4	5
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	2	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	3	4	2	1
		Criteria Subtotal		9.00	21.00	14.00	14.00
		Weighted Score (20% of final score)		7.20	16.80	11.20	11.20
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	3	4	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	2	4	5	5
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	1	5	4	3
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	1	3	4	4
		Criteria Subtotal		7.00	16.00	15.00	13.00
		Weighted Score (20% of final score)		7.00	16.00	15.00	13.00

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	1	5	4	3
	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	4	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	1	3	5	4
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	1	3	4	5
		Criteria Subtotal		8.00	15.00	15.00	13.00
		Weighted Score (20% of final score)		8.00	15.00	15.00	13.00
Score (Maximum of 100 points)				**38.58**	**73.51**	**72.44**	**69.96**

Project 12

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Physical Environment and Toronto Water Infrastructure Risk	Risk Assessment	Ability to reduce the immediate risk to Toronto Water infrastructure caused by watercourse erosion.	5	3	3	3	3
	Erosion Hazard	Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	5	3	3	3	3
	Flood Hazard	Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to	5	3	3	3	3
		Criteria Subtotal		9.00	9.00	9.00	9.00
		Weighted Score (20% of final score)		12.00	12.00	12.00	12.00
Natural Environment	Geomorphic Form & Function	Ability to improve geomorphic stability and natural components of watercourse function.	5	3	2	3	3
	Improvements to Aquatic Habitat/Community	Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbudity (water quality), and passage/connectivity.	5	3	3	3	3
	Minimize Impacts to Aquatic Habitat/Community	Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	5	5	3	3	1
	Improvements to Water Quality and Groundwater Connectivity	Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	5	3	3	4	4
	Improvements to Terrestrial Habitat	Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	5	3	3	2	2
	Minimize Impacts to Terrestrial Habitat	Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others Ability to balance tree removals against flood hazards Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	5	5	3	2	1
	Climate Change Resiliency	Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	5	3	3	3	3
		Criteria Subtotal		25.00	20.00	20.00	17.00
		Weighted Score (20% of final score)		14.29	11.43	11.43	9.71
Social and Cultural Environment	Landowner and Public Acceptance	Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	5	3	3	3	3
	Short-term Impacts to Community	Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	5	3	2	1	1
	Long-term Impacts to Community	Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	5	3	2	2	3
	Flood Hazard to Public	Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	5	3	3	4	4
	Cultural Heritage and Archaeological Resources	Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	5	4	2	1	1
		Criteria Subtotal		16.00	12.00	11.00	12.00
		Weighted Score (20% of final score)		12.80	9.60	8.80	9.60
Economic Environment	Capital Cost	Estimated capital costs for implementing the alternative solution Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	5	4	3	2	1
	Lifecycle Cost Consideration	Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	5	3	2	3	4
	Cost Effectiveness (Economy of Scale)	Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	5	3	4	2	1
	Climate Change Risk	Ability to buffer against financial uncertainties of climate change.	5	2	3	3	4
		Criteria Subtotal		12.00	12.00	10.00	10.00
		Weighted Score (20% of final score)		12.00	12.00	10.00	10.00
	Regulatory Agency Acceptance	Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	5	3	2	1	1

Category	Evaluation Criteria	Indicator	Score	Alt. 1 - Do nothing	Alt. 2 - Local Improvement	Alt. 3 - Local Improvements with FP Connection	Alt. 4 Reach Scale or Longer Works
Technical and Engineering Considerations	Ease of Implementation/Constructability	Potential impacts to surrounding infrastructure during and after construction.	5	5	3	2	1
	Resource Effectiveness	Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	5	3	3	4	4
	Climate Change Adaptation	Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	5	3	3	2	2
		Criteria Subtotal		14.00	11.00	9.00	8.00
		Weighted Score (20% of final score)		14.00	11.00	9.00	8.00
Score (Maximum of 100 points)				**65.09**	**56.03**	**51.23**	**49.31**

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Physical Environment and Toronto Water Infrastructure Risk

Component	Criteria	Alternative 1: Do Nothing/Emergency Works	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Physical Environment and Toronto Water Infrastructure Risk	**Risk Assessment** • Ability to reduce the immediate risk to Toronto Water (TW) infrastructure caused by watercourse erosion.	• Does not address problem statement of protecting TW infrastructure from erosion • No erosion protection provided, and continued erosion/scour of channel bed and banks will result in exposure of TW infrastructure over time. • Emergency works may be evaluated, resulting in limited, site-localized application of erosion protection.	• Highest depth of cover over sewer crossing at Project 7 (2 m), however sewer relocation required. • Lower depth of cover over sewer crossing at Project 11 (2.31 m), relative to Alternative 4. • Lower depth of cover at Project 1 (1.49 m), sewer relocation required, relative to Alternative 4. • Exposed MH at Project 1 to be removed. • Armourstone protection included for at-risk MH sites • Bank treatments incorporated into design at localized areas to stabilize degraded banks in proximity to TW infrastructure.	• Highest depth of cover over sewer crossing at Project 7 (2 m), however sewer relocation required. • Lower depth of cover over sewer crossing at Project 11 (2.31 m), relative to Alternative 4. • Lower depth of cover at Project 1 (1.49 m), sewer relocation required, relative to Alternative 4. • Exposed MH at Project 1 to be removed. • Armourstone protection included for at-risk MH sites • Bank treatments incorporated into design at localized areas to stabilize degraded banks in proximity to TW infrastructure. • Reduction in erosion over Alternative 2 by improving floodplain connectivity	• Lower depth of cover over crossing at Project 7 (1.15 m), sewer relocation not required (but preferred). • Highest depth of cover over crossing at Project 11 (2.57 m). • Highest depth of cover over sewer crossing at Project 1 (1.81 m), sewer relocation required. • Exposed MH at Project 1 to be removed. • Armourstone protection included for at-risk MH sites • Reach-scale bank treatments incorporated into design to stabilize degraded banks in proximity to TW infrastructure. • Reach-scale works allow for the creek to be realigned the furthest away from maintenance holes.
	Erosion Hazard • Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	• No alteration to channel corridor will result in the higher erosion rates and soonest TTC of TW infrastructure. • Emergency works may be evaluated to stabilize specific sites. .	• Lesser degree of alteration to channel corridor (channel alignment and cross section) except in longitudinally isolated, relatively short segments (local works). Potential for erosion to continue, possibly at accelerated rates in untouched sections. • Bank protection proposed in brief segments and focused around TW infrastructure however potentially less sustainable over longer term relative to Alternatives 3 and 4 • Isolated floodplain enhancements longitudinally will create constriction and expansion under higher flows. Potentially creating zones of instability at transitions.	• Increased floodplain connectivity and access resulting in reduced lateral migration/erosion rates and higher time to contact (TTC) of TW infrastructure.	• Establishment of reach scale natural corridor in addition to increased floodplain connectivity will allow for the greatest reduction in erosion rates and longer time to contact (TTC) of TW infrastructure.
	Flood Hazard • Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to maintain the sites.	• No floodplain enhancements are provided, therefore no reduction in flood hazard. • Emergency works may be evaluated, and flood hazard relief may occur within the immediate site, depending on the design outcome..	• Opportunity for minor floodplain enhancements over shorter segments through benching and grading. • Isolated floodplain enhancements longitudinally will limit ability to reduce flood hazard overall.	• Opportunity for major floodplain enhancements through continuous floodplain connectivity; connecting several project sites longitudinally target floodplain corridor width of 15-25m dependent on area constraints and a balance between tree/soil removals and flood capacity.	• Opportunity for major floodplain enhancements through full scale channel corridor restoration and continuous floodplain connectivity throughout; target floodplain corridor width of 15-25m dependent on constraints and design sinuosity and a balance between tree/soil removals and flood capacity.
Physical Environment and TW Infrastructure Risk Summary	●	● ● ●	● ● ● ●	● ● ● ● ●	

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Natural Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Natural Environment	**Geomorphic Form and Function** • Ability to improve geomorphic stability and natural components of watercourse function.	• Allows for no improvement in geomorphic stability. • Continued channel bed and bank erosion will result in further degradation, and geomorphic instability.	• Allows for improvement in geomorphic stability through channel restoration, but limited longitudinally to localized areas. • Continued channel bed and bank erosion located outside localized stabilization areas will result in further degradation of geomorphic stability. Potential to cause instability of the treatment areas over the longer term. • Potential instability at upstream and downstream transitions under greater flow events where floodplain area changes.	• Allows for some improvement in geomorphic stability compared to Alternative 2 by establishing continuous bankfull floodplain connectivity, longitudinally between channel design sites. • Reach scale floodplain connectivity reduces potential impacts of expansion and contraction between design sites • Allows for natural bankfull channel development in connecting reaches that are currently of a good geomorphic function, with no TW asset risks	• Establishment of reach scale natural corridor allows for greatest ability to improve geomorphic stability by restoring natural channel condition in closer equilibrium with prevailing flow and sediment transport regimes. • Design incorporates sinuosity, continuous pool-riffle sequences, and continuous floodplain connectivity further promoting stability.
	Improvements to Aquatic Habitat/Community • Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbidity (water quality), and passage/connectivity.	• Existing channel maintains some aquatic habitat value. • Lack of floodplain connectivity increases erosion rates and sediment loading from immediate channel (increased turbidity).	• Lack of floodplain connectivity throughout increases erosion rates and sediment entering the creek (increased turbidity), at sites without floodplain access. • Opportunity for some enhanced habitat features including short pool-riffle sequences and localized vegetated bank treatments.	• Establishment of continuous floodplain connectivity, longitudinally, reduces overall in stream erosion and sediment entering the creek (reduced turbidity). • Opportunity for some enhanced habitat features including short pool riffles sequences and localized vegetated bank treatments.	• Establishment of reach scale natural corridor allows for greatest ability to improve aquatic habitat by restoring higher quality habitat and more stable habitat features along the greatest length of creek. • Enhanced habitat features include design of continuous pool riffle sequences, longer overhanging vegetation, substrate suitable to aquatic species present, and improved water quality by re-establishing floodplain connectivity.
	Minimize Impacts to Aquatic Habitat/Community • Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	• Least amount of construction disturbance. No construction. • If emergency works explored, disturbance localized to issue site. • Existing channel erosion and instability do negatively impact aquatic habitat.	• Construction works will contain some in water works in localized areas	• Construction works will contain in water works in localized areas and out of water works in floodplain.	• Extensive in-water work required for construction of reach scale channel design, resulting in significant disturbance of aquatic habitat and species.
	Improvements to Water Quality and Groundwater Connectivity • Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	• Allows for no improvement as no enhancements to water quality are provided.	• Lack of floodplain connectivity beyond local works areas increases erosion rates and sediment entering the creek (increased turbidity). • Local works do not adequately address entrenchment and widespread erosion issues.	• Establishment of continuous floodplain connectivity reduces in stream erosion and sediment entering the creek (reduced turbidity). • Does not include continuity in improvements to channel stability of bed/bank materials and morphology in between local works.	• Establishment of reach scale natural corridor allows for greatest improvements through improved floodplain connectivity and reduced erosion, resulting in the least amount of sediment entering the creek.
	Improvements to Terrestrial Habitat • Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	• Allows for no improvement as no enhancements to terrestrial habitat are provided.	• Allows for limited improvement as improvements will be within areas of local works and have limited benefits for habitat connectivity.	• Allows for more strategic restoration and tree preservation plans balanced with floodplain regrading objectives. • Restoration area not sufficient for tree restoration plan at 3:1 (replacement:removal) . Offsite areas required • Restoration plans substantial, and can provide improvement. But over an area of less disturbance than Alternative 4.	• Largest amount of disturbance and tree removals. • Restoration area not sufficient for tree restoration plan at 3:1 (replacement:removal). Offiste areas required. • Restoration plan would need to be substantial to provide overall improvement.

