

5 PHASE 4: PRIORITIZATION AND PHASING OF PREFERRED SOLUTIONS

Given the spatial density of the twenty-four (x24) priority sites, and the expansive nature of some of the proposed sub reach based solutions, several priority sites are often addressed through a single local or sub reach based works project. Through this bundling process, the twenty-four (x24) priority sites were grouped into eleven (11) capital works projects which will address not only the top twenty-four (24) priority sites identified in the Risk Assessment Report, but will also address several other lower priority sites with medium to long-term erosion related risks to Toronto Water infrastructure. **Phase 4** will provide an overview of this bundling process, and describe the system developed to prioritize the eleven (11) projects based on their associated failure risk to Toronto Water Infrastructure. Cost estimates for each of the eleven (11) projects are also provided as part of this phase.

5.1 Grouping of Priority Sites into Projects

A total of eleven (11) capital works projects have been proposed as part of the Newtonbrook GSMP, which will address all of the previously identified twenty-four (24) high priority erosion risk sites, as well as an additional nineteen (19) lower priority sites. In summary, the eleven (11) proposed capital works projects will address erosion related risks to:

- 8x Exposed Sanitary Sewer Crossings;
- 1x Exposed Sanitary Sewer Maintenance Hole;
- 1x Previously Exposed Sanitary Sewer Maintenance Hole (Protected through Ongoing Emergency Works);
- 7x Sanitary Sewer Crossings with Minimal Cover;
- 17x Lateral Risks to Sanitary Sewer Infrastructure;
- 1x Watermain Crossing with Minimal Cover;
- 1x Exposed Watermain Chamber;
- 4x Failed Storm Sewer Outfalls;
- 4x Storm Sewer Outfalls that are Functional but in a Degraded Condition;
- Multiple risks to Private Property;
- Multiple risks to the Local Multi-Use Trail System; and
- 3x Private Oil Pipeline Crossings (Trans-Northern, Imperial Oil and Sun-Canadian).

The eleven projects and their associated priority sites are summarized in **Table 5-1**, with the spatial distribution of the projects shown in **Figure 5-1**. For ease of reference each project has been assigned a brief description or name, based on the watercourse in which it is located (i.e., NBC for Newtonbrook Creek and BRC for Blue Ridge Creek) and its relative geographic location (i.e., proximity to a major road or confluence with the Don River).

Table 5-1: Project Risk Sites Summary

Project Description	Priority Site #	Description	TW Asset ID
NBC - Finch	5	Exposed Sanitary Sewer Maintenance Hole and Lateral Risk to Sanitary Sewer Near Pedestrian Trail	SL4031857
	6	Exposed Sanitary Sewer Crossing upstream of Farmingdale Road	SL4031887
	7	Exposed Sanitary Sewer Crossing Downstream of Finch Avenue and Bayview Avenue	SL4031887
	8	Exposed Sanitary Sewer Maintenance Hole and Lateral Risk to Sanitary Sewer Downstream of Finch Avenue and Bayview Avenue	MH4915013638
	9	Exposed Sanitary Sewer Crossing at Finch Avenue and Bayview Avenue	SL4033483

Project Description	Priority Site #	Description	TW Asset ID
	19	Lateral Risk to Sanitary Sewer at Finchgate Court	SL4032401
	20	Lateral Risk to Sanitary Sewer at Brucedale Crescent	SL4031887
	22	Lateral Risk to Sanitary Sewer Downstream of Finch Avenue and Bayview Avenue	SL4033483
	26	Lateral Risk to Sanitary Sewer at Farmingdale Road	SL4031857
	53	Storm Outfall at top of slope of Farmingdale Road	OF4902413782
	65	Storm Outfall by pedestrian trail at Farmingdale Road	OF4907413839
NBC - Canary	4	Failed Storm Water Outfall at Canary Crescent	OF4884313907
NBC - Confluence	1	Previously Exposed Sanitary Sewer Maintenance Hole (Protected Through Emergency Works) and Lateral Risk to Sanitary Sewer	SL4033582 MH4856914969
	42	Sanitary Sewer Crossing upstream of the Don River	SL4033032
NBC - King Maple	2	Exposed Sanitary Sewer Crossing at Restwell Crescent	SL4032406
	25	Lateral Risk to Sanitary Sewer at Earlywood Court	SL4032404
	27	Lateral Risk to Sanitary Sewer at Page Avenue	SL4033583
	34	Sanitary Sewer Crossing at Earlywood Court	SL4032404
NBC - Forest Grove	3	Failed Storm Water Outfall at Forest Grove Drive	OF4854214333
	24	Lateral Risk to Sanitary Sewer downstream of Forest Grove Drive	SL4033584
BRC - Confluence	12	Failed Storm Sewer Outfall at Hi Mount Drive	OF4830215159
	23	Lateral Risk to Sanitary Sewer at Hi Mount Drive	SL4053177
	40	Lateral Risk to Sanitary Sewer at Clarinda Drive	SL4051741
BRC - Upper	13	Failed Storm Sewer Outfall at Citation Drive	OF4824214956
	14	Exposed Sanitary Sewer Crossing at Sifton Court	SL4029711
	15	Lateral Risk to Sanitary Sewer downstream of Sifton Court	SL4030293
	21	Lateral Risk to Sanitary Sewer at Ambrose Road	SL4030487
	29	Lateral Risk to Sanitary Sewer at Citation Drive	SL4030369
	36	Lateral Risk to Sanitary Sewer at Ambrose Road	SL4030294
NBC - Tanner	11	Exposed Sanitary Sewer Crossing upstream of Blessed Trinity Parish	SL4032523
	39	Sanitary Sewer Crossing at Laredo Court and the Hydro Corridor	SL4034029
	64	Degraded Storm Outfall at Wideford Place	OF4950913010
NBC - Manorcrest	10	Exposed Watermain Chamber at Manorcrest Drive	LN24062
	43	Sanitary Sewer Crossing at Laredo Court	SL4031891
	69	Storm Outfall at end of Manorcrest Drive	OF4940713236

Project Description	Priority Site #	Description	TW Asset ID
NBC - Page	16	Lateral Risk to Sanitary Sewer at Heathview Avenue and Page Avenue	SL4033585
	18	Lateral Risk to Sanitary Sewer upstream of Forest Grove Drive	SL4034031
NBC - Maxome	17	Lateral Risk to Sanitary Sewer upstream of Maxome Avenue	SL4032958
	30	Lateral Risk to Sanitary Sewer downstream of Revcoe Drive	SL4033490
	32	Sanitary Sewer Crossing at Harnish Crescent and Revcoe Drive	SL4053177
	33	Sanitary Sewer Crossing upstream of Maxome Avenue	SL4033487
	35	Second Sanitary Sewer Crossing upstream of Maxome Avenue	SL4033486

The following sections will outline the methodology used to develop and apply a project prioritization system, to determine the order in which these projects are recommended to be completed, allowing the City to plan resource allocation. The project prioritization system is based on a project-by-project risk impact analysis, as described in the following section.

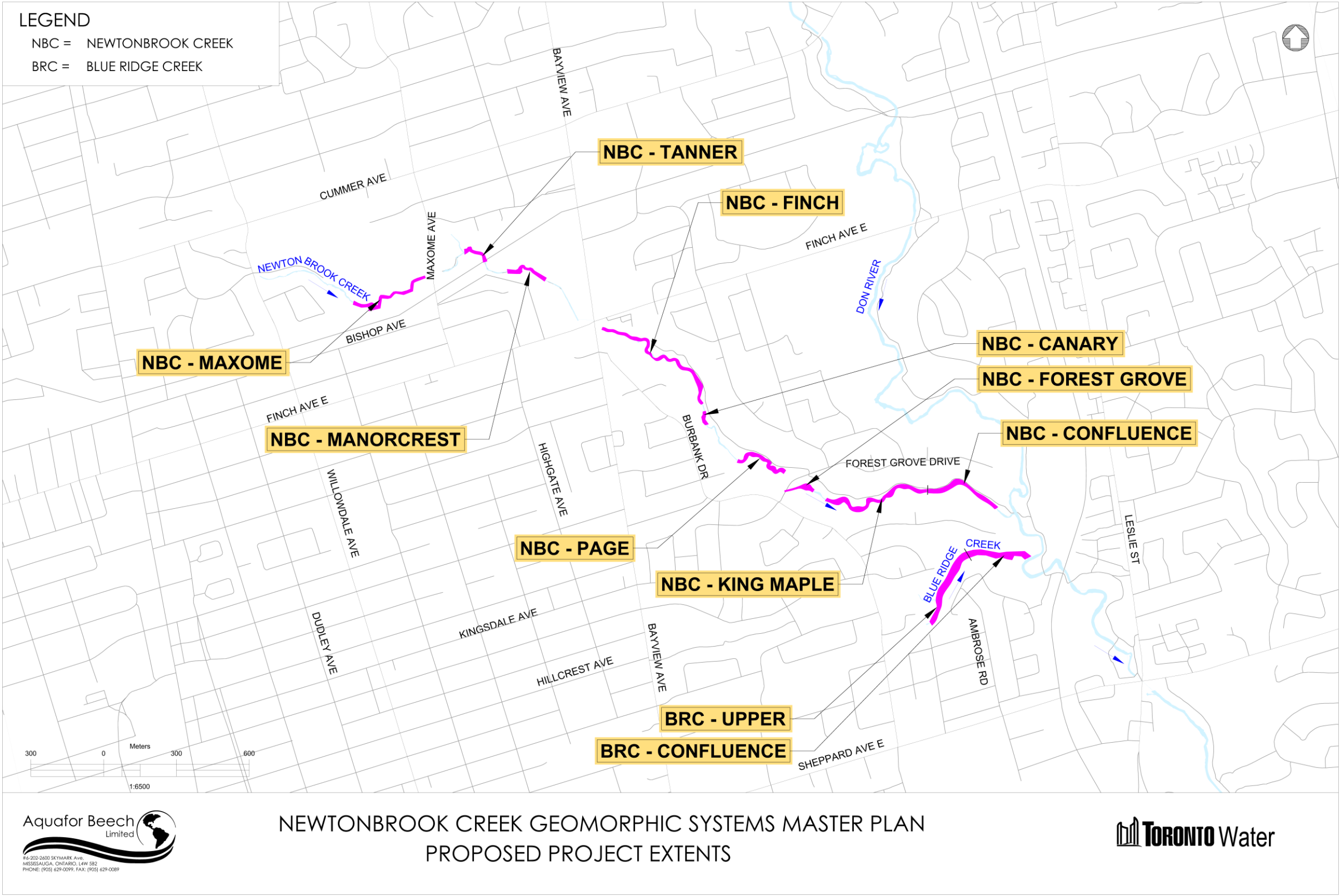


Figure 5-1: Spatial Distribution of the Eleven NCGSMP Capital Works Projects

5.2 Project Risk Prioritization Methodology

The prioritization methodology used to prioritize the eleven capital works projects was based on the failure risk associated with each respective project. The basis of the failure risk framework is the principal that failure risk is the product of failure likelihood and failure impact, as shown in the following equation.

$$\text{Failure Risk} = \text{Failure Likelihood} \times \text{Failure Impact}$$

Failure risk is calculated for each of the risk sites that constitute a project. The maximum failure risk of all the risk sites that constitute a project is considered to be the overall project failure risk.

