4.23 Priority Site #21 – Lateral Risk to Sanitary Sewer at Ambrose Road

Priority Site #21 is located in Reach BR1 of Blue Ridge Creek, approximately 370 metres upstream of the confluence between Blue Ridge Creek and the Don River. This segment of Blue Ridge Creek is characterized by a steep channel gradient coupled with signs of active degradation and channel widening. The channel banks are primarily composed of highly erodible silt and sand rich gravel material, creating opportunities for significant bank erosion during high flow events.

At this priority site location, bank erosion has created a lateral erosion risk to a 300 mm diameter sanitary sewer running parallel to the creek. The exposed bank materials are extremely erodible and are not protected by any engineered bank treatments. With an estimated lateral cover depth of 3.50 m, the projected time to contact is 11.74 years. It is recommended that consideration be given to protecting the sewer through the installation of an engineered bank treatment such as a vegetated buttress or armourstone retaining wall. A photo illustrating the site-specific channel conditions and actively eroding bank encroaching towards the sanitary sewer line is presented in **Figure 4-103**.

Figure 4-103: Degraded Channel Conditions at Priority Site #21, Where Actively Eroding Bank has Created a Lateral Risk to a 300 mm Diameter Sanitary Sewer

Sanitary Sewer parameters relevant to this priority site are summarized in **Table 4-24** with a drawing illustrating the existing conditions of the project site presented in **Figure 4-104**.

Table 4-24: Summary of Priority Site #21 Sanitary Sewer Parameters

Parameter	Sanitary Trunk Sewer
Toronto Water Asset ID	SL4030487
Year of Construction	1977
Diameter	300
Lateral Depth of Cover	3.5 m
Estimated Time to Contact	11.74 years
Condition of Bank Protection Works	N/A – No Bank Protection Works Present

4.23.1Priority Site #21 – Description of Restoration Alternatives

Alternative 1: Do Nothing – Over time as the channel continues to widen the sanitary sewer will become exposed. Given the height of the sewer within the bank, there is potential for the sewer to become undermined as the toe of the bank continues to erode. Future emergency works may be required if the exposed sewer begins to show signs of structural degradation (i.e., spalling, cracking, slumping, etc.).

Alternative 2: Local Works – Construct a vegetated buttress, roughly 45 metres in length, centered around the point of minimum lateral cover. The vegetated buttress will provide lateral erosion protection and would tie-into the bank works proposed as part of the local works solution for Priority Site #13, which is the failed storm sewer outfall at Citation Drive. The slope behind the buttress will be regarded to smoothly transition into existing conditions, and will also be stabilized through the application of coir-matting and restoration plantings.

Alternative 3: Sub-Reach-Based Works – Apply natural channel design works for approximately 300 metres of channel length including riffle-pool morphology and engineered bank treatments. These works are intended to build the creek back up and stabilize this segment of Blue Ridge creek from a geomorphic perspective. The proposed works will extend from the confluence between Reaches BR-1 and BR-2 to just upstream of the confluence between Reaches BR-1, BR-3, and BR-4. The proposed works will look to realign the creek away from the sanitary sewer, and implement a vegetated buttress as bank protection works at this priority site location, in order to reduce the lateral erosion risk to the sanitary sewer. Implementation of this sub-reach-based works solution will also have the added benefit of restoring a failed storm sewer outfall identified as Priority Site #13, and protecting an exposed sanitary sewer crossing identified as Priority Site #14. Three (3) additional lateral erosion risks sites identified as Priority Sites #15, #29, and #36 will also be addressed through a combination of minor channel realignment to increase the erosion buffer and implementation of engineered bank treatments in the form of armourstone retaining walls or vegetated buttresses. These works are intended to tie-into a second sub-reach-based works alternative designed to address priority sites #12, #23 & #40 by restoring the remaining downstream portion of Reach BR-1.