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
	Minimize Impacts to Terrestrial Habitat • Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others. • Ability to balance tree removals against flood hazards • Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	• No disturbance as there are no tree removals or disturbance to the terrestrial environment. • Emergency works may result in limited impacts to terrestrial habitat. • Small amount of impact as continued erosion and bank stability will result in loss of habitat and trees along top of slope.	• Continued erosion and bank instability outside localized areas will result in loss of habitat and trees along top of slope • Disturbance and tree removals primarily within localized areas where channel is undergoing realignment. • Low amount of disturbance to terrestrial environment outside of localized area. • Habitat enhancements and compensation required at detailed design. **Estimated Tree Removals: 560 – 780**	• Disturbance and tree removals within localized areas of channel realignment and also within floodplain connectivity zones. • Habitat enhancements and compensation required at detailed design. • Tree removals can be strategically retained and balanced with floodplain regrading objectives. **Estimated Tree Removals: 860 – 1470**	• Largest amount of disturbance and tree removals to accommodate reach-scale channel realignment and floodplain restoration. • Habitat enhancements and compensation required at detailed design. **Estimated Tree Removals: 1020 – 1680**
	Climate Change Resiliency • Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	• Existing channel conditions are not in equilibrium with the prevailing flow and sediment regime, therefore will not be resilient to climate change impacts.	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system resilience to uncertain changes in climate.	• Reduced flooding impacts through reach-scale floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion. • Reach scale connections for the floodplain allows for increased degree of resiliency against more frequent, and higher magnitude events compared to Alternative 2.	• Greatest improvement through increasing system, reach-based continuity in improved channel stability. Alows for increased degree of resiliency against more frequent, and higher magnitude events compared to Alternative 3. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion.
Natural Environment Summary	●	● ●	● ● ● ●	● ● ● ● ●

		Least Preferred		Less Preferred		Neutral		More Preferred		Most Preferred
Legend		●		● ●		● ● ●		● ● ● ●		● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Social and Cultural Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Social and Cultural Environment	**Landowner and Public Acceptance** • Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	• No construction impacts. • Emergency works may be evaluated, which will have limited impacts. • Continued erosion along riverbank will result in potential loss of pedestrian trail over time, and risk to park users.	• Addresses project objectives of protecting public infrastructure from erosion, while minimizing the amount of impacts to the recreational and terrestrial resources (i.e., fewer tree removals property requirements, temporary construction impacts – noise, access, dust).	• Localized channel restoration and reach scale floodplain connectivity will improve the system longer-term, however the overall benefit of extensive works for long-term sustainability at local sites may not be fully realized by the public • High amount of tree removals, property requirements/easements for site access, and temporary construction impacts (noise, access, dust).	• Reach-scale channel restoration and floodplain connectivity will improve the system longer-term, however the overall benefit of extensive works for long-term sustainability at local sites may not be fully realized by the public • Highest amount of tree removals, property requirements, and temporary construction impacts (noise, access, dust).
	Short-term Impacts to Community • Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	• No construction impacts. • Emergency works may be evaluated, which will have limited impacts. • Continued erosion along riverbank will result in loss of pedestrian trail over time.	• Addresses project objectives of protecting public infrastructure from erosion, while minimizing the amount of impacts to the recreational and terrestrial resources (i.e., fewer tree removals property requirements, temporary construction impacts – noise, access, dust).	• High amount of short-term impacts - tree removals, property requirements, and temporary construction impacts (noise, access, dust).	• Highest amount of short-term impacts - tree removals, property requirements, and temporary construction impacts (noise, access, dust).
	Long-term Impacts to Community • Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	• No long-term positive impacts as no works are proposed. • Continued erosion along riverbank will result in loss of public pathway over time.	• Addresses risks in localized areas. However, areas not subject to design will continue to erode and decrease the sustainability of design in the newly constructed areas.	• Greater long-term positive impacts providing benefits to the creek and trail system by restoring natural channel conditions in localized areas in addition to widening the floodplain for better connectivity. • Will substantially reduce erosion long term through floodplain connectivity, and enhance sustainability of design segments and non design segments.	• Greatest long-term impacts providing benefits to the creek and trail system by restoring natural channel conditions reach-scale. • Provides the best overall environmental improvements (geomorphic form/function, water quality, and aquatic/terrestrial habitat) and aesthetic since it is reach-scale. • Will substantially reduce erosion long term through restoration design and floodplain connectivity.
	Flood Hazard to Public • Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	• No floodplain enhancements are provided, therefore no reduction in flood hazard to public. • Pedestrian trail and bridges will remain at risk.	• Opportunity for minor floodplain enhancements in localized areas which has potential to reduce flood extents locally. • No continuity in floodplain connectivity/access and stabilization design; without extending these, erosion will likely reoccur.	• Opportunity for major floodplain enhancements through continuous floodplain connectivity; target floodplain corridor width of 15-25m dependent on area • Reduced flood hazard as floodplain area expanded along bankfull channel (design and natural sections)	• Opportunity for major floodplain enhancements through continuous floodplain connectivity and reach-scale channel design; target floodplain corridor width of 15-25m dependent on area • Reduced flood hazard as floodplain area expanded along designed bankfull channel
	Cultural Heritage and Archaeological Resources • Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	• No construction impacts • Emergency works may be evaluated, which will have limited impacts. • Continued erosion throughout corridor may result in exposure of cultural heritage or archaeological resources (if present). • No identified impacts to Indigenous treaty rights or issues.	• Continued erosion throughout corridor may result in exposure of cultural heritage or archaeological resources (if present). • Area of disturbance limited to local works, with potential for disturbance to cultural heritage and archaeological resources.. • No identified impacts to Indigenous treaty rights or issues.	• Large amount of disturbance to accommodate localized channel realignment and floodplain restoration pose threat of exposing cultural heritage or archaeological resources. • No identified impacts to Indigenous treaty rights or issues.	• Largest amount of to accommodate reach-scale channel realignment and floodplain restoration pose greatest threat of exposing cultural heritage or archaeological resources. • No identified impacts to Indigenous treaty rights or issues.
Social and Cultural Environment Summary	●	● ● ● ● ●	● ● ● ●	● ● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Economic Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Economic Environment	**Capital Cost** • Estimated capital costs for implementing the alternative solution. • Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. • Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material • Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	• No capital investment • Emergency works may be evaluated, requiring relatively low capital investment. But may require frequent maintenance. • Significant costs will be incurred if there are catastrophic losses of infrastructure.	• Lower capital investment, while significantly reducing risks of catastrophic losses of infrastructure and ongoing maintenance/emergency works.	• High capital cost for construction. • Hight tree removals, and restoration. Tree plantings likely required off site to meet 3:1 (plantings:removals) restoration requirements. • High excess soils, potentially high costs depending on disposal requirements.	• Highest capital cost to implement reach-scale works • Highest tree removals, and restoration. Tree plantings likely required off site to meet 3:1 (plantings:removals) restoration requirements. • Greatest excess soils. Potentially high costs depending on disposal requirements.
	Lifecycle Cost Consideration • Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	• Highest long-term reoccurring costs, as only emergency works may be considered. • Without extending the length of creek stabilization, the same issues will occur.	• Addresses some chronic erosion issues through localized channel realignment and bank stabilization • Potential for shorter lifespan compared to Alternatives 3 and 4 in case channel adjustment in non-design reaches destabilizes local works sites	• Addresses chronic erosion through localized channel realignment and bank stabilization issues in addition to floodplain connectivity at reach-scale with limited maintenance.	• Best addresses chronic erosion issues by restoring self-sustaining system with a more coherent channel morphology and floodplain connectivity at reach-scale with limited maintenance.
	Cost Effectiveness (Economy of Scale) • Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	• No improvements proposed. • Emergency works may be evaluated. Cost effectiveness will depend on number of sites addressed through emergency works.	• Provides stabilization in localized areas, however each improvement will be completed separately costing more, • Local works allow for multiple improvements to be completed by clustering project sites into local works, but mostly limited to completing each local works site by prioritization. • Less opportunities for cost sharing with other infrastructure owners where sites are not combined into single projects such as alternative 3.	• Provides adequate protection to critical infrastructure with a lesser cost and environmental/social disturbance since channel bed modifications are not reach-scale. • Ability for multiple improvements to be completed together, by combining Local works sites with floodplain connections, and combine lesser priority sites with greater priority sites. • Provides ability to cost share over more project sites.	• Provides the most protection to critical infrastructure, however, with higher environmental/social disturbance and cost since channel bed modifications are reach-scale. • Reach scale works combine all projects sites into one solutions. However, project likely to be phased or segmented due to costs and cost sharing opportunities. • Provides ability to cost share over more project sites.

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
	Climate Change Risk • Ability to buffer against financial uncertainties of climate change.	• No improvements proposed. • Emergency works may be evaluated, but unlikely to be sustainable against climate change if localised to issue site. • Existing channel conditions are not in equilibrium with the prevailing flow and sediment regime, therefore will result in costs associated with impacts to the creek corridor and TW infrastructure.	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system and will only temporarily buffer against climate change.	• Reduced flooding impacts through reach-scale floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion and costs associated with the uncertainties of climate change.	• Greatest improvement through increasing system, reach-based continuity in improved channel stability. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing the greatest amount of erosion and costs associated with the uncertainties of climate change.
Economic Environment Summary		●	● ● ● ● ●	● ● ● ●	● ● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Technical and Engineering Considerations

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Technical and Engineering Considerations	**Regulatory Agency Acceptance** • Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	• No construction impacts. • Emergency works may be evaluated, with minimal impact (relative). However, regulatory agencies likely to prefer holistic solutions. • Continued erosion along riverbank will result in loss of pedestrian trail over time	• Addresses project objectives of protecting TW infrastructure from erosion, while minimizing the amount of impacts to terrestrial resources (i.e., fewer tree removals, permitting, etc.). • Option cannot increase floodlines for TRCA approvals.	• Localized channel restoration and reach scale floodplain connectivity will improve the system longer-term, however regulatory agencies may not be as supportive given the larger footprint of disturbance and time to construct. • High amount of tree removals and permitting. • TRCA more supportive of reduced flooding impacts.	• Reach-scale channel restoration and floodplain connectivity will improve the system longer-term, however regulatory agencies may not be as supportive given the larger footprint of disturbance and time to construct. • Highest amount of tree removals and permitting. • TRCA more supportive of reduced flooding impacts.
	Ease of Implementation/Constructability • Potential impacts to surrounding infrastructure during and after construction. • Ability to limit tree removals and excess soils • Soils estimated based on an assumed mean depth of 1.5 m	• No construction related impacts. • Emergency works may be evaluated, likely to have limited, localized potential impacts during and after construction.	• Lowest chance of potential utility challenges in areas where channel bed modifications are proposed, to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Smallest footprint of disturbance poses less impacts to surrounding infrastructure, however there is still risk of TW infrastructure being eroded out with only localized design. **Estimated Excess Soils: 10060 to 15093 m^3**	• Potential utility challenges in areas where channel bed modifications are proposed to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Large footprint of disturbance may pose some impacts to surrounding infrastructure **Estimated Excess Soils: 16153 to 25724 m^3**	• Greatest chance of potential utility challenges in areas where channel bed modifications are proposed to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Largest footprint of disturbance may pose some impacts to surrounding infrastructure. **Estimated Excess Soils: 18957 to 30115 m^3**
	Resource Effectiveness • Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	• No improvements proposed • Emergency works more likely to be completed separately based on risk/priority • No tree removals/plantings	• Improvements are localized to each project area, with a clustering of issue sites. • Low amount of tree removals • Permitting greater based on each site being completed separately • Engineering greater due to each site being completed separately. Possibly multiple consultants/designers.	• Provides multiple improvements at once, while reducing the area that would require permitting and/or post-construction monitoring • By connecting local works sites, greater efficiency permitting and approvals • Moderate amount of tree removals. Off-site compensations likely • Projects may be better phased than Alternatives 2 and 4, as local works sites are connected through floodplain, but complexity of design is less.	• Provides greatest number of improvements, however, increases permitting and/or monitoring requirements based on disturbance of larger footprint • Required permitting depends on phasing of reach scale corridor works. • Greatest amount of tree removals. Off site compensations likely. • Engineering likely to be phased due to extent of reach works. Multiple projects and bids, perhaps multiple consultant/designers.