The failure likelihood of each risk site was adapted from the risk scores presented as part of the risk assessment process outlined earlier in this report. Whereas, the failure impact of each site was calculated using a series of site-specific factors. This project failure risk methodology used to determine project prioritization is described in detail in the following subsections.

5.2.1 Failure Likelihood Methodology

The methodology used to calculate failure likelihood was adapted from the risk score methodology presented earlier, which outlined the risk scores associated with vertical erosion risks, lateral erosion risks, and stormwater outfall risks. Each of these erosion risks were evaluated (on a site-by-site basis) based on three factors, unique to each type of risk. Each of these three factors were scored from 1-5, resulting in an overall risk score ranging from 3-15 for each erosion risk site.

These risk scores were then adapted for use as the failure likelihood metric in the project failure impact calculation. Firstly, the risk scores were normalized to a scale from 1 to 5, by dividing each risk score by a factor of three. This normalization was completed to allow the failure likelihood scores to be directly comparable to the failure impact scores, which are scored on a 1 to 5 scale. A second change required to adapt the risk scores to be used as failure likelihood values occurred for instances where sanitary infrastructure was exposed and where stormwater headwalls have become disconnected from the upstream pipe segment. In these instances, the maximum score of 5 was applied. This qualifier was instituted to reflect that these instances represent infrastructure that have already begun to significantly deteriorate or fail, and as such, they should receive a maximum failure likelihood score.

5.2.1.1 Emergency Works at NBC - Confluence

Aquafor understands that the Toronto Water Divisional Operational Services Department has recently undertaken emergency infrastructure protection works at the exposed sanitary maintenance hole within the NBC - Confluence project in Spring 2024, after the completion of the initial geomorphic risk assessment process. These works included the placement of angular stone in the immediate vicinity of the exposed maintenance hole, to provide some level of protection against lateral erosion. As such, the horizontal risk score has been updated accordingly for this risk site, to reflect the emergency works, as shown in **Table 5-2**.

Table 5-2: Updated Risk Score for Exposed Maintenance Hole within NBC - Confluence project

Horizontal Offset (m) – Based on Estimated Emergency Works Cover	Lateral Erosion Rate (m/yr)	Time to Contact (yr)	Time to Contact Risk Score	(Rc/W)	Rc/W Risk Score	Bank Protection Works	Lateral Infrastructure Condition Risk Score	Updated Horizontal Risk Score
1.0	0.2428	4.12	4	7.2	2	Gabion Stone	2	8

Previously, when this sanitary maintenance hole was exposed, it would have received a maximum failure likelihood score of 5 (15 divided by a factor of 3). Based on these emergency protection works, this site will now receive a failure likelihood score of 2.67 (8 divided by a factor of 3).

5.3 Failure Impact Methodology

The methodology used to calculate Failure Impact, groups failure impacts into three distinct sections by type of infrastructure; Sanitary, Stormwater and Watermain. For each of the corresponding infrastructure groups, the failure impact was determined based on a series of site-specific factors.

5.3.1 Sanitary Infrastructure Failure Impact Methodology

For sanitary infrastructure, failure would result in the discharge of untreated wastewater into Newtonbrook or Blue Ridge Creek. As these creeks are a tributary of the Don River, which outlets into Lake Ontario, the discharge of untreated wastewater would pose a threat to Toronto's potable water supply drawn from Lake Ontario. Additionally, the discharge of untreated wastewater into a creek would classify as "the discharge of a contaminant into the natural environment". As such, the City of Toronto would face an MECP compliance risk in the event of wastewater discharge into Newtonbrook or Blue Ridge Creeks. Due to these extreme failure consequences, the failure impact of all sanitary infrastructure was assigned the maximum score of 5, as shown in **Table 5-3**.

Table 5-3: Sanitary Infrastructure Failure Impact

Sanitary Infrastructure	
Failure Impact Description	Due to risk of untreated wastewater discharge into a creek and the associated compliance (MECP) risk, all sanitary sewers receive a "High" failure impact score
Failure Impact Score	High (5)

5.3.2 Stormwater Infrastructure Failure Impact Methodology

For stormwater infrastructure, failure would result in placing the surrounding area at an elevated risk to erosion. If there is no infrastructure or private property in close proximity to the outfall point of failure, then failed stormwater infrastructure will likely have a lowered impact. However, if the outfall point of failure is in close proximity to a multi-use pathway, a road right-of-way, or private property, then failed stormwater infrastructure has the potential to pose safety risks to trail and road users, as well as private property owners. Furthermore, if an outfall point of failure is in close proximity to sanitary infrastructure, it has the potential to expose or damage this sanitary infrastructure, and as a result, carries a higher failure impact. Due to these associated consequences, the failure impacts for stormwater infrastructure were assigned accordingly, as shown in **Table 5-4**.

Table 5-4: Stormwater Infrastructure Failure Impact

Stormwater Infrastructure			
Failure Impact Description	No infrastructure or Private Property within 10 metres of Outfall	Outfall within 10m of Pathway / Road ROW / Private Property	Outfall within 10 metres of Sanitary Infrastructure
Failure Impact Score	Low (1)	Moderate (2)	Moderate (3)

5.3.3 Watermain Infrastructure Failure Impact Methodology

For watermain infrastructure, failure could result in the discharge of potable water into Newtonbrook Creek, and potential service impacts to end users, depending on the level of failure. The failure impact magnitude also depends on the size of the watermain, and whether it is a distribution watermain (part of a localized distribution system), or a transmission watermain (supplies water to localized distribution systems). Transmission watermain

have a larger failure impact due to the larger amounts of potable water they convey. Due to these associated consequences, the failure impacts for watermain infrastructure were assigned accordingly, as shown in **Table 5-5**.

Table 5-5: Watermain Infrastructure Failure Impact

Watermain Infrastructure		
Failure Impact Description	Watermain up to 600 mm in Diameter (Distribution)	Watermain Over 600mm Diameter (Transmission)
Failure Impact Score	Moderate (3)	High (4)

5.4 Risk Impact Methodology

The failure likelihood along with the failure impact was determined for each of the sites that constitute each of the eleven (11) projects. From there, the project failure risk was determined by taking the maximum failure risk of the sites that make up the project. This process was completed for each of the eleven capital works projects. **Table 5-6** illustrates the process used to determine the maximum failure risk for Project #1: NBC - Finch. The complete list of project failure risk evaluation tables are provided in **Appendix V**.

Table 5-6: Project Failure Risk Evaluation for Project #1: NBC - Finch

Project #1: NBC - Finch			
Site #	Scaled Condition Rating	Failure Impact	Failure Risk
Exposed/Failed High Priority Sites			
5	5.0	5.0	25.0
6	5.0	5.0	25.0
7	5.0	5.0	25.0
8	5.0	5.0	25.0
9	5.0	5.0	25.0
Additional High Priority Risk Sites			
19	4.0	5.0	20.0
20	1.3	5.0	6.7
22	3.7	5.0	18.3
Additional Risk Sites			
26	3.3	5.0	16.7
53	3.7	3.0	11.0
65	2.3	1.0	2.3
Project #1: NBC - Finch - Failure Risk:			25.0

The site(s) within each project that contained the maximum failure risk are considered the driving sites behind each project's prioritization, as shown in **Table 5-7**.

Table 5-7: Driving Priority Sites for Each of the Capital Works Projects

Project Description	Priority Site	Description	TW Asset ID	Failure Risk
NBC - Finch	5	Exposed Sanitary Sewer Maintenance Hole and Lateral Risk to Sanitary Sewer Near Pedestrian Trail	SL4031857	25.0
	6	Exposed Sanitary Sewer Crossing upstream of Farmingdale Road	SL4031887	25.0

Project Description	Priority Site	Description	TW Asset ID	Failure Risk
	7	Exposed Sanitary Sewer Crossing Downstream of Finch and Bayview Avenue	SL4031887	25.0
	8	Exposed Sanitary Sewer Maintenance Hole and Lateral Risk to Sanitary Sewer Downstream of Finch and Bayview Avenue	MH4915013638	25.0
	9	Exposed Sanitary Sewer Crossing at Finch and Bayview Avenue	SL4033483	25.0
NBC - King Maple	2	Exposed Sanitary Sewer Crossing at Restwell Crescent	SL4032406	25.0
BRC - Upper	14	Exposed Sanitary Sewer Crossing at Sifton Court	SL4029711	25.0
NBC - Tanner	11	Exposed Sanitary Sewer Crossing upstream of Blessed Trinity Parish	SL4032523	25.0
NBC - Maxome	17	Lateral Risk to Sanitary Sewer upstream of Maxome Avenue	SL4032958	21.7
NBC - Manorcrest	10	Exposed Watermain Chamber at Manorcrest Drive	LN24062	20.0
NBC - Forest Grove	24	Lateral Risk to Sanitary Sewer downstream of Forest Grove Drive	SL4033584	18.3
BRC - Confluence	23	Lateral Risk to Sanitary Sewer at Hi Mount Drive	SL4053177	18.3
NBC - Confluence	1	Previously Exposed Sanitary Sewer Maintenance Hole and Lateral Risk to Sanitary Sewer Near Pedestrian Trail	SL4033582 MH4856914969	13.3
NBC - Page	16	Lateral Risk to Sanitary Sewer at Heathview and Page Avenue	SL4033585	13.0
	18	Lateral Risk to Sanitary Sewer upstream of Forest Grove Drive	SL4034031	13.0
NBC - Canary	4	Failed Storm Water Outfall at Canary Crescent	OF4884313907	10.0

Based on the failure risk evaluation, the eleven projects were prioritized, and grouped into four (4) distinct priority tiers, as shown in **Table 5-8**, and illustrated in **Figure 5-2**.

Table 5-8: Project Prioritization Based on Failure Risk Assessment

Project Name	Priority Grouping	Project Description	Project Failure Risk
Project #1: NBC - Finch	High	Multiple Sanitary Assets Downstream of Bayview and Finch	25.0
Project #2: NBC - King Maple	High	Exposed Sanitary Sewer Downstream of Forest Grove Near King Maple Place	25.0
Project #3: BRC - Upper	High	Upper Blue Ridge Creek near Sifton Court	25.0
Project #4: NBC - Tanner	High	Exposed Sanitary Crossing Downstream of Maxome Avenue Near Tanner Court	25.0
Project #5: NBC - Maxome	Mid-High	Multiple Sanitary Risks Directly Upstream of Maxome Avenue	21.7
Project #6: NBC - Manorcrest	Mid-High	Watermain Infrastructure Upstream of Bayview and Finch Near Manorcrest Drive	20.0
Project #7: NBC - Forest Grove	Mid-Low	Failed Stormwater Outfall Downstream of Forest Grove Drive	18.3

Project Name	Priority Grouping	Project Description	Project Failure Risk
Project #8: BRC - Confluence	Mid-Low	Lower Blue Ridge Creek near Confluence with the Don River	18.3
Project #9: NBC - Confluence	Lower	Previously Exposed Sanitary Maintenance Hole near Confluence with the Don River	13.3
Project #10: NBC - Page	Lower	Multiple Sanitary Assets Upstream of Forest Grove Drive Near Page Avenue	13.0
Project #11: NBC - Canary	Lower	Failed Stormwater Outfall at Burbank Drive Near Canary Crescent	10.0

In order to establish an approximate implementation timeline for the each of the eleven projects, the four priority tiers were divided into five-year implementation blocks, beginning in 2025 and ending in 2045, as shown in **Table 5-9**. It is acknowledged, the ultimate prioritization of capital works projects will be at the discretion of the City of Toronto and will need to take into consideration a multitude of factors in addition to project failure risk. Some of these potential additional factors are outlined in the following section.