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A1: Evaluation of Alternatives – Alternative 2 Preferred, Applies to Projects 4, 5, 6, 7, 10, 11

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
	Climate Change Adaptation • Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	• No mandates addressed • Emergency works may be evaluated, unlikely to have long-term benefits or resiliency. Limited habitat benefits. • Continued degradation anticipated at potentially accelerated rates in response to climate change.	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system. • Will not protect the channel corridor from flooding or erosion long term in response to climate change.	• Will likely satisfy regulatory mandates through reduced flooding impacts with reach-scale floodplain connectivity • Channel will be able to convey higher flows in floodplain, reducing erosion and costs associated with the uncertainties of climate change.	• Most likely to satisfy regulatory mandates through increasing system, reach-based continuity in improved channel stability, which provides the greatest benefits. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing the greatest amount of erosion
Technical and Engineering Considerations Summary		●	● ● ● ● ●	● ● ●	● ●

Component	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Physical Environment and Toronto Water Infrastructure Risk	●	● ● ●	● ● ● ●	● ● ● ● ●
Natural Environment	●	● ●	● ● ● ●	● ● ● ● ●
Social and Cultural Environment	●	● ● ● ● ●	● ● ● ●	● ● ●
Economic Environment	●	● ● ● ● ●	● ● ● ●	● ● ●
Technical and Engineering Considerations	●	● ● ● ● ●	● ● ●	● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Physical Environment and Toronto Water Infrastructure Risk

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Physical Environment and Toronto Water Infrastructure Risk	**Risk Assessment** • Ability to reduce the immediate risk to Toronto Water (TW) infrastructure caused by watercourse erosion.	• Does not address problem statement of protecting TW infrastructure from erosion • No erosion protection provided, and continued erosion/scour of channel bed and banks will result in exposure of TW infrastructure over time. • Emergency works may be evaluated, resulting in limited, site-localized application of erosion protection.	• Highest depth of cover (DOC) over sewer crossing at Project 2 (2.27 m) Project 8 (1.14 m), Project 9 (1.60m); DOC exceeds 1 m at all sewer crossing locations. • Bank treatments incorporated into design to stabilize degraded banks in proximity to TW infrastructure. • No score of 5 (Most preferred) as no alternative will guarantee full elimination of channel erosion.	• Highest depth of cover (DOC) over sewer crossing at Project 2 (2.27 m) Project 8 (1.14 m), Project 9 (1.60m); DOC exceeds 1 m at all sewer crossing locations. • Bank treatments incorporated into design to stabilize degraded banks in proximity to TW infrastructure. • Reduction in erosion over Alternative 2 by improving floodplain connectivity • No score of 5 (Most preferred) as no and alternative will eliminate watercourse erosion.	• Higher depth of cover over sewer crossing locations than existing depth of cover, however generally not higher than Alternatives 2 and 3 (Project 2 – 1.65 m; Project 8 – 1.04 m; Project 9 – 1.17 m).
	Erosion Hazard • Ability to reduce long-term erosion hazard risks (including slope stability) within the channel.	• No alteration to channel corridor will result in the higher erosion rates and soonest TTC of TW infrastructure. • Emergency works may be evaluated to stabilize specific sites. .	• Lesser degree of alteration to channel corridor (channel alignment and cross section) except in longitudinally isolated, relatively short segments (local works). Potential for erosion to continue, possibly at accelerated rates in untouched sections. • Bank protection proposed in brief segments and focused around TW infrastructure however potentially less sustainable over longer term relative to Alternatives 3 and 4 • Isolated floodplain enhancements longitudinally will create constriction and expansion under higher flows. Potentially creating zones of instability at transitions	• Increased floodplain connectivity and access resulting in reduced lateral migration/erosion rates and higher time to contact (TTC) of TW infrastructure.	• Establishment of reach scale natural corridor in addition to increased floodplain connectivity will allow for the greatest reduction in erosion rates and longer time to contact (TTC) of TW infrastructure.
	Flood Hazard • Ability of alternative to reduce adverse impacts of flooding in an urban environment, minimizing risk to infrastructure. In particular in the overbank zone of the creek, where increased flooding may minimize access required to maintain the sites.	• No floodplain enhancements are provided, therefore no reduction in flood hazard. • Emergency works may be evaluated, and flood hazard relief may occur within the immediate site, depending on the design outcome..	• Opportunity for minor floodplain enhancements over shorter segments through benching and grading. • Isolated floodplain enhancements longitudinally will limit ability to reduce flood hazard overall. •	• Opportunity for major floodplain enhancements through continuous floodplain connectivity; connecting several project sites longitudinally target floodplain corridor width of 15-25m dependent on area constraints and a balance between tree/soil removals and flood capacity.	• Opportunity for major floodplain enhancements through full scale channel corridor restoration and continuous floodplain connectivity throughout; target floodplain corridor width of 15-25m dependent on constraints and design sinuosity and a balance between tree/soil removals and flood capacity.
Physical Environment and TW Infrastructure Risk Summary	●	● ● ●	● ● ● ●	● ● ● ● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Natural Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Natural Environment	**Geomorphic Form and Function** • Ability to improve geomorphic stability and natural components of watercourse function.	• Allows for no improvement in geomorphic stability. • Continued channel bed and bank erosion will result in further degradation of geomorphic stability.	• Allows for improvement in geomorphic stability through channel restoration, but limited longitudinally to localized areas. • Continued channel bed and bank erosion located outside localized stabilization areas will result in further degradation of geomorphic stability. Potential to cause instability of the treatment areas over the longer term. • Potential instability at upstream and downstream transitions under greater flow events where floodplain area changes.	• Allows for some improvement in geomorphic stability compared to Alternative 2 by establishing continuous bankfull floodplain connectivity, longitudinally between channel design sites. • Reach scale floodplain connectivity reduces potential impacts of expansion and contraction between design sites • Allows for natural bankfull channel development in connecting reaches that are currently of a good geomorphic function, with no TW asset risks	• Establishment of reach scale natural corridor allows for greatest ability to improve geomorphic stability by restoring natural channel condition in closer equilibrium with prevailing flow and sediment transport regimes. • Design incorporates sinuosity, continuous pool-riffle sequences, and continuous floodplain connectivity further promoting stability.
	Improvements to Aquatic Habitat/Community • Greater improvements to fish and aquatic habitat/community including substrate, overhanging vegetation, turbidity (water quality), and passage/connectivity.	• Existing channel maintains some aquatic habitat value. • Lack of floodplain connectivity increases erosion rates and sediment entering the creek (increased turbidity).	• Lack of floodplain connectivity throughout increases erosion rates and sediment entering the creek (increased turbidity), at sites without floodplain access. • Opportunity for some enhanced habitat features including short pool-riffle sequences and localized vegetated bank treatments.	• Establishment of continuous floodplain connectivity, longitudinally, reduces overall in stream erosion and sediment entering the creek (reduced turbidity). • Opportunity for some enhanced habitat features including short pool riffles sequences and localized vegetated bank treatments.	• Establishment of reach scale natural corridor allows for greatest ability to improve aquatic habitat by restoring higher quality habitat and more stable habitat features along the greatest length of creek. • Enhanced habitat features include design of continuous pool riffle sequences, longer overhanging vegetation, substrate suitable to aquatic species present, and improved water quality by re-establishing floodplain connectivity.
	Minimize Impacts to Aquatic Habitat/Community • Limit disturbance to fish and aquatic habitat/populations (temporary or permanent loss) including species at risk.	• Least amount of construction disturbance. No construction. • If emergency works explored, disturbance localized to issue site. • Existing channel erosion and instability do negatively impact aquatic habitat..	• Construction works will contain some in water works in localized areas.	• Construction works will contain in water works in localized areas and out of water works in floodplain..	• Extensive in-water work required for construction of reach scale channel design, resulting in significant disturbance of aquatic habitat and species.
	Improvements to Water Quality and Groundwater Connectivity • Ability to improve surface water quality and groundwater through reduced erosion and improved floodplain connectivity.	• Allows for no improvement as no enhancements to water quality are provided.	• Lack of floodplain connectivity beyond local works areas increases erosion rates and sediment entering the creek (increased turbidity). • Local works do not adequately address entrenchment and widespread erosion issues.	• Establishment of continuous floodplain connectivity reduces in stream erosion and sediment entering the creek (reduced turbidity). • Does not include continuity in improvements to channel stability of bed/bank materials and morphology in between local works.	• Establishment of reach scale natural corridor allows for greatest improvements through improved floodplain connectivity and reduced erosion, resulting in the least amount of sediment entering the creek.
	Improvements to Terrestrial Habitat • Ability to improve connectivity, diversity and sustainability of terrestrial habitat.	• Allows for no improvement as no enhancements to terrestrial habitat are provided.	• Allows for limited improvement as improvements will be within areas of local works and have limited benefits for habitat connectivity	• Allows for more strategic restoration and tree preservation plans balanced with floodplain regrading objectives. • Restoration area not sufficient for tree restoration plan at 3:1 (replacement:removal) . Offsite areas required • Restoration plans substantial, and can provide improvement. But over an area of less disturbance than Alternative 4.	• Largest amount of disturbance and tree removals. • Restoration area not sufficient for tree restoration plan at 3:1 (replacement:removal). Offiste areas required. • Restoration plan would need to be substantial to provide overall improvement.

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
	Minimize Impacts to Terrestrial Habitat • Ability to limit disturbance to existing woodlots/other terrestrial habitat and natural heritage features and vegetation by type – including ESAs, ANSIs, wildlife corridors, species at risk, and others. • Ability to balance tree removals against flood hazards • Evaluated through a comparison of area of disturbance in ha based on conceptual grading limits (18 to 24 m wide corridor)	• No disturbance as there are no tree removals or disturbance to the terrestrial environment. • Emergency works may result in limited impacts to terrestrial habitat. • Small amount of impact as continued erosion and bank stability will result in loss of habitat and trees along top of slope.	• Continued erosion and bank instability outside localized areas will result in loss of habitat and trees along top of slope • Disturbance and tree removals primarily within localized areas where channel is undergoing realignment. • Low amount of disturbance to terrestrial environment outside of localized area. • Habitat enhancements and compensation required at detailed design. **Estimated Tree Removals: 560 – 780**	• Disturbance and tree removals within localized areas of channel realignment and also within floodplain connectivity zones. • Habitat enhancements and compensation required at detailed design. • Tree removals can be strategically retained and balanced with floodplain regrading objectives. **Estimated Tree Removals: 860 – 1470**	• Largest amount of disturbance and tree removals to accommodate reach-scale channel realignment and floodplain restoration. • Habitat enhancements and compensation required at detailed design. **Estimated Tree Removals: 1020 – 1680**
	Climate Change Resiliency • Ability to adapt to, and be resilient to a changed hydrological flow regime and accompanied geomorphic response due to climate change.	• Existing channel conditions are not in equilibrium with the prevailing flow and sediment regime, therefore will not be resilient to climate change impacts..	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system resilience to uncertain changes in climate.	• Reduced flooding impacts through reach-scale floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion. • Reach scale connections for the floodplain allows for increased degree of resiliency against more frequent, and higher magnitude events compared to Alternative 2..	• Greatest improvement through increasing system, reach-based continuity in improved channel stability. Alows for increased degree of resiliency against more frequent, and higher magnitude events compared to Alternative 3. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion..
Natural Environment Summary	●	● ●	● ● ● ●	● ● ● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Social / Cultural & Socio-Economic Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Social and Cultural Environment	**Landowner and Public Acceptance** • Ability to be accepted by landowners and community including First Nations and Indigenous consultation. This includes acceptance of impacts to large trees.	• No construction impacts. • Emergency works may be evaluated, which will have limited impacts. • Continued erosion along riverbank will result in potential loss of pedestrian trail over time, and risk to park users.	• Addresses project objectives of protecting public infrastructure from erosion, while minimizing the amount of impacts to the recreational and terrestrial resources (i.e., fewer tree removals property requirements, temporary construction impacts – noise, access, dust).	• Localized channel restoration and reach scale floodplain connectivity will improve the system longer-term, however the overall benefit of extensive works for long-term sustainability at local sites may not be fully realized by the public. • High amount of tree removals, property requirements/easements for site access, and temporary construction impacts (noise, access, dust).	• Reach-scale channel restoration and floodplain connectivity will improve the system longer-term, however the overall benefit of extensive works for long-term sustainability at local sites may not be fully realized by the public • Highest amount of tree removals, property requirements, and temporary construction impacts (noise, access, dust).
	Short-term Impacts to Community • Ability to limit short-term (2-5 years) negative impacts, such as erosion damage, closures and noise, on the community. Impacts relate to doing nothing or during construction.	• No construction impacts. • Emergency works may be evaluated, which will have limited impacts. • Continued erosion along riverbank will result in loss of pedestrian trail over time.	• Addresses project objectives of protecting public infrastructure from erosion, while minimizing the amount of impacts to the recreational and terrestrial resources (i.e., fewer tree removals property requirements, temporary construction impacts – noise, access, dust).	• High amount of short-term impacts - tree removals, property requirements, and temporary construction impacts (noise, access, dust).	• Highest amount of short-term impacts - tree removals, property requirements, and temporary construction impacts (noise, access, dust).
	Long-term Impacts to Community • Ability to produce long-term positive impacts, such as improved environment, education, amenities and aesthetics, on the community. Impacts relate to doing nothing or following construction. (Including Climate Change Sustainability)	• No long-term positive impacts as no works are proposed. • Continued erosion along riverbank will result in loss of public pathway over time..	• Addresses risks in localized areas. However, areas not subject to design will continue to erode and decrease the sustainability of design in the newly constructed areas.. • Areas not subject to design will continue to erode and decrease the longevity of stability in the newly constructed areas.	• Greater long-term positive impacts providing benefits to the creek and trail system by restoring natural channel conditions in localized areas in addition to widening the floodplain for better connectivity. • Will substantially reduce erosion long term through floodplain connectivity, and enhance sustainability of design segments and non design segments	• Greatest long-term impacts providing benefits to the creek and trail system by restoring natural channel conditions reach-scale. • Provides the best overall environmental improvements (geomorphic form/function, water quality, and aquatic/terrestrial habitat) and aesthetic since it is reach-scale. • Will substantially reduce erosion long term through restoration design and floodplain connectivity.
	Flood Hazard to Public • Ability to reduce impacts to private and public property (i.e., dwellings, pathways, etc.) resulting from flooding.	• No floodplain enhancements are provided, therefore no reduction in flood hazard to public. • Pedestrian trail and bridges will remain at risk.	• Opportunity for minor floodplain enhancements in localized areas which has potential to reduce flood extents locally. • No continuity in floodplain connectivity/access and stabilization design; without extending these, erosion will likely reoccur.	• Opportunity for major floodplain enhancements through continuous floodplain connectivity; target floodplain corridor width of 15-25m dependent on area • Reduced flood hazard as floodplain area expanded along bankfull channel (design and natural sections)	• Opportunity for major floodplain enhancements through continuous floodplain connectivity and reach-scale channel design; target floodplain corridor width of 15-25m dependent on area Reduced flood hazard as floodplain area expanded along designed bankfull channel
	Cultural Heritage and Archaeological Resources • Ability to protect built heritage resources, cultural heritage landscapes and archaeological resources.	• No construction impacts • Emergency works may be evaluated, which will have limited impacts. • Continued erosion throughout corridor may result in exposure of cultural heritage or archaeological resources (if present). • No identified impacts to Indigenous treaty rights or issues.	• Continued erosion throughout corridor may result in exposure of cultural heritage or archaeological resources (if present). • Area of disturbance limited to local works, with potential for disturbance to cultural heritage and archaeological resources. • No identified impacts to Indigenous treaty rights or issues..	• Large amount of disturbance to accommodate localized channel realignment and floodplain restoration pose threat of exposing cultural heritage or archaeological resources. • No identified impacts to Indigenous treaty rights or issues.	• Largest amount of to accommodate reach-scale channel realignment and floodplain restoration pose greatest threat of exposing cultural heritage or archaeological resources. • No identified impacts to Indigenous treaty rights or issues.
Social and Cultural Environment Summary		●	● ● ● ●	● ● ●	● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Economic Environment

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Economic Environment	**Capital Cost** • Estimated capital costs for implementing the alternative solution. • Includes consideration for tree removals and restoration (including off-site plantings), based on a relative comparison of the area of disturbance, and potential for restoration based on a 3:1 planting to removal ratio, and a spacing of 2.5 m on centre for plantings. • Includes consideration for excess soils based on a relative comparison of the area of disturbance/volume of excavated material • Capital costs determined at the evaluation stage based on a rate of $5000/linear metre for natural channel design sections, and $1000/ linear metre for floodplain connections	• No/low capital investment • Emergency works may be evaluated. • Significant costs will be incurred if there are catastrophic losses of infrastructure	• Lower capital investment, while significantly reducing risks of catastrophic losses of infrastructure and ongoing maintenance/emergency works.	• High capital cost for construction. • Hight tree removals, and restoration. Tree plantings likely required off site to meet 3:1 (plantings:removals) restoration requirements. • High excess soils, potentially high costs depending on disposal requirements.	• Highest capital cost to implement reach-scale works • Highest tree removals, and restoration. Tree plantings likely required off site to meet 3:1 (plantings:removals) restoration requirements. • Greatest excess soils. Potentially high costs depending on disposal requirements.
	Lifecycle Cost Consideration • Ability to limit the long-term reoccurring costs of intervening to address chronic erosion issues, such as reoccurring erosion over a span of thirty years.	• Highest long-term reoccurring costs, as only emergency works may be considered. • Without extending the length of creek stabilization, the same issues will occur.	• Addresses some chronic erosion issues through localized channel realignment and bank stabilization • Potential for shorter lifespan compared to Alternatives 3 and 4 in case channel adjustment in non-design reaches destabilizes local works sites.	• Adequately addresses chronic erosion issues by restoring self-sustaining system with a more coherent channel morphology and floodplain connectivity at reach-scale with limited maintenance.	• Adequately addresses chronic erosion issues by restoring self-sustaining system with a more coherent channel morphology and floodplain connectivity at reach-scale with limited maintenance.
	Cost Effectiveness (Economy of Scale) • Ability to provide multiple improvements, such as more infrastructure protection and less environmental and social disturbances, at a cost less than the total of completing all the improvements separately. Includes the ability for Toronto Water to partner and share costs with other infrastructure owners with infrastructure at risk of erosion.	• No improvements proposed. • Emergency works may be evaluated. Cost effectiveness will depend on number of sites addressed through emergency works.	• Provides stabilization in localized areas, however each improvement will be completed separately costing more, • Local works allow for multiple improvements to be completed by clustering project sites into local works, but mostly limited to completing each local works site by prioritization. • Less opportunities for cost sharing with other infrastructure owners where sites are not combined into single projects such as alternative 3.	• Provides adequate protection to critical infrastructure with a lesser cost and environmental/social disturbance since channel bed modifications are not reach-scale. • Ability for multiple improvements to be completed together, by combining Local works sites with floodplain connections, and combine lesser priority sites with greater priority sites. • Provides ability to cost share over more project sites.	• Provides the most protection to critical infrastructure, however, with higher environmental/social disturbance and cost since channel bed modifications are reach-scale. • Reach scale works combine all projects sites into one solutions. However, project likely to be phased or segmented due to costs and cost sharing opportunities. • Provides ability to cost share over more project sites.

		Least Preferred		Less Preferred		Neutral		More Preferred		Most Preferred
Legend		●		● ●		● ● ●		● ● ● ●		● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
	Climate Change Risk • Ability to buffer against financial uncertainties of climate change.	• No improvements proposed. • Emergency works may be evaluated, but unlikely to be sustainable against climate change if localised to issue site. • Existing channel conditions are not in equilibrium with the prevailing flow and sediment regime, therefore will result in costs associated with impacts to the creek corridor and TW infrastructure..	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system and will only temporarily buffer against climate change. • .	• Reduced flooding impacts through reach-scale floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing erosion and costs associated with the uncertainties of climate change.	• Greatest improvement through increasing system, reach-based continuity in improved channel stability. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing the greatest amount of erosion and costs associated with the uncertainties of climate change.
Economic Environment Summary		●	● ●	● ● ● ● ●	● ● ● ●

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Technical and Engineering Considerations

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Technical and Engineering Considerations	**Regulatory Agency Acceptance** • Ability to satisfy Regulatory Agency (City, TRCA, DFO, Urban Forestry, Provincial) mandates	• No construction impacts. • Emergency works may be evaluated, with minimal impact (relative). However, regulatory agencies likely to prefer holistic solutions. • Continued erosion along riverbank will result in loss of pedestrian trail over time	• Addresses project objectives of protecting TW infrastructure from erosion, while minimizing the amount of impacts to terrestrial resources (i.e., fewer tree removals, permitting, etc.). • Option cannot increase floodlines for TRCA approvals.	• Localized channel restoration and reach scale floodplain connectivity will improve the system longer-term, however regulatory agencies may not be as supportive given the larger footprint of disturbance and time to construct. • High amount of tree removals and permitting. • TRCA more supportive of reduced flooding impacts.	• Reach-scale channel restoration and floodplain connectivity will improve the system longer-term, however regulatory agencies may not be as supportive given the larger footprint of disturbance and time to construct. • Highest amount of tree removals and permitting. • TRCA more supportive of reduced flooding impacts. •
	Ease of Implementation/Constructability • Potential impacts to surrounding infrastructure during and after construction. • Ability to limit tree removals and excess soils • Soils estimated based on an assumed mean depth of 1.5 m	• No construction related impacts. • Emergency works may be evaluated, likely to have limited, localized potential impacts during and after construction..	• Lowest chance of potential utility challenges in areas where channel bed modifications are proposed, to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Smallest footprint of disturbance poses less impacts to surrounding infrastructure, however there is still risk of TW infrastructure being eroded out with only localized design. **Estimated Excess Soils: 10060 to 15093 m^3**	• Potential utility challenges in areas where channel bed modifications are proposed to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Large footprint of disturbance may pose some impacts to surrounding infrastructure. **Estimated Excess Soils: 16153 to 25724 m^3**	• Greatest chance of potential utility challenges in areas where channel bed modifications are proposed to be confirmed at detailed design. • Temporary working access easement required for construction and maintenance • Largest footprint of disturbance may pose some impacts to surrounding infrastructure. **Estimated Excess Soils: 18957 to 30115 m^3**
	Resource Effectiveness • Ability to provide multiple improvements, such as more infrastructure protection, using less operational resources than if the improvements were completed separately. Includes the ability to reduce engineering, permitting and administration services to free up resources for other priority work.	• No improvements proposed • Emergency works more likely to be completed separately based on risk/priority • No tree removals/plantings	• Improvements are localized to each project area, with a clustering of issue sites. • Low amount of tree removals • Permitting greater based on each site being completed separately • Engineering greater due to each site being completed separately. Possibly multiple consultants/designers.	• Provides multiple improvements at once, while reducing the area that would require permitting and/or post-construction monitoring • By connecting local works sites, greater efficiency permitting and approvals • Moderate amount of tree removals. Off-site compensations likely • Projects may be better phased than Alternatives 2 and 4, as local works sites are connected through floodplain, but complexity of design is less..	• Provides greatest number of improvements, however, increases permitting and/or monitoring requirements based on disturbance of larger footprint • Required permitting depends on phasing of reach scale corridor works. • Greatest amount of tree removals. Off site compensations likely. • Engineering likely to be phased due to extent of reach works. Multiple projects and bids, perhaps multiple consultant/designers.
	Climate Change Adaptation • Ability to satisfy regulatory mandates in response to climate change. This includes to support habitat restoration benefits, long-term generational benefits, and resiliency and sustainability benefits that may still be in development stages with reference to existing policies and mandates.	• No No mandates addressed • Emergency works may be evaluated, unlikely to have long-term benefits or resiliency. Limited habitat benefits. • Continued degradation anticipated at potentially accelerated rates in response to climate change.	• Local erosion risks will be addressed, however does not provide system-scale, reach-based designs that are necessary to significantly improve system. • Will not protect the channel corridor from flooding or erosion long term in response to climate change.	• Will likely satisfy regulatory mandates through reduced flooding impacts with reach-scale floodplain connectivity • Channel will be able to convey higher flows in floodplain, reducing erosion and costs associated with the uncertainties of climate change.	• Most likely to satisfy regulatory mandates through increasing system, reach-based continuity in improved channel stability, which provides the greatest benefits. • Reduced flooding impacts through combined reach-scale realignment and floodplain connectivity; channel will be able to convey higher flows in floodplain, reducing the greatest amount of erosion