Table 5-9: Recommended Implementation Timeline for Each Priority Tier

Priority Group	Implementation Timeline
High	2025-2030
Mid-High	2030-2035
Mid-Low	2035-2040
Lower	2040-2045

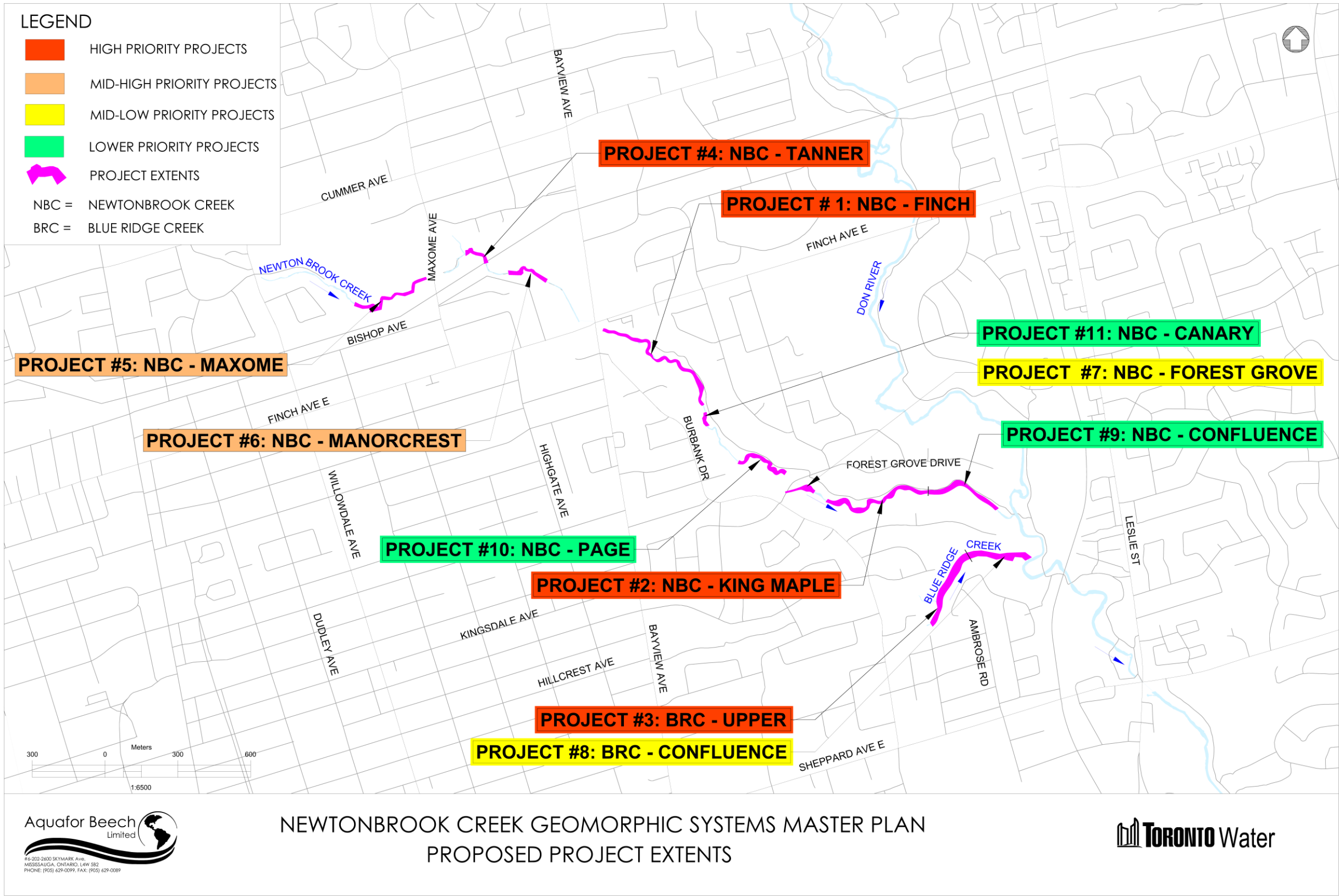


Figure 5-2: Spatial Distribution of Eleven Prioritized NCGSMP Capital Works Projects

5.5 Additional Project Prioritization Factors

Additional refinement of project phasing will depend on a series of additional factors, which go beyond the failure risk of each project. These factors can be grouped into two distinct categories: factors internal to the NCGSMP study area which influence project prioritization, and factors external to the NCGSMP study area. These two categories and associated prioritization factors are outlined in the following subsections.

5.6 Internal GSMP Prioritization Factors

5.6.1 Shared Construction Access

Shared construction access will play an important role in the prioritization of the eleven projects. As the study area is situated within a highly constrained urban corridor, access to the eleven project sites is limited, with multiple projects sharing portions of the same proposed access routes. Based on the principle of shared access, there is an opportunity to complete projects of similar priority in a consecutive fashion, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access could be completed in a systematic manner, such that access for a future project does not occur in areas where access route restoration was recently completed. As such, shared construction access will factor into the implementation of these projects.

5.6.2 Property Access Permissions

The eleven proposed projects may require different levels of property access permissions in order to access and complete the proposed works. As the establishment of private property access permissions typically requires a significant amount of lead time, it may be logical to prioritize a project with minimal required access permissions over a project of similar failure risk with extensive property access permissions. This would allow for the construction of the former project, while property access permissions are established for the latter.

5.6.3 Applicable Timing Windows

Each of the eleven projects will be subject to the applicable timing window restrictions relating to tree removals, in-water works, and species at risk. Tree removals will need to comply with the collective migratory birds & bat roosting restriction window, where trees cannot be felled from April 1st – September 30th of any given year. In water works will need to comply with the in-water timing windows specific to the project. These timing windows will be dependent on the thermal regime of the watercourse at the project location, and the species of fish present. It is possible that these timing windows may differ between the Newtonbrook Creek projects and the Blue Ridge Creek projects, and possibly between projects of a shared watershed. These in-water works timing windows, along with any project specific species-at-risk timing window restrictions, will be established through the detailed design process and later confirmed by regulatory agencies (i.e., DFO or MECP).

5.7 External GSMP Prioritization Factors

5.7.1 Priorities of Other Geomorphic System Master Plan Projects

The City of Toronto is currently undergoing a total of five geomorphic systems master plan projects for watercourses across the City, which are in various stages of completion. In addition to Newtonbrook and Blue Ridge creeks, the Humber River, Mimico Creek, German Mills Creek and Yellow Creek are all under assessment. Upon completion of each of the Master Plan reports for the five city-wide GSMP projects, the City of Toronto must prioritize projects across each of these watercourses.

5.7.2 Additional Nearby Projects

There is the possibility of numerous other projects within and external to the City to occur in close proximity to any of the eleven capital works projects. Potential nearby projects to be led by the City may include basement flooding reduction projects, bridge/culvert replacements, or nearby road improvement works. Potential nearby projects to be completed external to the City include private property protection works led by TRCA, or pipeline protection projects to be led by the utility owner. Each of these potential nearby projects could offer a potential for collaboration through project alignments, or they could pose a barrier through project conflict. Consequently, the opportunities or conflicts associated with these externally driven projects may influence the prioritization of the NCGSMP projects.

5.8 Prioritization Summary and Cost Estimates

Aquafor has prepared cost estimates for each of the eleven projects. These cost estimates account for costs associated with site preparation and removals, channel and outfall rehabilitation work, and site restoration works. Additionally, these cost estimates include detailed design consulting fees, an allowance for construction administration and inspection, post construction monitoring, and project specific studies relating to subsurface utilities and soils. A 20% contingency is applied to ensure the cost estimates remain conservative. The cost estimates are displayed in **Table 5-10**.

Table 5-10: Project Cost Summary

Project Name	Project Description	Project Cost Estimates
Project #1: NBC - Finch	Multiple Sanitary Assets Downstream of Bayview and Finch	\$8,207,000
Project #2: NBC - King Maple	Exposed Sanitary Sewer Downstream of Forest Grove Near King Maple Place	\$5,959,000
Project #3: BRC - Upper	Upper Blue Ridge Creek near Sifton Court	\$4,834,000
Project #4: NBC - Tanner	Exposed Sanitary Crossing Downstream of Maxome Avenue Near Tanner Court	\$2,434,000
Project #5: NBC - Maxome	Multiple Sanitary Risks Directly Upstream of Maxome Avenue	\$5,757,000
Project #6: NBC - Manorcrest	Watermain Infrastructure Upstream of Bayview and Finch Near Manorcrest Drive	\$3,271,000
Project #7: NBC - Forest Grove	Failed Stormwater Outfall Downstream of Forest Grove Drive	\$1,733,000
Project #8: BRC - Confluence	Lower Blue Ridge Creek near Confluence with the Don River	\$4,971,000
Project #9: NBC - Confluence	Previously Exposed Sanitary Maintenance Hole near Confluence with the Don River	\$4,449,000
Project #10: NBC - Page	Multiple Sanitary Assets Upstream of Forest Grove Drive Near Page Avenue	\$4,848,000
Project #11: NBC - Canary	Failed Stormwater Outfall at Burbank Drive Near Canary Crescent	\$875,000
Total		\$47,338,000

The following subsections provide, on a project-by-project basis, a complete project cost breakdown, along with project specific details and an illustration of the conceptual designs. High resolution drawings showing the planform design for the eleven projects are provided in **Appendix W**.

5.8.1 Project #1: NBC - Finch - Multiple Sanitary Assets Downstream of Bayview and Finch

Project #1: NBC - Finch includes the following key elements listed below:

- 650 metres of channel restoration works along the upstream extents of Reach N2
- Provide 1.0 metre of cover over four (x4) exposed sanitary sewer crossings (Priority Site #5 - SL4031857, Priority Site #6 - SL4031887, Priority Site #7 - SL4031887 and Priority Site #9 - SL4033483)
- Protect an exposed sanitary sewer maintenance hole (Priority Site #8 - SL4033483)
- Mitigate lateral erosion risks at four (x4) additional erosion sites (Priority Site #19 - SL4032401, Priority Site #20 - SL4031887, Priority Site #22 - SL4033483, MH4918613545, SL4031888 and Priority Site #26 - SL4031857)
- Rehabilitate two (x2) local storm sewer outfalls (Priority Site #53 - OF4902413782 and Priority Site #65 - OF4907413839)
- Provide protection to the multi-use trail system at multiple locations.

A preliminary conceptual drawing of the works associated with Project #1: NBC - Finch is provided in **Figure 5-3**. Project #1: NBC Finch is included in the High Priority project group, with a maximum project failure risk of 25.0. The driving priority sites for this project include four (x4) exposed sanitary sewers and one (x1) exposed sanitary maintenance hole.

This project will likely share access with Project #11: NBC - Canary and Project #10: NBC - Page. As such, it is recommended these projects are completed in a consecutive fashion wherever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. To this end, the restoration of this shared access should be completed in a systematic manner. Furthermore, portions of the proposed works are on private property. As such, property access coordination with land owners to facilitate Permission to Enter agreements must be completed in order to access this location and construct the works.