	Least Preferred	Less Preferred	Neutral	More Preferred	Most Preferred
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

Table A2: Evaluation of Alternatives – Alternative 3 Preferred, Applies to Projects 1, 2, 3, 8, 9

Component	Criteria	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Technical and Engineering Considerations Summary		●	● ● ● ●	● ● ● ● ●	● ● ●

Component	Alternative 1: Do Nothing	Alternative 2: Local Works (<200 m in length)	Alternative 3: Local Works with Reach-scale Floodplain Connection	Alternative 4: Reach Works
Physical Environment and Toronto Water Infrastructure Risk	●	● ● ●	● ● ● ●	● ● ● ●
Natural Environment	●	● ●	● ● ● ●	● ● ● ●
Social and Cultural Environment	●	● ● ● ●	● ● ●	● ●
Economic Environment	●	● ●	● ● ● ● ●	● ● ● ●
Technical and Engineering Considerations	●	● ● ● ●	● ● ● ● ●	● ● ●

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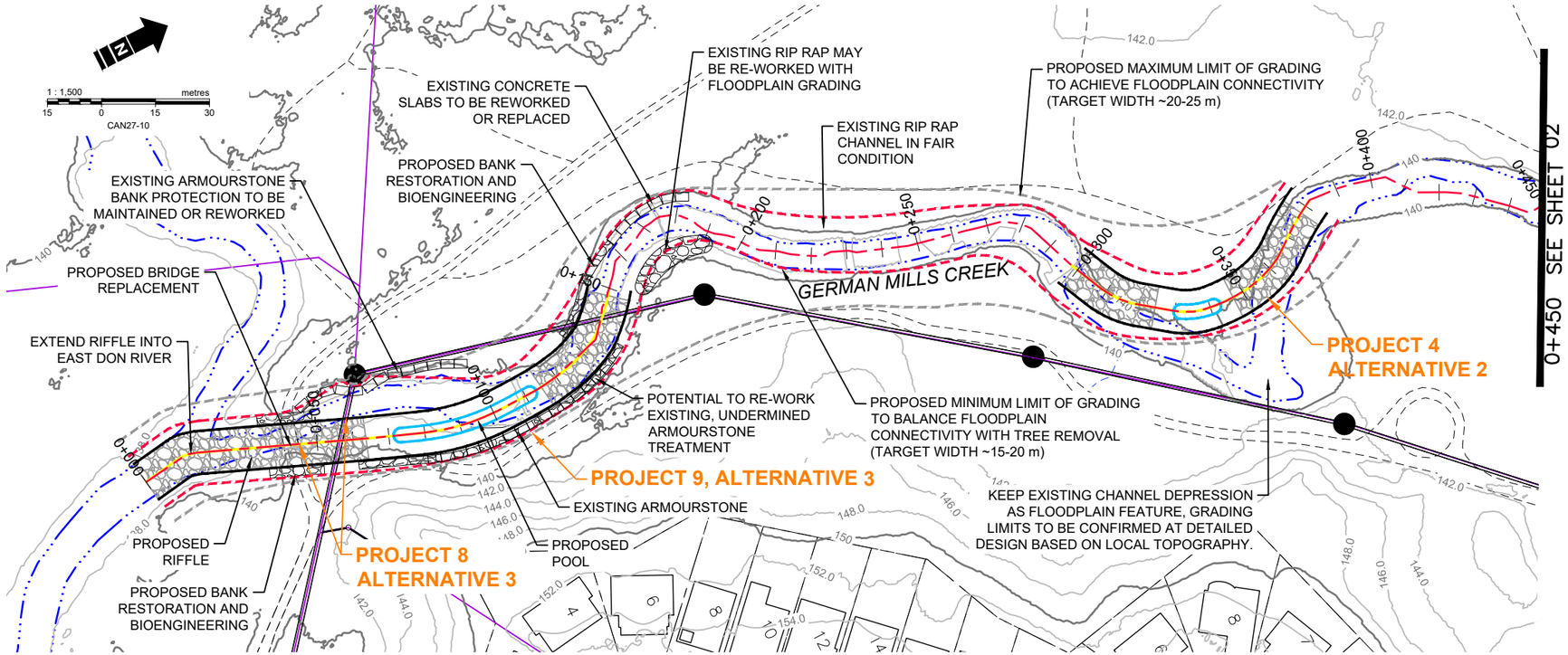
Legend	●	● ●	● ● ●	● ● ● ●	● ● ● ● ●

APPENDIX F-5
Concept Drawings for Preferred Alternative



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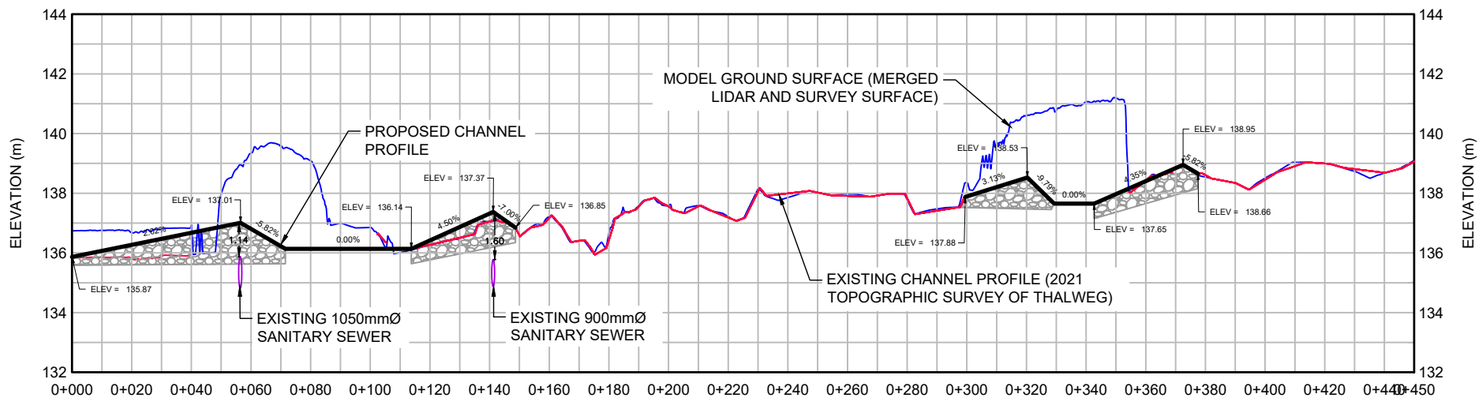

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REFERENCE:
1. BASE MAP TOPOGRAPHY COMPILED FROM CITY OF TORONTO OPEN SOURCE DATA, TWAG SERVICING DATA AND DRF15170_TOPO2D.
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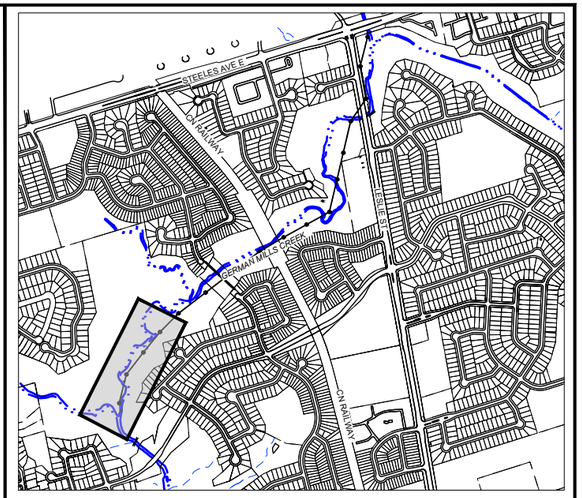

KEY MAP
NOT TO SCALE

LEGEND

- LOT LINE
- RIVER SHORELINE
- THALWEG
- TRAIL
- EXISTING CONTOUR (2m INTERVAL)
- SANITARY SEWER
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REVISION

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A	2022-06-23	ISSUE FOR REVIEW	NC	RP	KW

Matrix Solutions Inc.
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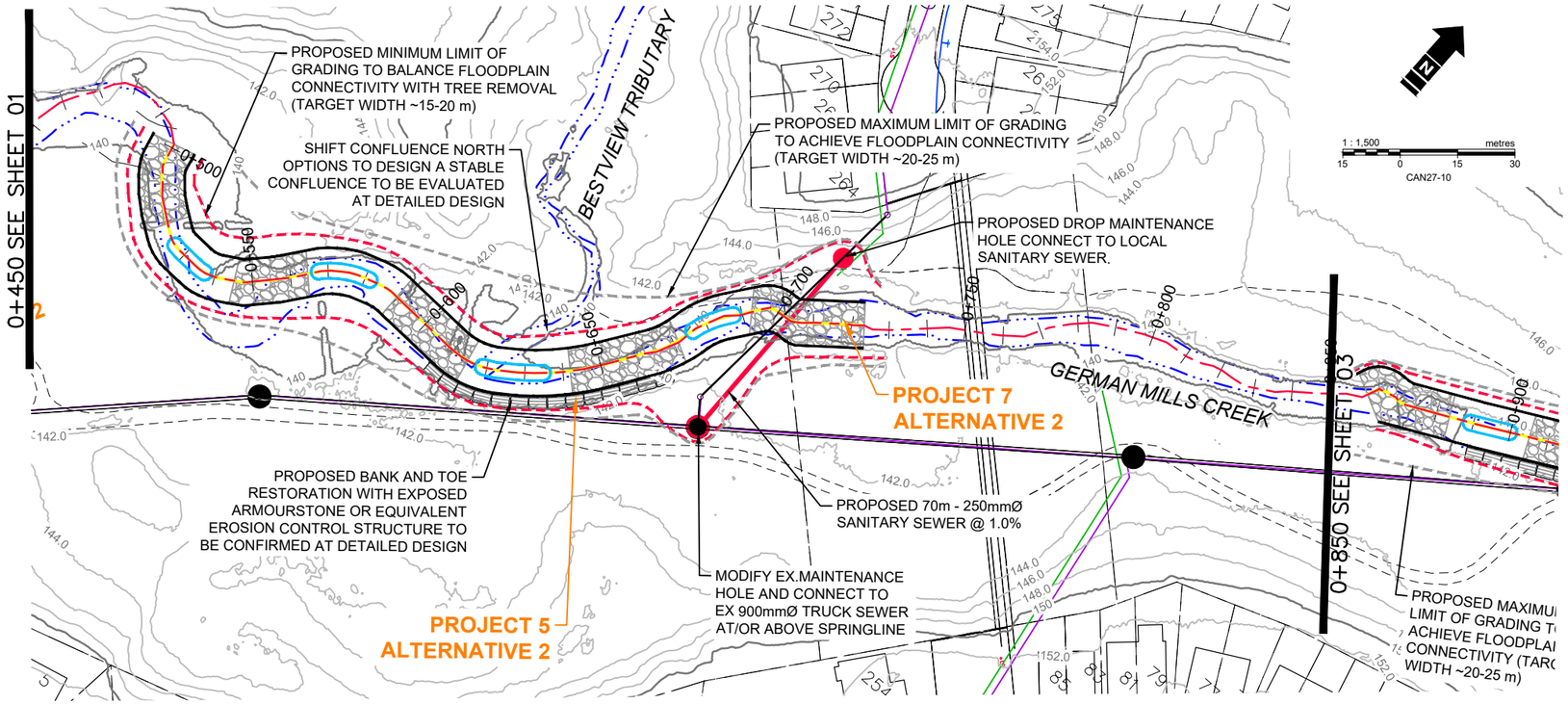
STA. 0+000 TO 0+450

DATE:	TECHNICAL:	REVIEWER:	DRAWN:
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT:	REVISION:	DRAWING:
32227-504	B	F5a