Project #1: NBC - Finch is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #1: NBC - Finch will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #1: NBC - Finch show the total project costs to be **\$8,207,000**.

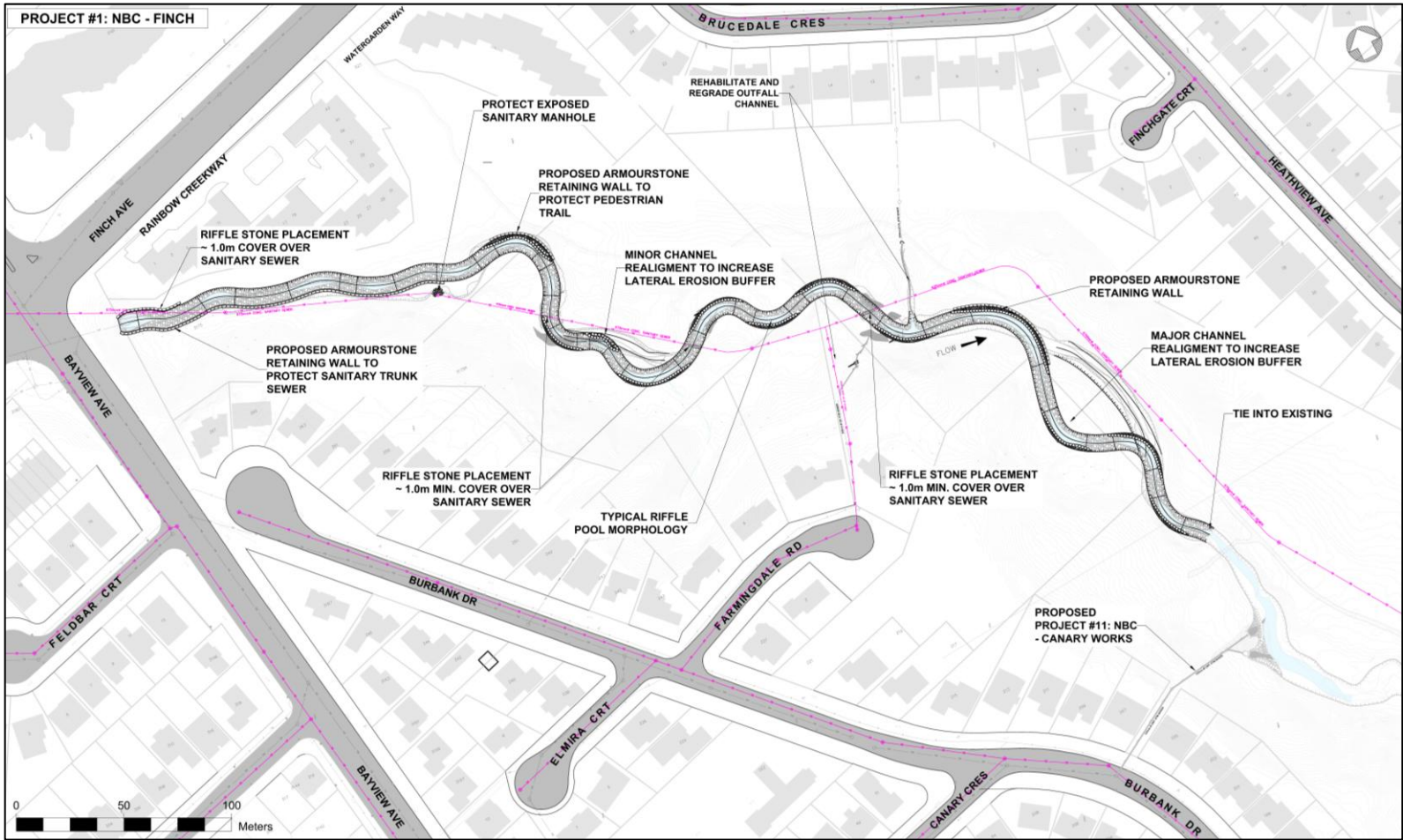


Figure 5-3: Project #1: NBC - Finch Preliminary Conceptual Drawing

5.8.2 Project #2: NBC - King Maple - Exposed Sanitary Sewer Downstream of Forest Grove near King Maple Place

Project #2: NBC - King Maple includes the following key elements listed below:

- 500 metres of channel restoration works along the middle of Reach N1
- Provide 1.0 metre of cover over an exposed sanitary sewer crossing (Priority Site #2 - SL4032406)
- Increase the depth of cover overtop of a second buried sanitary sewer crossing (Priority Site #34 - SL4032404)
- Mitigate lateral erosion risks at two secondary erosion sites (Priority Site #25 - SL4032404 and Priority Site #27 - SL4033583)
- Provide protection to the multi-use trail system.

A preliminary conceptual drawing of the works associated with Project #2: NBC - King Maple is provided in **Figure 5-4**. Project #2: NBC King Maple is included in the High Priority project group, with a maximum project failure risk of 25.0. The driving priority site for this project is the exposed sanitary sewer crossing at Restwell Crescent.

This project will share access with Project #9: NBC - Confluence and Project #7: NBC - Forest Grove. As such, it is recommended these projects are completed in a consecutive fashion wherever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner.

Project #2: NBC - King Maple is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #2: NBC - King Maple will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF).

Refined cost estimates for Project #2: NBC - King Maple show the total project costs to be **\$5,959,000**.

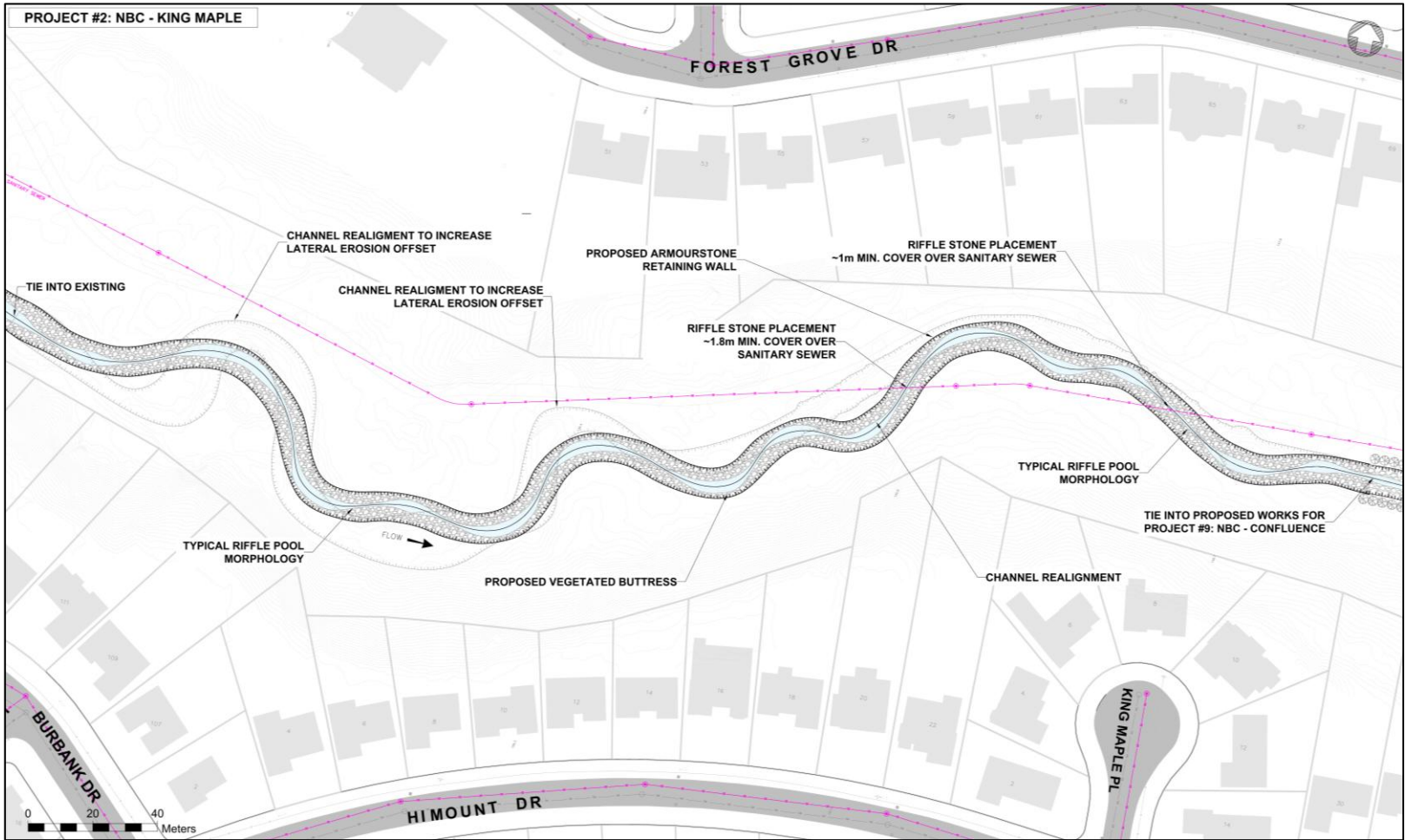


Figure 5-4: Project #2: NBC - King Maple - Preliminary Conceptual Drawing

5.8.3 Project #3: BRC - Upper - Upper Blue Ridge Creek near Sifton Court

Project #3: BRC - Upper includes the following key elements listed below:

- 300 metres of channel restoration works within the upstream extents of Reach BR1
- Replace a failed storm sewer outfall (Priority Site #13 - OF4824214956)
 - Includes repairing/replacing 97.3 metres of failed storm sewer pipe (SL4029533, SL4029532, SL4034315)
 - Includes repairing/replacing 94.7 metres of failed sanitary sewer pipe (SL4030295, SL4030486)
 - Includes slope restoration work to benefit private properties, including #141 & #142 Citation Drive.
- Provide 1.0 metres of cover overtop of an exposed sanitary sewer crossing (Priority Site #14 - SL4029711)
- Address four (x4) lateral erosion risk sites through minor channel realignment and the construction of bank protection works (Priority Site #15 - SL4030293, Priority Site #21 - SL4030487, Priority Site #29 - MH4825114957, SL4030369, and Priority Site #36 - SL4030294)
- Provide toe erosion protection at select locations to help benefit private properties, including #67, #69, #71, #73, #75, #77, #79, #81, #83, #85, #87, #91 Clarinda Drive

A preliminary conceptual drawing of the works associated with Project #3: BRC - Upper is provided in **Figure 5-5**. Project #3: BRC - Upper is included in the High Priority project group, with a maximum project failure risk of 25.0. The driving priority site for this project is the exposed sanitary sewer crossing at Sifton Court. This project will share access with Project #8: BRC - Confluence. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner. The storm sewer pipe replacement works associated with this project will need to be coordinated with other City departments and the ongoing Basement Flooding program.

Project #3: BRC - Upper is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #3: BRC - Upper will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNR). Refined cost estimates for Project #3: BRC - Upper show the total project costs to be **\$4,834,000**.