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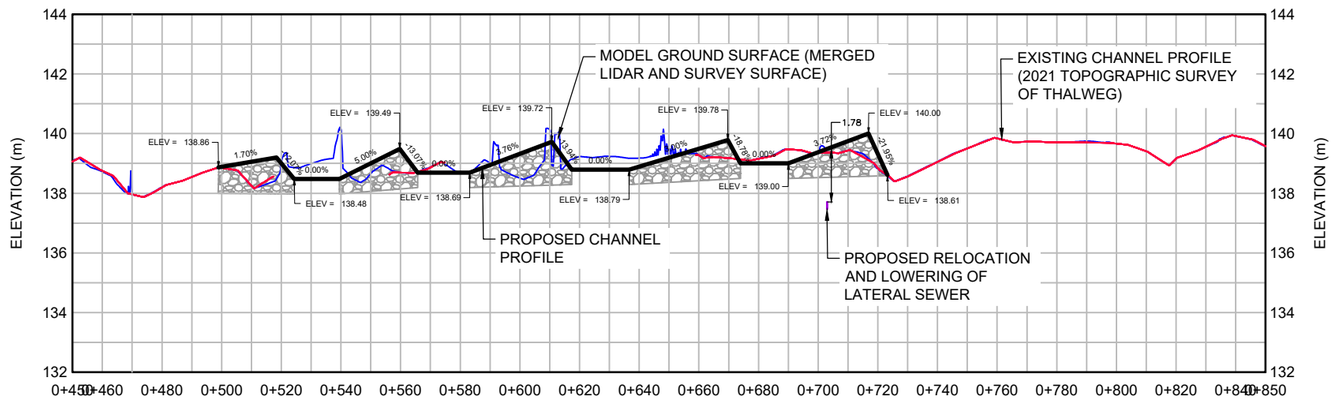

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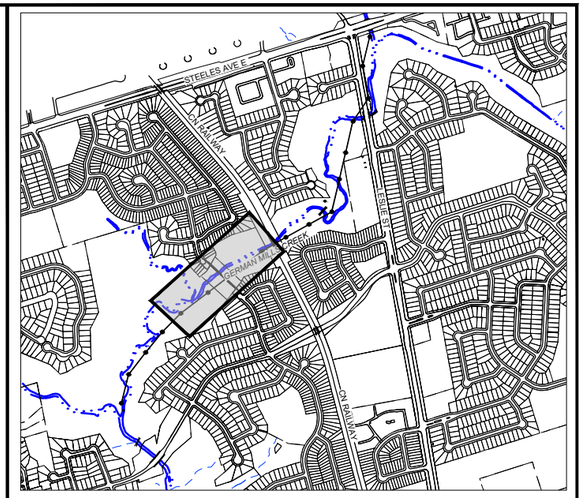

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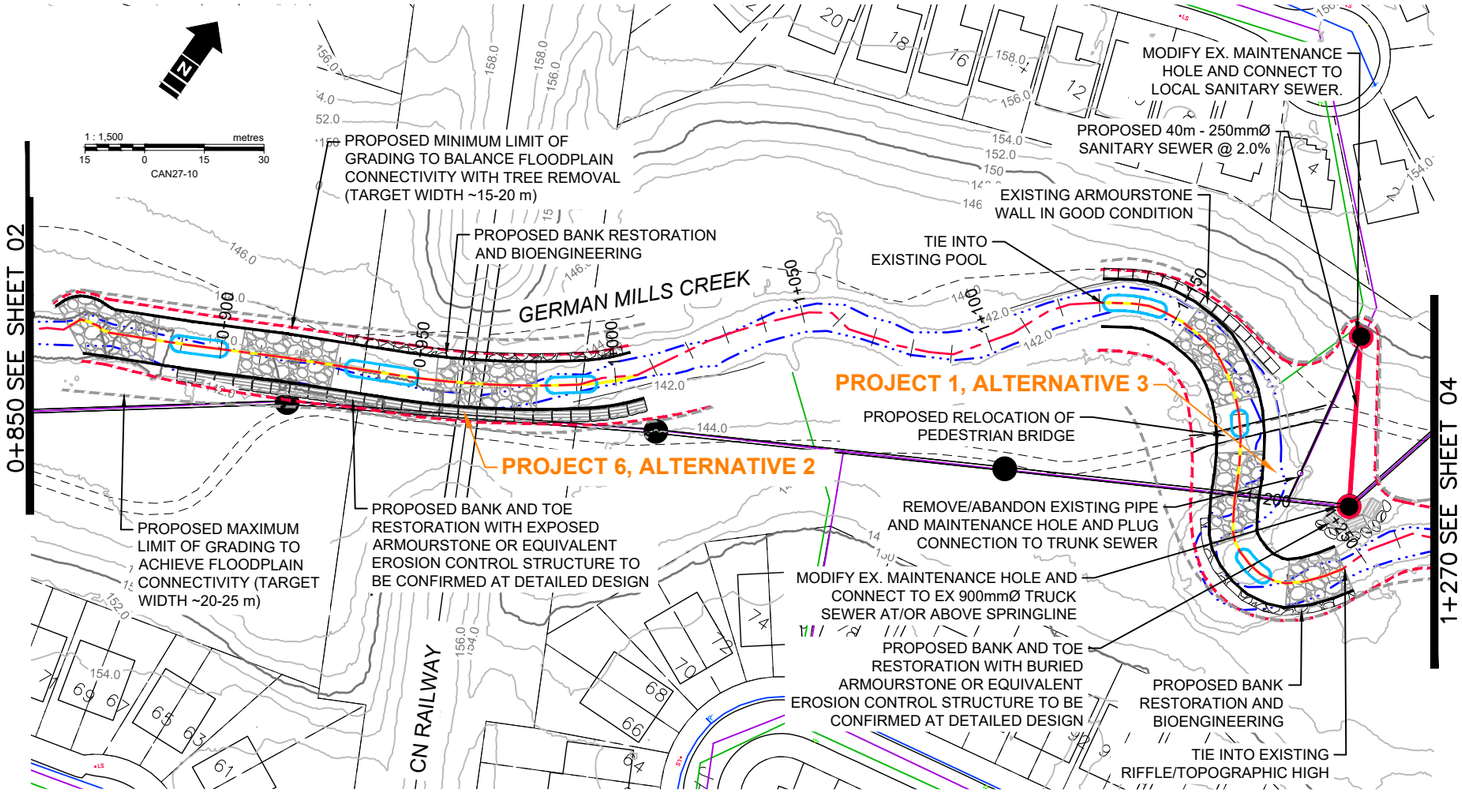

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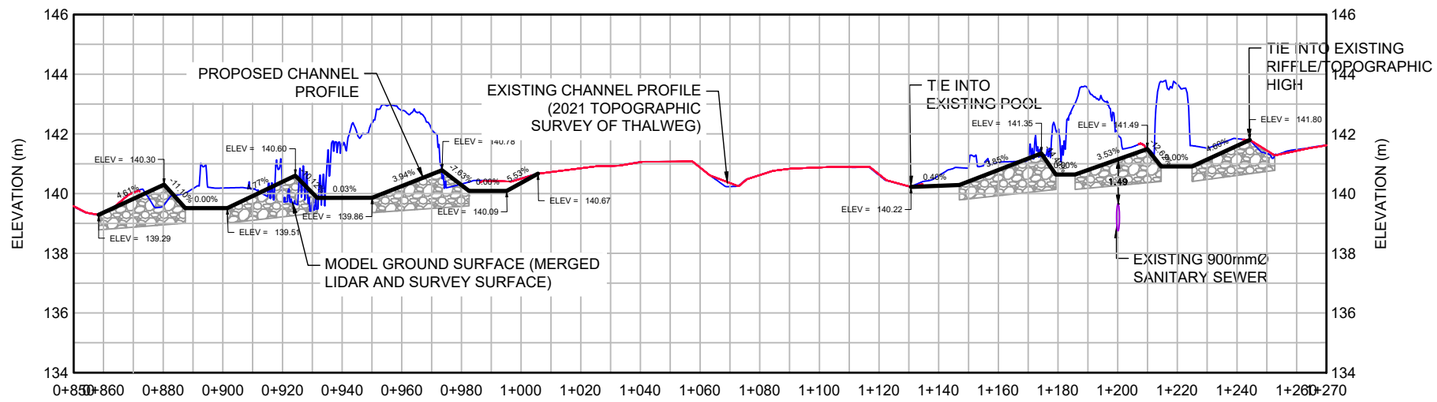

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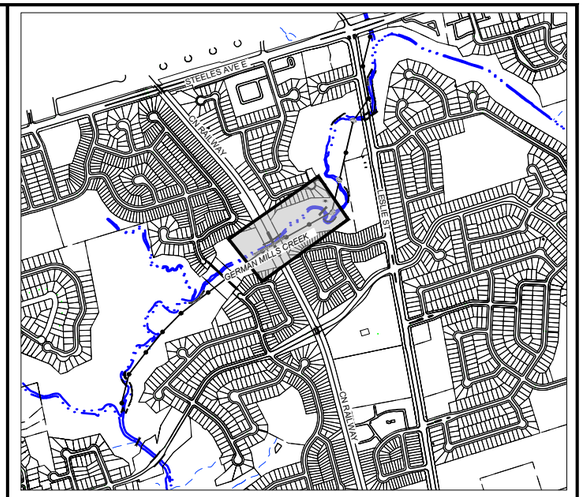

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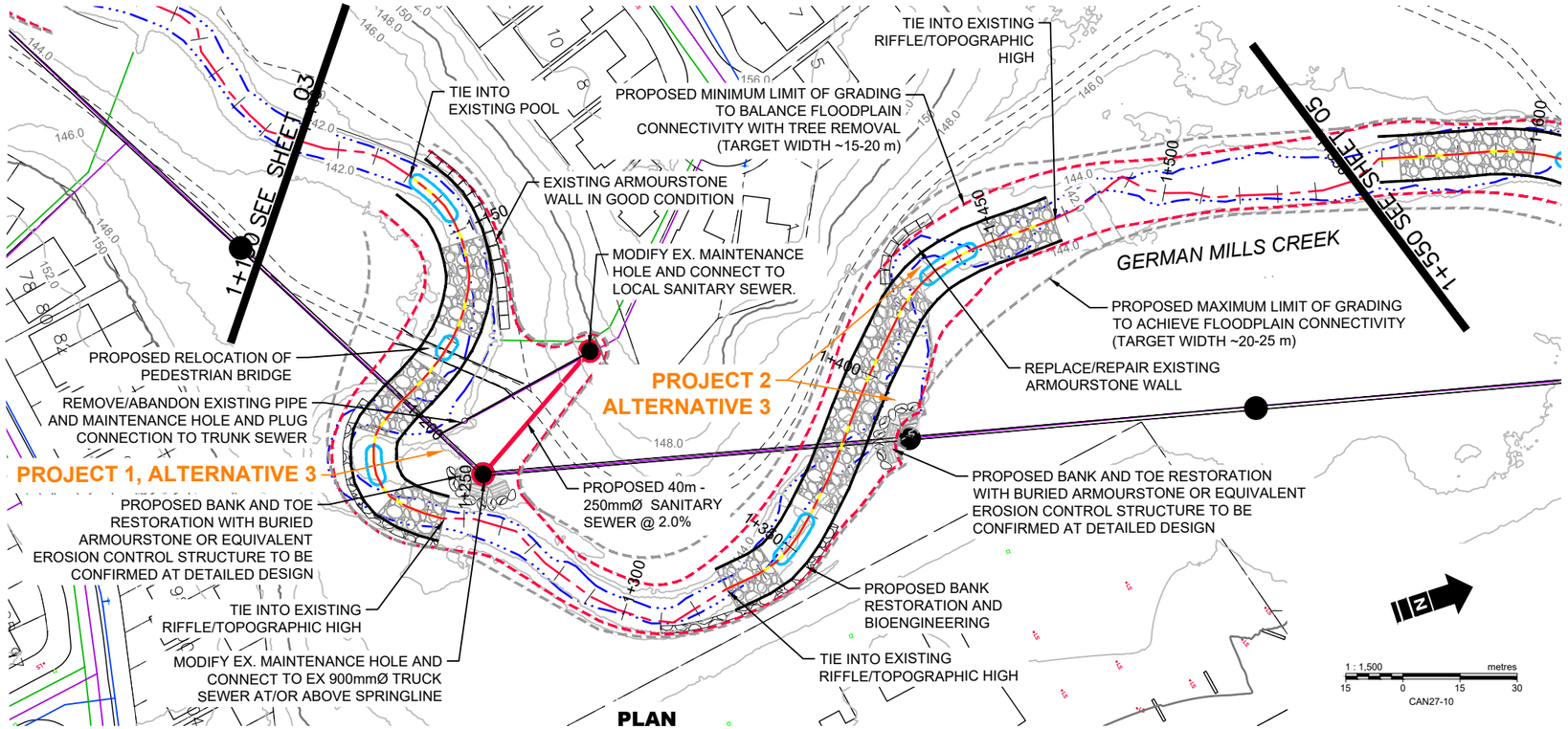
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT: 32227-504
REVISION: B
DRAWING: F5c