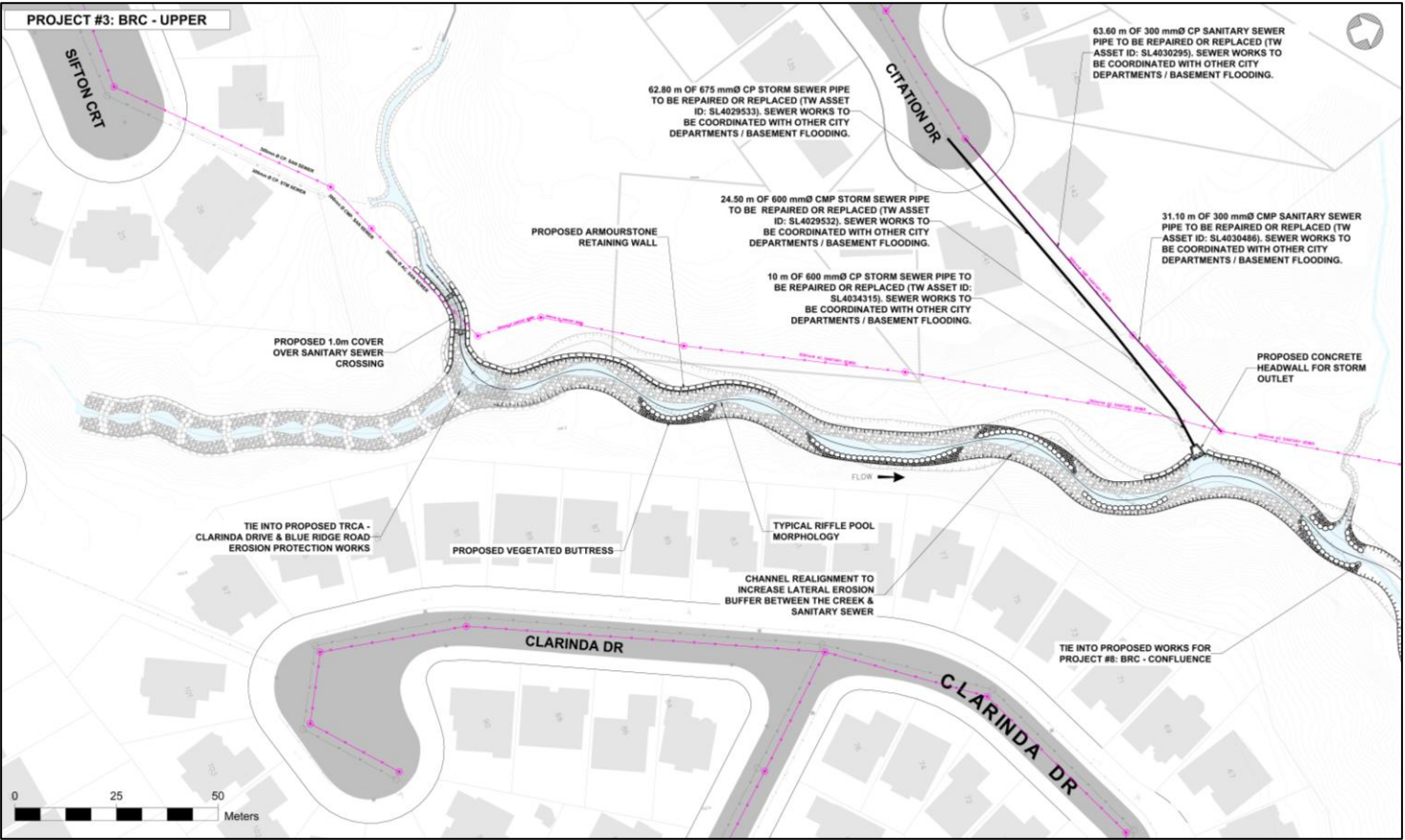


Figure 5-5: Project #3: BRC - Upper - Preliminary Conceptual Drawing

5.8.4 Project #4: NBC - Tanner - Exposed Sanitary Crossing Downstream of Maxome Avenue near Tanner Court

Project #4: NBC - Tanner includes the following key elements listed below:

- 120 metres of channel restoration works within Reach N3
- Provide 1.0 metre of cover overtop of an exposed sanitary sewer crossing (Priority Site #11 - SL4032523)
- Increase the depth of cover over an additional sanitary sewer crossing to a minimum of 1.5 metres (Priority Site #39 - SL4034029)
- Rehabilitate a storm sewer outfall (Priority Site #64 - OF4950913010)
- Provide 1.0 metre of cover over three oil pipelines (Trans-Northern, Sun-Canadian, and Imperial Oil).

A preliminary conceptual drawing of the works associated with Project #4: NBC - Tanner is provided in **Figure 5-6**. Project #4: NBC - Tanner is included in the High Priority project group, with a maximum project failure risk of 25. The driving priority site for this project is the exposed sanitary sewer upstream of Blessed Trinity Parish. Particular consultation efforts will be required with the pipeline owners, including Sun Canadian, Trans Northern, and Imperial Oil. The exact location of the three pipelines will likely need to be confined through a Subsurface Utility Investigation Level A assessment, and specific utility protection measures will be confirmed as part of the detailed design phase.

Project #4: NBC - Tanner is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #4: NBC - Tanner will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #4: NBC - Tanner show the total project costs to be **\$2,434,000**.

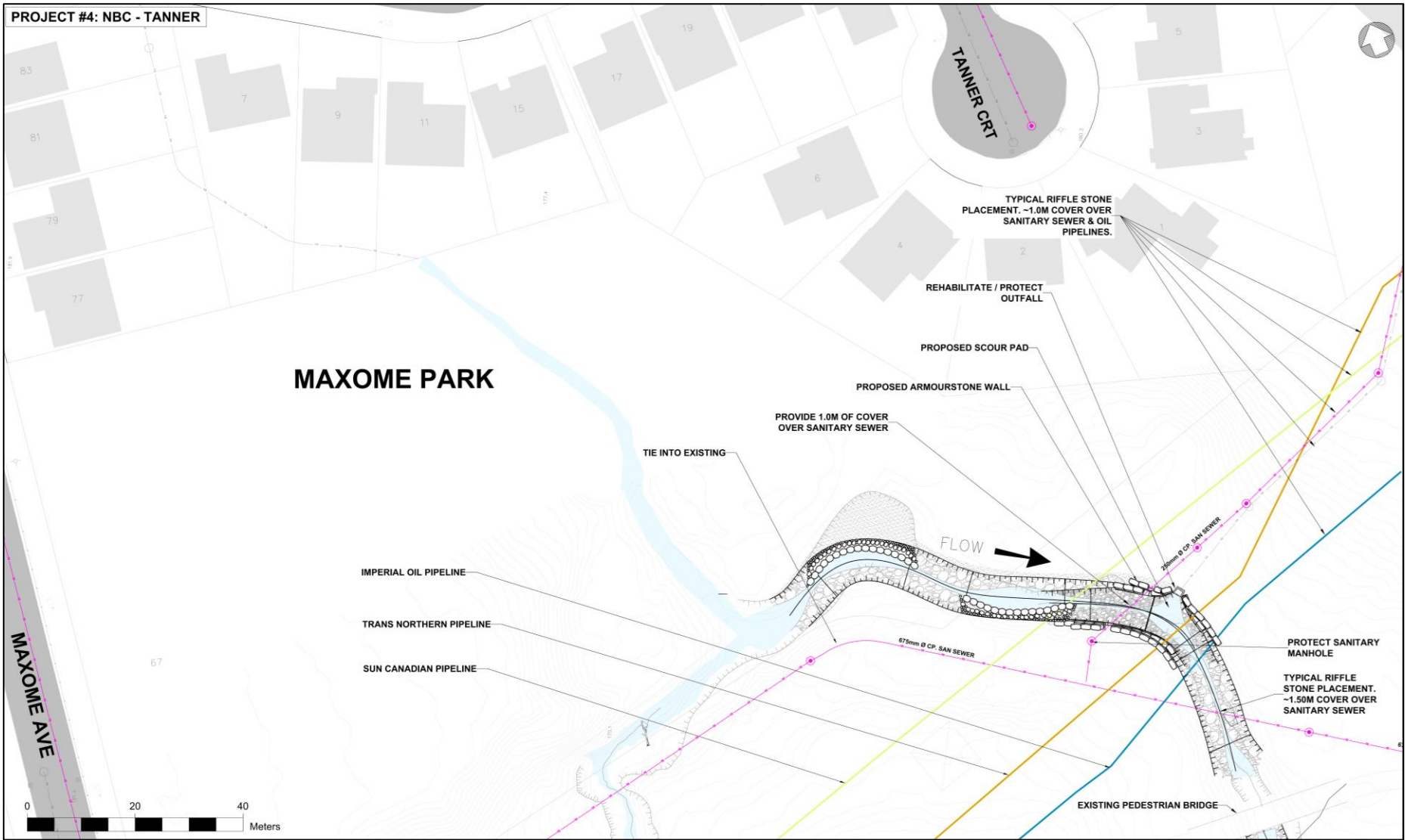


Figure 5-6: Project #4: NBC - Tanner - Preliminary Conceptual Drawing

5.8.5 Project #5: NBC - Maxome - Multiple Sanitary Risks Directly Upstream of Maxome Avenue

Project #5: NBC - Maxome includes the following key elements listed below:

- 350 metres of channel restoration works within Reach N4
- Address two (x2) lateral erosion risk sites through channel realignment and construction of an armourstone retaining wall (Priority Site #17 - SL4032958 and Priority Site #30 - SL4033490, MH4918613545, SL4031888)
- Increase the depth of cover over three (x3) sanitary sewer crossings by a minimum of 1.0 metre (Priority Site #32 - SL4031698, Priority Site #33 - SL4031698, and Priority Site #35 - SL4032961)
- Provide protection to the multi-use trail system

A preliminary conceptual drawing of the works associated with Project #5: NBC - Maxome is provided in **Figure 5-7**. Project #5: NBC - Maxome is included in the Mid-High Priority project group, with a maximum project failure risk of 21.7. The driving priority site for this project is the lateral risk to the sanitary sewer upstream of Maxome Avenue.

Project #5: NBC - Maxome is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank and slope restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #5: NBC - Maxome will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #5: NBC - Maxome show the total project costs to be **\$5,757,000**.