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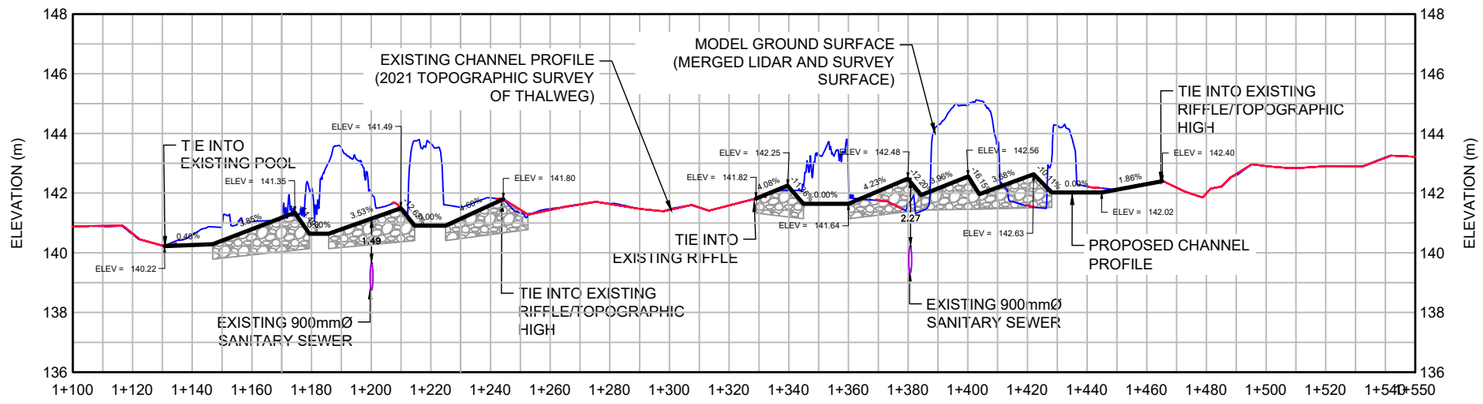

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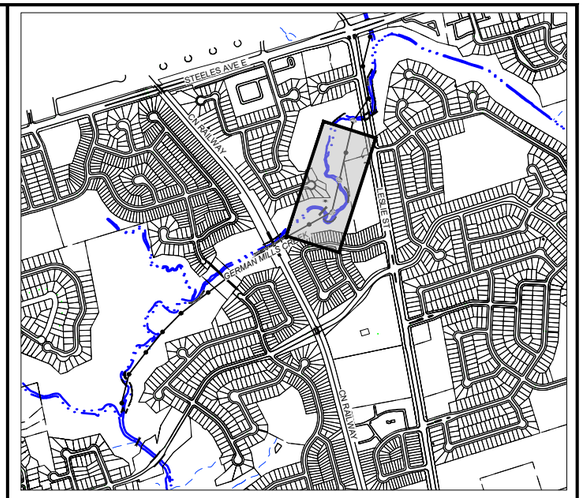

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- MAXIMUM GRADING LIMIT
- EXISTING ARMOURSTONE
- PROPOSED BANK AND TOE RESTORATION WITH EXPOSED ARMOURSTONE
- PROPOSED BANK AND TOE RESTORATION WITH BURIED ARMOURSTONE
- PROPOSED BANK RESTORATION AND BIOENGINEERING
- RIFFLE
- POOL

REVISION					
B	2023-01-27	ISSUE FOR REVIEW	NC	RP	KW
A	2022-06-23	ISSUE FOR REVIEW	NC	RP	KW
No.	DATE	DESCRIPTION	BY	CHK.	DRN.

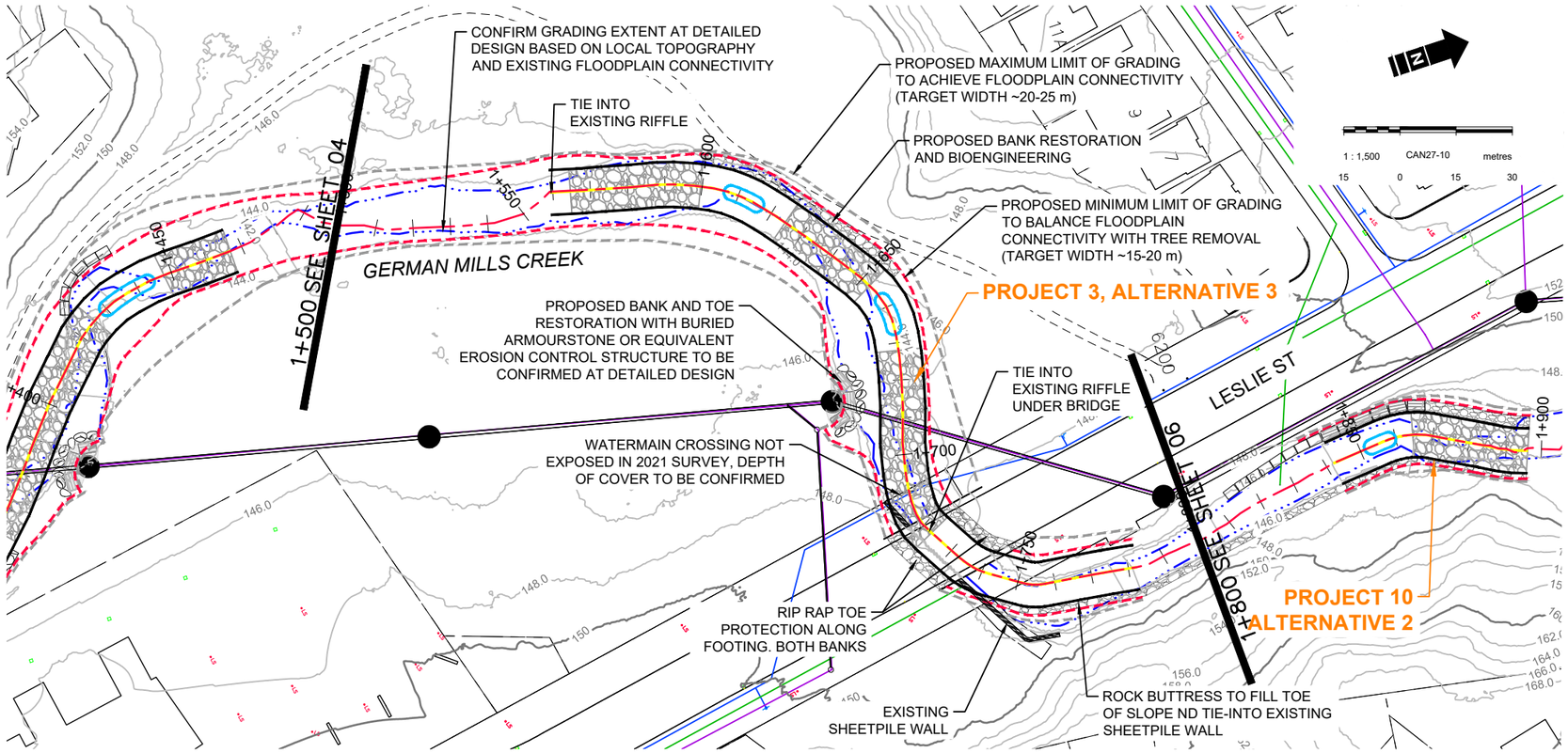
Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

CITY OF TORONTO
GERMAN MILLS GSMP EA

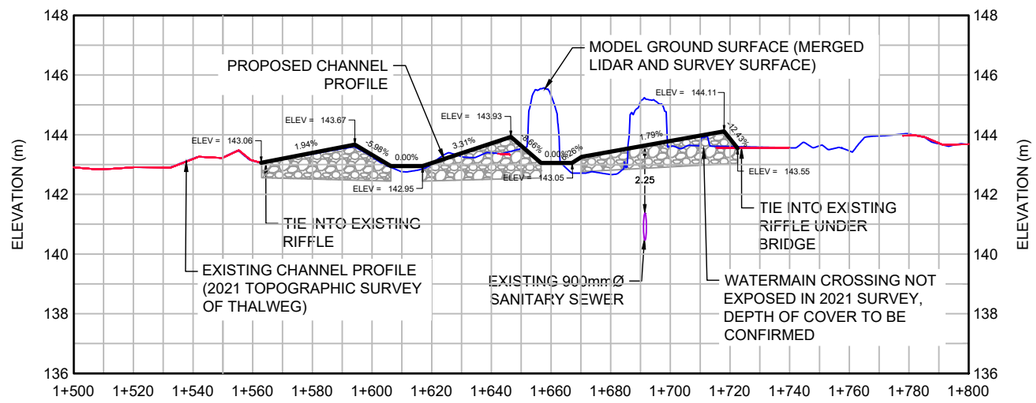
PREFERRED ALTERNATIVE STA. 1+100 TO 1+550

DATE:	TECHNICAL:	REVIEWER:	DRAWN:
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT:	REVISION:	DRAWING:
32227-504	B	F5d



PLAN
SCALE 1:1500



PROFILE
HORIZONTAL SCALE 1:2000
VERTICAL SCALE 1:200

REFERENCE:
1. BASE MAP TOPOGRAPHY COMPILED FROM CITY OF TORONTO OPEN SOURCE DATA, TWAG SERVICING DATA AND DRF15170_TOPO2D.
2. MAPPED CREEK ALIGNMENT ON PLAN FROM 2018 ORTHOPHOTOGRAPHY DIGITIZED BY MATRIX SOLUTIONS.
3. TOPOGRAPHIC SURFACE BASED ON 2015 LIDAR DIGITAL ELEVATION MODEL (OPEN SOURCE) COMBINED WITH TOPOGRAPHIC AND CHANNEL PROFILE SURVEY BY MATRIX SOLUTIONS JULY TO SEPTEMBER 2021.
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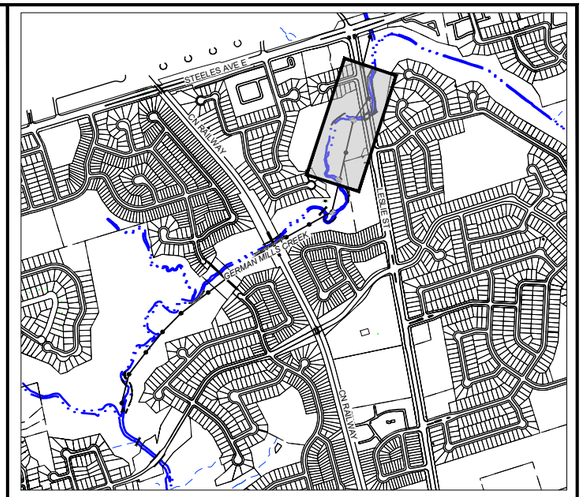
5. COORDINATE SYSTEM ONTARIO MTM ZONE 10 NAD27.



KEY MAP
NOT TO SCALE

LEGEND

- LOT LINE
- RIVER SHORELINE
- THALWEG
- TRAIL
- EXISTING CONTOUR (2m INTERVAL)
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- SANITARY SEWER
- MAINTENANCE HOLE
- CHANNEL REALIGNMENT
- CHANNEL BANK
- MINIMUM GRADING LIMIT
- MAXIMUM GRADING LIMIT
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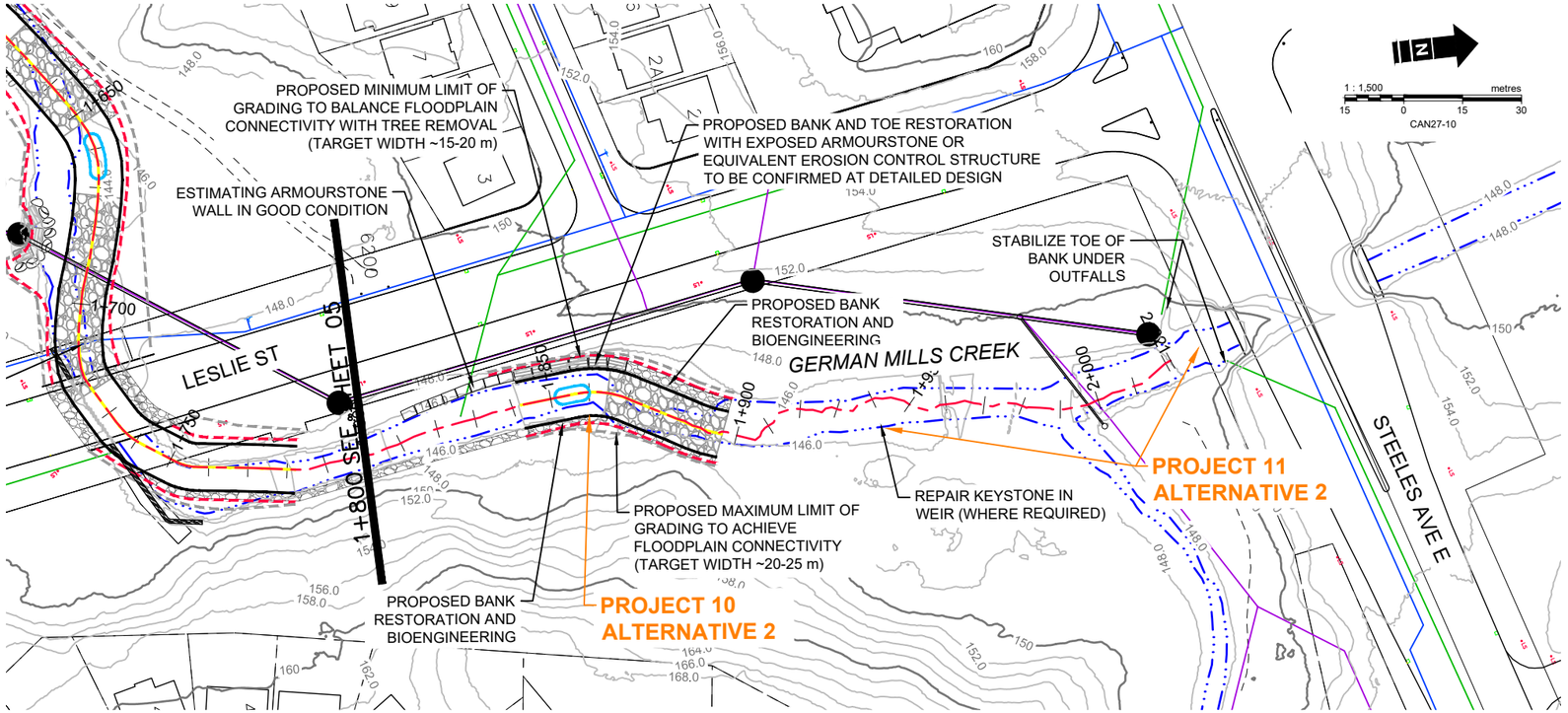
GERMAN MILLS GSMP EA

PREFERRED ALTERNATIVE STA. 1+500 TO 1+800

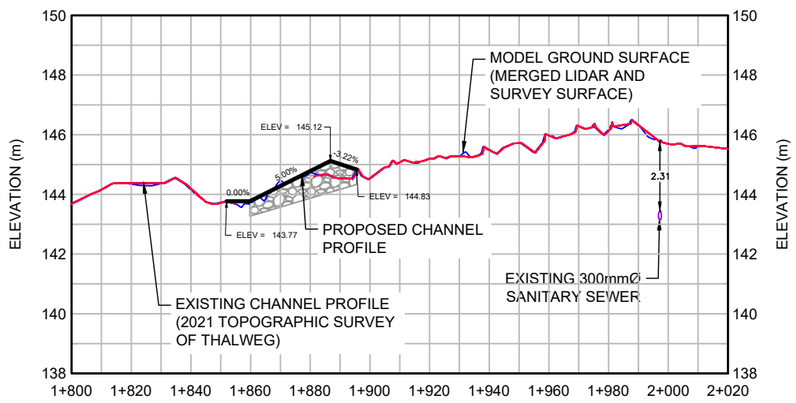
DATE:	TECHNICAL:	REVIEWER:	DRAWN:
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT: 32227-504 | REVISION: B | DRAWING: F5e



PLAN

SCALE 1:1500



PROFILE

HORIZONTAL SCALE 1:2000
VERTICAL SCALE 1:200

REFERENCE:

1. BASE MAP TOPOGRAPHY COMPILED FROM CITY OF TORONTO OPEN SOURCE DATA, TWAG SERVICING DATA AND DRF15170_TOPO2D.
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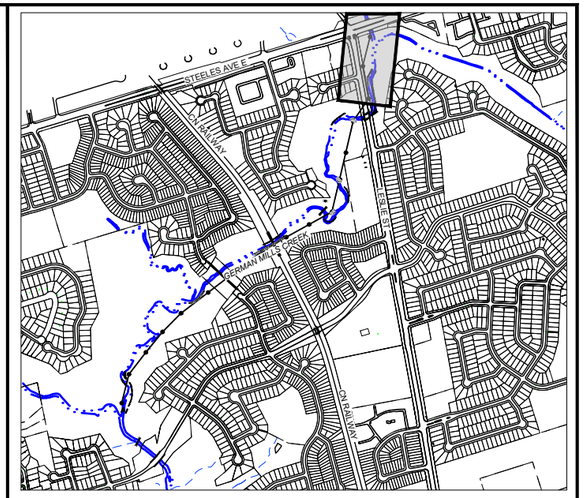

KEY MAP

NOT TO SCALE

LEGEND

- LOT LINE
- RIVER SHORELINE
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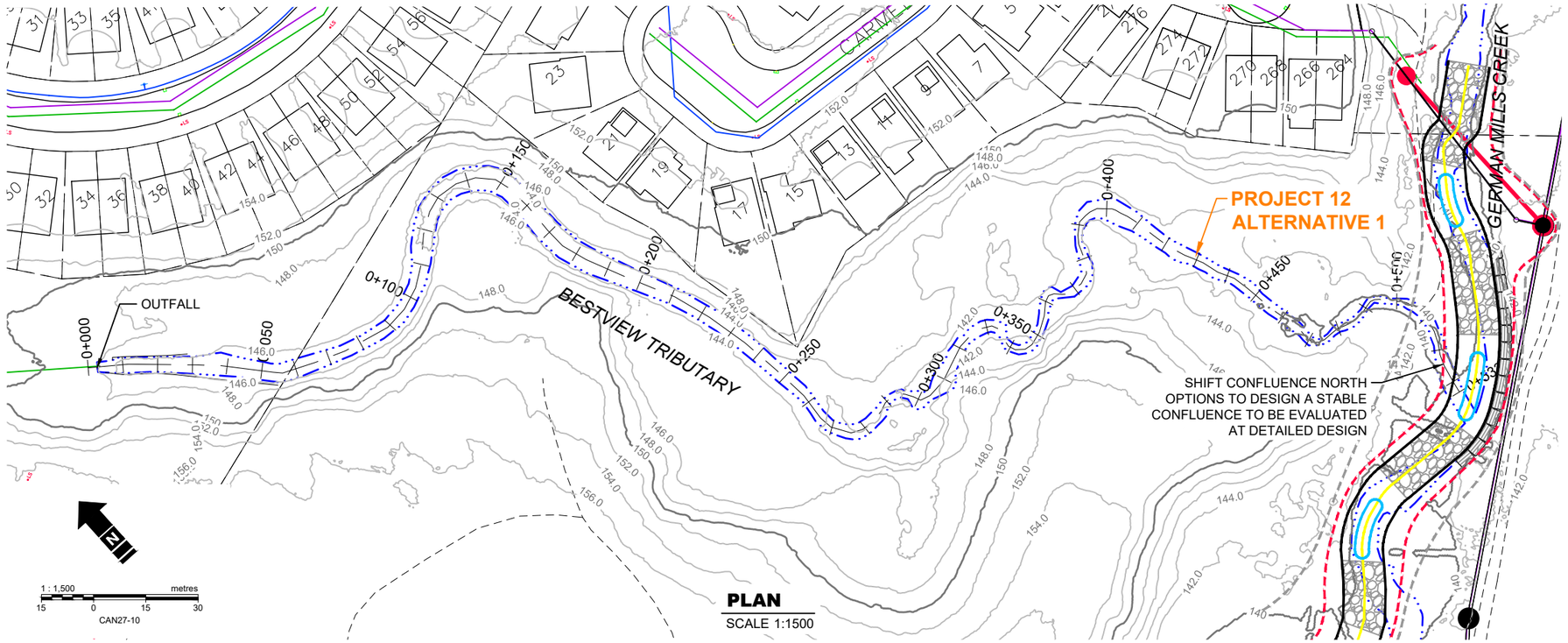
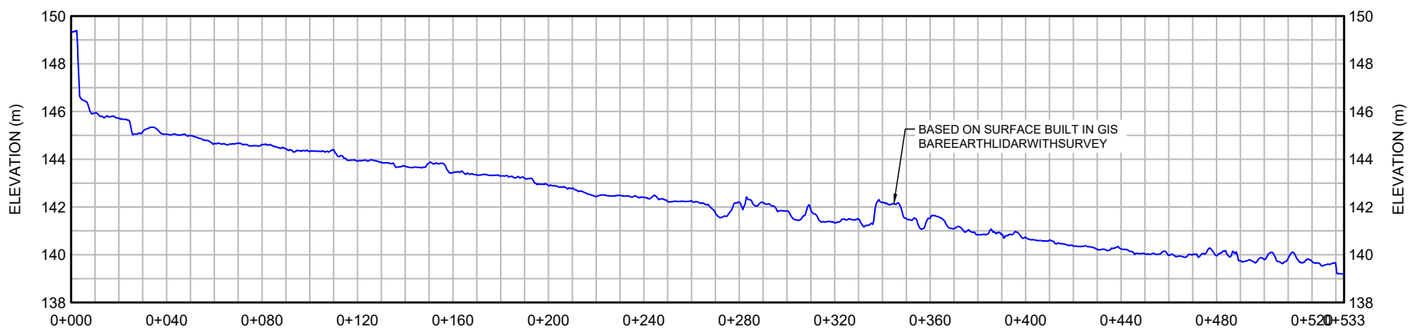
PREFERRED ALTERNATIVE STA. 1+800 TO 2+020

DATE:	TECHNICAL:	REVIEWER:	DRAWN:
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT:	REVISION:	DRAWING:
32227-504	B	F5f



PLAN
SCALE 1:1500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

REFERENCE:
1. BASE MAP TOPOGRAPHY COMPILED FROM CITY OF TORONTO OPEN SOURCE DATA, TWAG SERVICING DATA AND DRF15170_TOPO2D.
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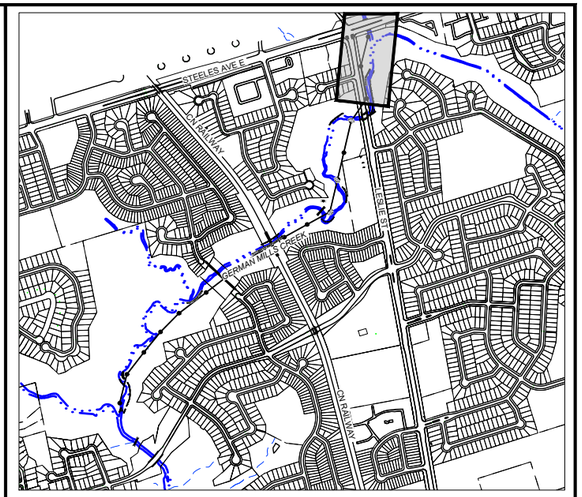

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PREFERRED ALTERNATIVE
STA. 0+000 TO 0+533

DATE:	TECHNICAL:	REVIEWER:	DRAWN:
APRIL 2022	N. CYPLES	R. PHILLIPS	K. WEILER

PROJECT:	REVISION:	DRAWING:
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