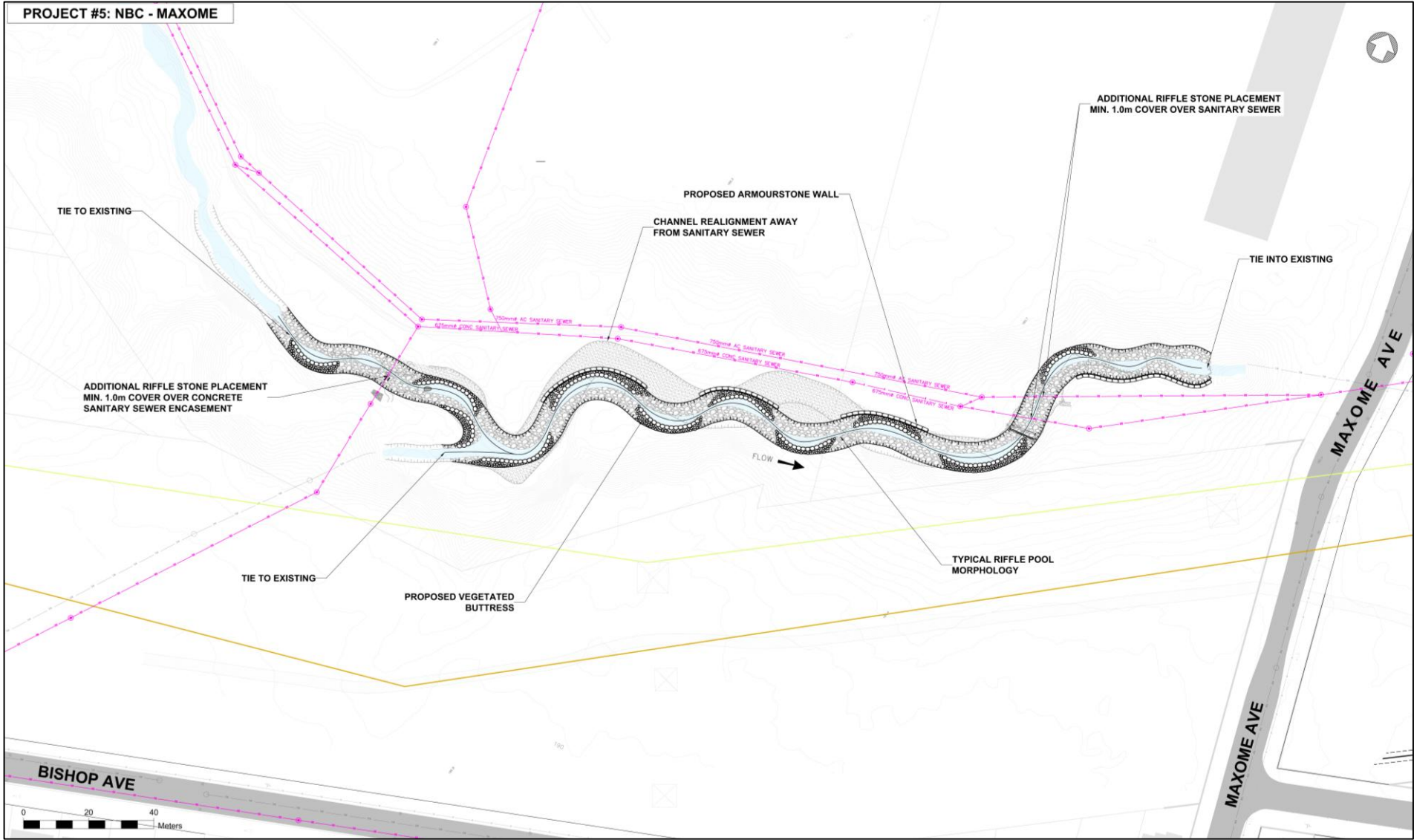


Figure 5-7: Project #5: NBC - Maxome - Preliminary Conceptual Drawing

5.8.6 Project #6: NBC - Manorcrest - Watermain Infrastructure Upstream of Bayview and Finch near Manorcrest Drive

Project #6: NBC - Manorcrest includes the following key elements listed below:

- 175 metres of channel restoration works within Reach N3
- Provide 1.42 metres of cover overtop of a buried 1,350 mm diameter watermain crossing (Priority Site #10 - LN24062)
- Protect an exposed watermain chamber (Priority Site #10 - LN24062) through construction of a vegetated buttress
- Increase the depth cover overtop of a buried sanitary sewer crossing upstream to a minimum of 2.0 metres (Priority Site #43 - SL4031891)
- Rehabilitate a storm sewer outfall and its associated outfall channel (Priority Site #69 - OF4940713236)

A preliminary conceptual drawing of the works associated with Project #6: NBC - Manorcrest is provided in **Figure 5-8**. Project #6: NBC - Manorcrest is included in the Mid-High Priority project group, with a project failure risk of 20.0. The driving priority site for this project is the exposed watermain chamber at Manorcrest Drive.

Project #6: NBC - Manorcrest is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank and slope restoration work and channel realignment, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #6: NBC - Manorcrest will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNR). Refined cost estimates for Project #6: NBC - Manorcrest show the total project costs to be **\$3,271,000**.

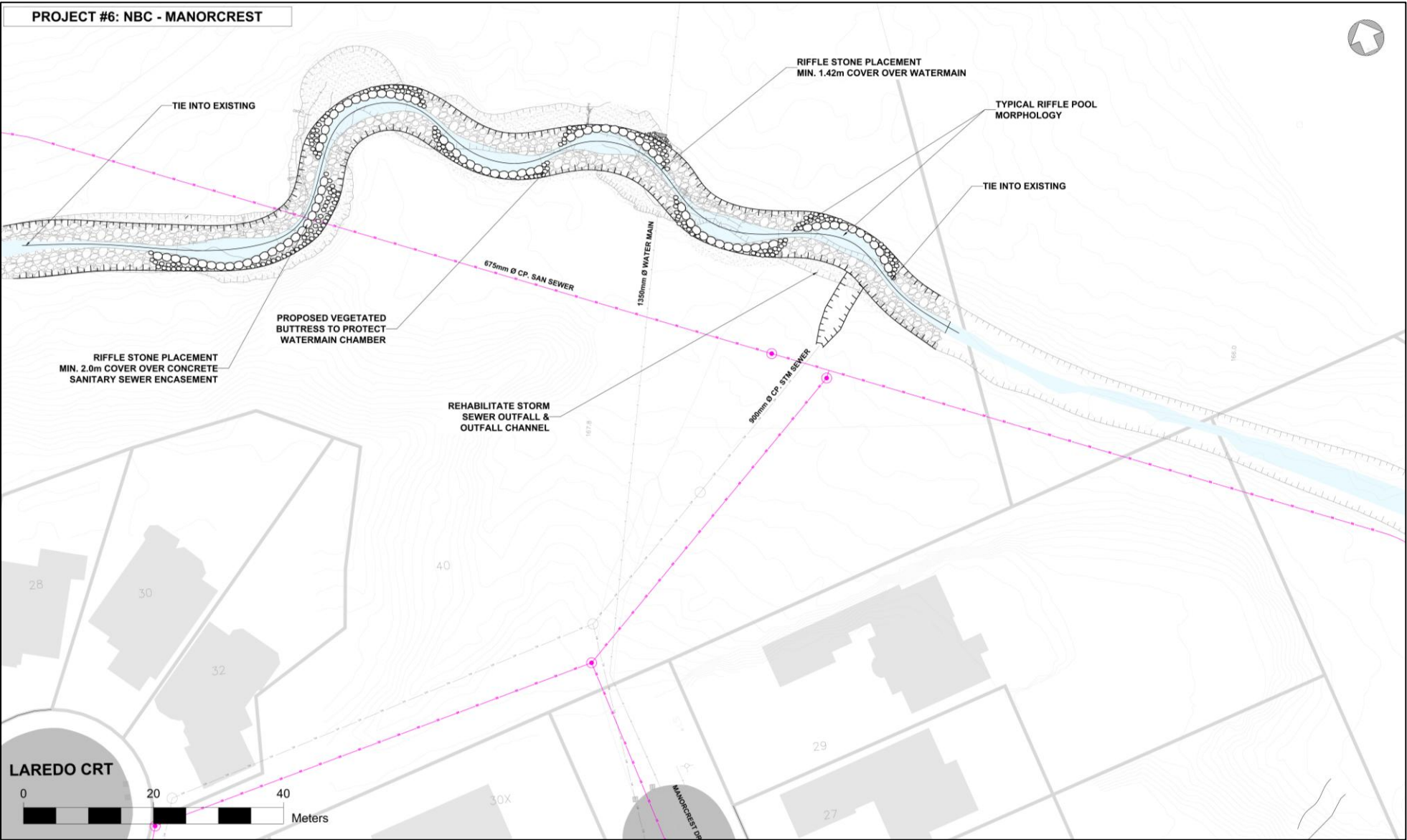


Figure 5-8: Project #6: NBC - Manorcrest - Preliminary Conceptual Drawing

5.8.7 Project #7: NBC - Forest Grove - Failed Stormwater Outfall Downstream of Forest Grove Drive

Project #7: NBC - Forest Grove includes the following key elements listed below:

- Restore a failed storm sewer outfall (Priority Site #3 - OF4854214333) at the upstream extents of Reach N1
 - Includes repairing/replacing 88 metres of failed corrugated metal pipe - SL4025495, SL4025505.
- Address an additional lateral erosion risk site (Priority Site #24 - SL4033584) through the construction of an armourstone wall with vegetated buttress toe protection

A preliminary conceptual drawing of the works associated with Project #7: NBC - Forest Grove is provided in **Figure 5-9**. Project #7: NBC - Forest Grove is included in the Mid-Low Priority project group, with a project failure risk of 18.3. The driving priority site for this project is the lateral risk to the sanitary sewer downstream of Forest Grove Drive, closely followed by the failed outfall downstream of Forest Grove Drive.

This project will share access with Project #2: NBC - King Maple and Project #9: NBC - Confluence. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner. The storm sewer pipe replacement works associated with this project will need to be coordinated with other City departments and the ongoing Basement Flooding program.

Project #7: NBC - Forest Grove is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank and slope restoration work, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #7: NBC - Forest Grove will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #7: NBC - Forest Grove show the total project costs to be **\$1,733,000**.

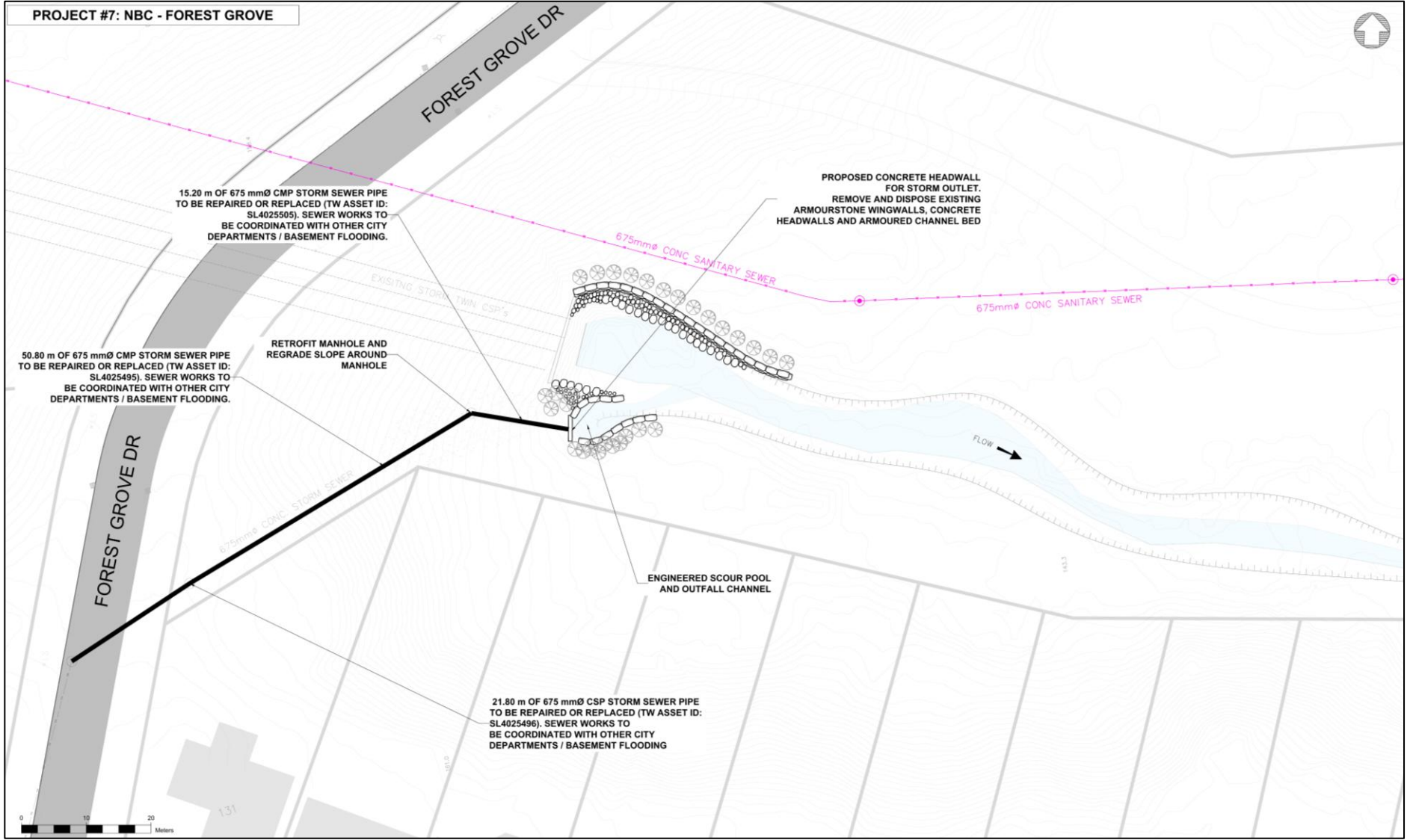


Figure 5-9: Project #7: NBC – Forest Grove - Preliminary Conceptual Drawing

5.8.8 Project #8: BRC - Confluence - Lower Blue Ridge Creek near Confluence with the Don River

Project #8: BRC - Confluence includes the following key elements listed below:

- 275 metres of channel restoration works within the downstream extents of Reach BR1
- Replace a failed storm sewer outfall (Priority Site #12 - OF4830215159)
 - Includes repairing/replacing 74 metres of failed corrugated metal pipe – (SL4050180, SL4050179).
 - Includes slope restoration work to benefit private properties including #55 and #59 Hi Mount Drive.
- Address two (x2) lateral erosion risk sites through minor channel realignment and the construction of an Armourstone retaining wall (Priority Site #23 - SL4053177 and Priority Site #40 - SL4051741)

Provide toe erosion protection at select locations to help benefit private properties Including #45, #47, #49, #51, #53, #55, #59 Hi Mount Drive and #63, #65, #67, #69, #71, #73 Hi Mount Drive.

A preliminary conceptual drawing of the works associated with Project #8: BRC - Confluence is provided in **Figure 5-10**. Project #8: BRC - Confluence is included in the Mid-Low Priority project group, with a maximum project failure risk of 18.3. The driving priority site for this project is the lateral risk to the sanitary sewer at Hi Mount Drive.

This project will share access with Project #3: BRC - Upper. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner. The storm sewer pipe replacement works associated with this project will need to be coordinated with other City departments and the ongoing Basement Flooding program.

Project #8: BRC - Confluence is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and realignment of the watercourse, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #8: BRC - Confluence will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #8: BRC - Confluence show the total project costs to be **\$4,971,000**.

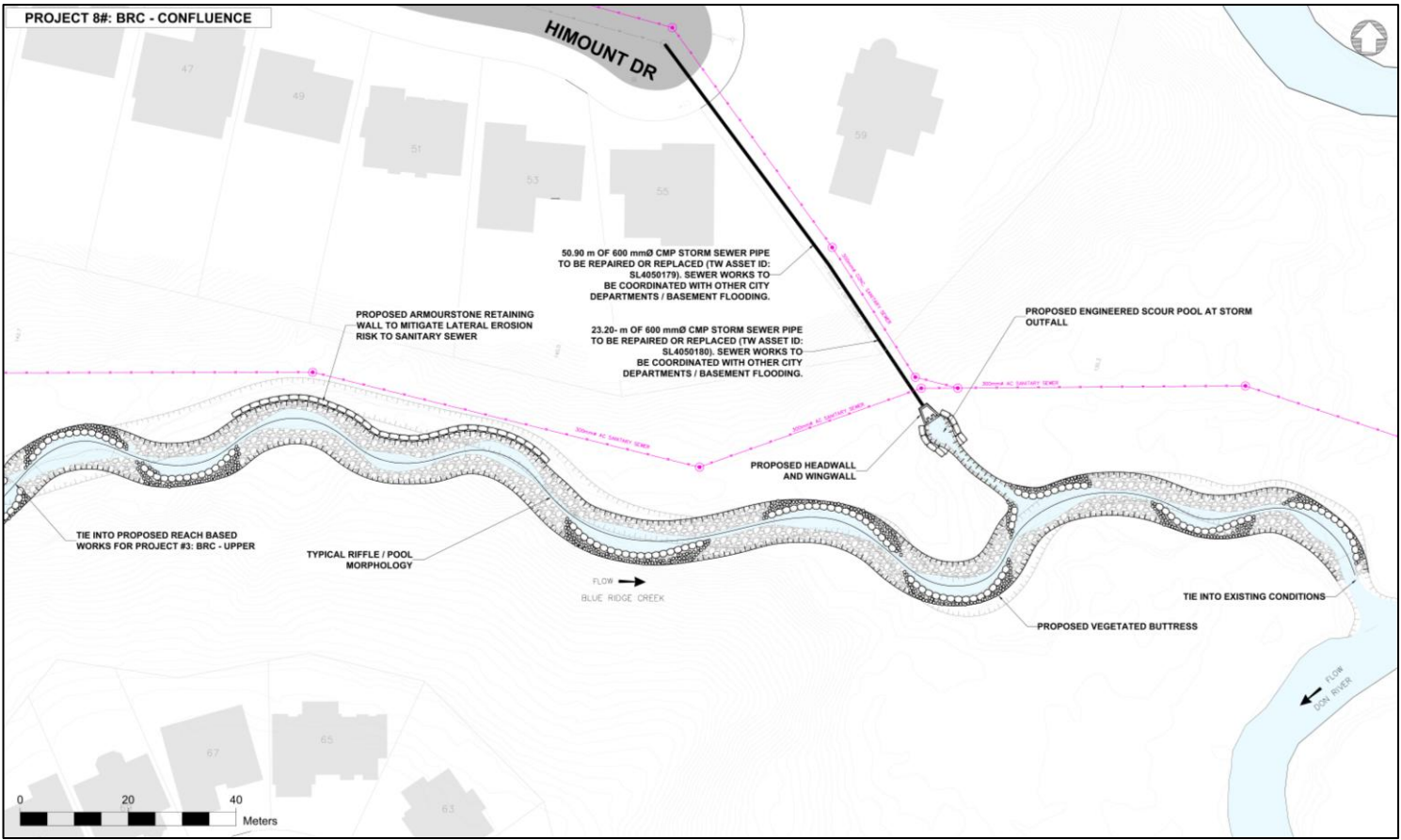


Figure 5-10: Project #8: BRC - Confluence - Preliminary Conceptual Drawing

5.8.9 Project #9: NBC - Confluence - Previously Exposed Sanitary Maintenance Hole near Confluence with the Don River

Project #9: NBC - Confluence includes the following key elements listed below:

- 350 metres of channel restoration work along the lower portion of Reach N1
- Provide 1.0 metre of cover over a near-exposed sanitary sewer crossing (Priority Site #1 - SL4033582)
- Protect a previous exposed sanitary maintenance hole (Priority Site #1 - MH4856914969), which has been temporarily protected through emergency works
- Increase the depth of cover overtop of a second buried sanitary sewer crossing (Priority Site #42 - SL4033032)
- Provide protection to the multi-use trail system.

A preliminary conceptual drawing of the works associated with Project #9: NBC - Confluence is provided in **Figure 5-11**. Project #9: NBC - Confluence is included in the Lower Priority project group, with a maximum project failure risk of 13.3. The driving priority site for this project is the previously exposed sanitary sewer maintenance hole and lateral risk to sanitary sewer near the confluence with the Don River.

This project will share access with Project #2: NBC - King Maple and Project #7 - NBC - Forest Grove. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner.

Project #9: NBC - Confluence is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and minor realignment of the watercourse, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #9: NBC - Confluence will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #9: NBC - Confluence show the total project costs to be **\$4,449,000**.

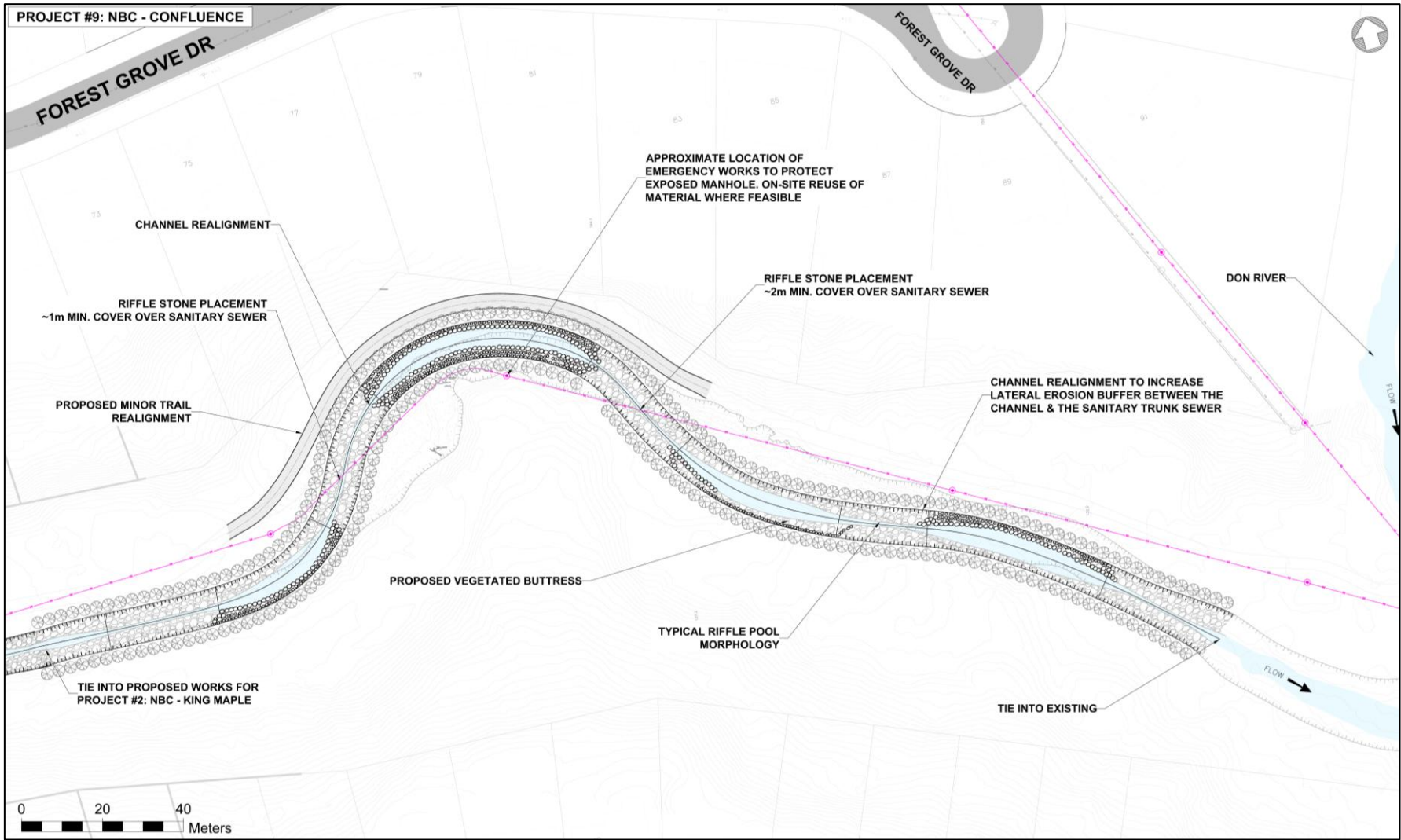


Figure 5-11: Project #9: NBC - Confluence - Preliminary Conceptual Drawing

5.8.10Project #10: NBC - Page - Multiple Sanitary Assets Upstream of Forest Grove Drive Near Page Avenue

Project #10: NBC - Page includes the following key elements listed below:

- 240 metres of channel restoration works at the downstream end of Reach N2
- Address two lateral erosion risk sites (Priority Site #16 - SL4033585 and Priority Site #18 - SL4034031) through a combination of channel realignment and the construction of bank protection works (i.e., Armourstone Retaining Wall).
- 220 metres of proposed trail restoration work
- Mitigate erosion related risks to the multi-use trail
- Establish a smoother, more geomorphically and hydraulically stable transition into the Forest Grove Drive Culvert

A preliminary conceptual drawing of the works associated with Project #10: NBC - Page is provided in **Figure 5-12**. Project #10: NBC - Page is included in the Lower Priority project group, with a maximum project failure risk of 13.0. The two driving priority sites for this project are the lateral risk to sanitary sewer infrastructure upstream of Forest Grove Drive and the lateral risk to the sanitary sewer infrastructure at Heathview and Page Avenue.

This project will share access with Project #1: NBC - Finch and Project #11 - NBC - Canary. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner.

Project #10: NBC - Page is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed bank restoration work and realignment of the watercourse, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #10: NBC - Page will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #10: NBC - Page show the total project costs to be **\$4,848,000**.

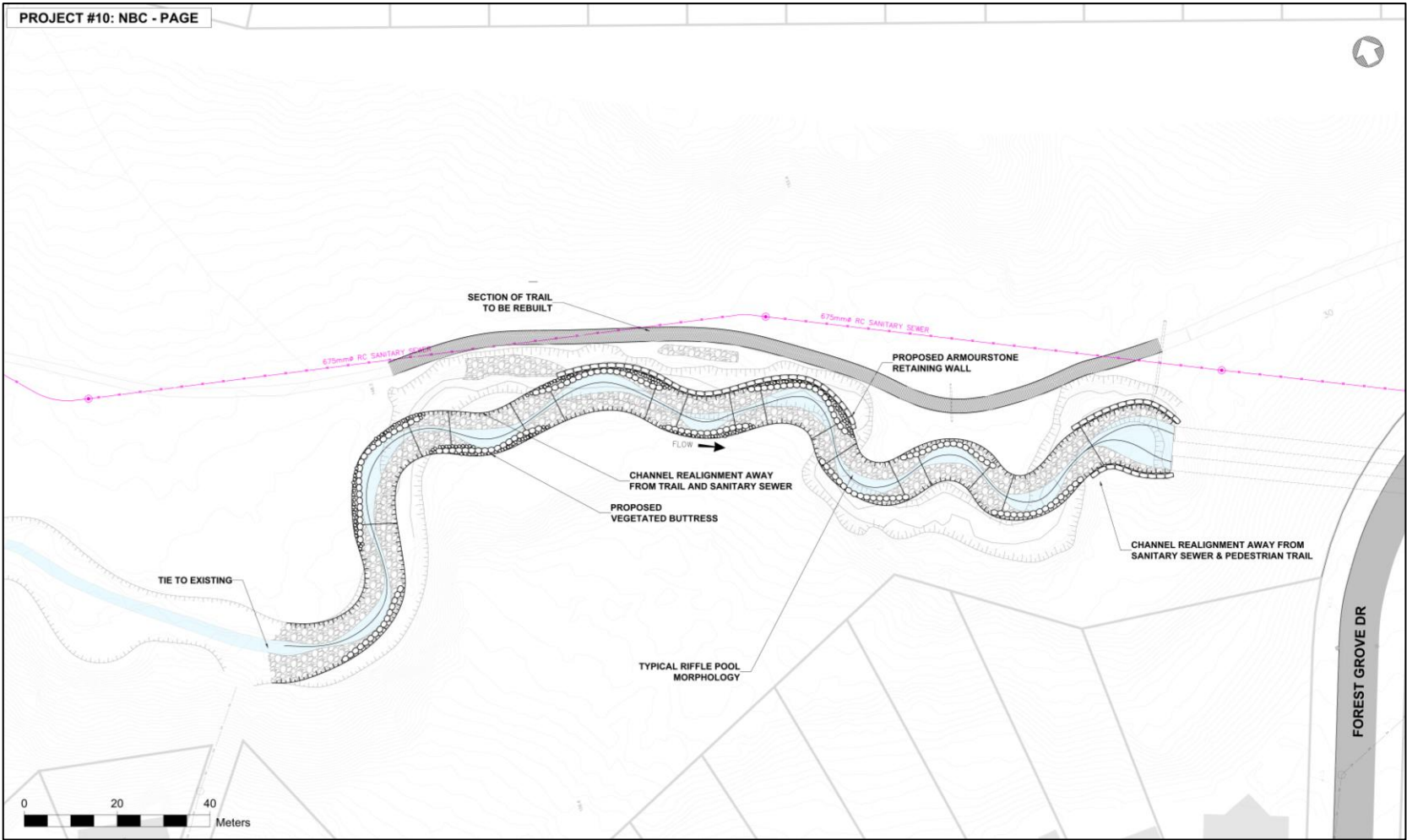


Figure 5-12: Project #10: NBC - Page - Preliminary Conceptual Drawing

5.8.11 Project #11: NBC - Canary - Failed Stormwater Outfall at Burbank Drive Near Canary Crescent

Project #11: NBC - Canary includes the following key elements listed below:

- Restore a failed storm sewer outfall in Reach N2 (Priority Site #4 - OF4884313907)
 - Includes repairing/replacing 92 metres of failed corrugated metal pipe - SL4025522, SL4025521
- Slope restoration to address potential erosion risks to private property including #205 and #207 Burbank Drive

A preliminary conceptual drawing of the works associated with Project #11: NBC - Canary is provided in **Figure 5-13**. Project #11: NBC - Canary is included in the Lower Priority project group, with a maximum project failure risk of 10.0. The driving priority site for this project is the failed stormwater outfall at Canary Crescent. The storm sewer pipe replacement works associated with this project will need to be coordinated with other City departments and the ongoing Basement Flooding program.

This project will share access with Project #1: NBC - Finch and Project #11 - NBC - Canary. As such, it is recommended these projects are completed in a consecutive fashion whenever possible, in order to minimize short term community impacts through general construction disturbance, as well as community trail closures. Furthermore, the restoration of this shared access should be completed in a systematic manner.

Project #11: NBC - Canary is classified as a Schedule B Municipal Class Environmental Assessment, due to the proposed slope restoration work, as per the 2023 update to the Municipal Class Environmental Assessment Act. Furthermore, it is expected Project #11: NBC - Canary will be subject to permitting requirements from the Toronto and Region Conservation Authority (TRCA), Fisheries and Oceans Canada (DFO), Ministry of the Environment, Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF). Refined cost estimates for Project #11: NBC - Canary show the total project costs to be **\$875,000**.

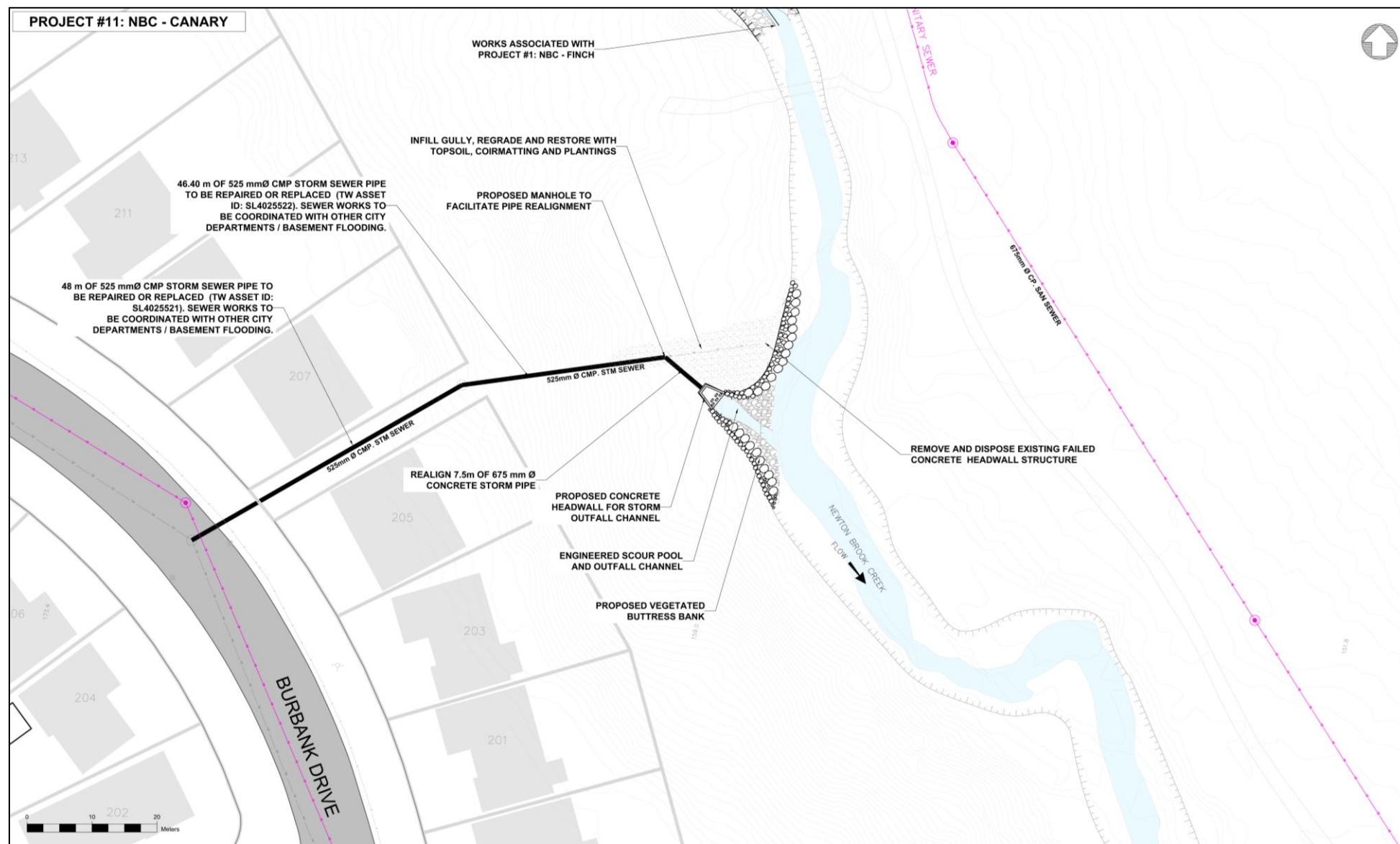


Figure 5-13: Project #11: NBC - Canary - Preliminary Conceptual Drawing