Preliminary concept drawings illustrating Alternative 2 and Alternative 3 are provided in **Figure 4-105.**

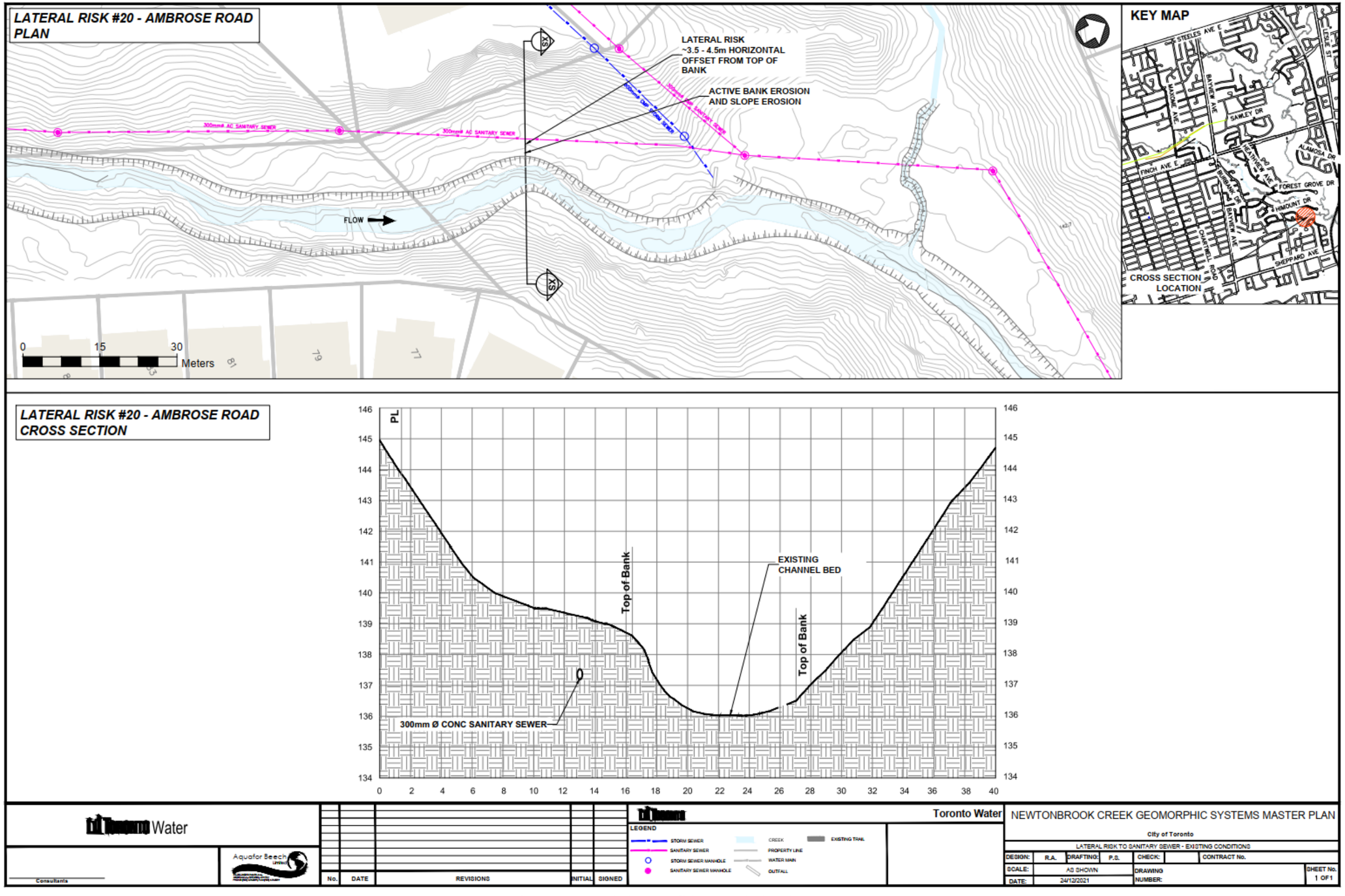

Figure 4-104: Existing Conditions – Priority Site #21

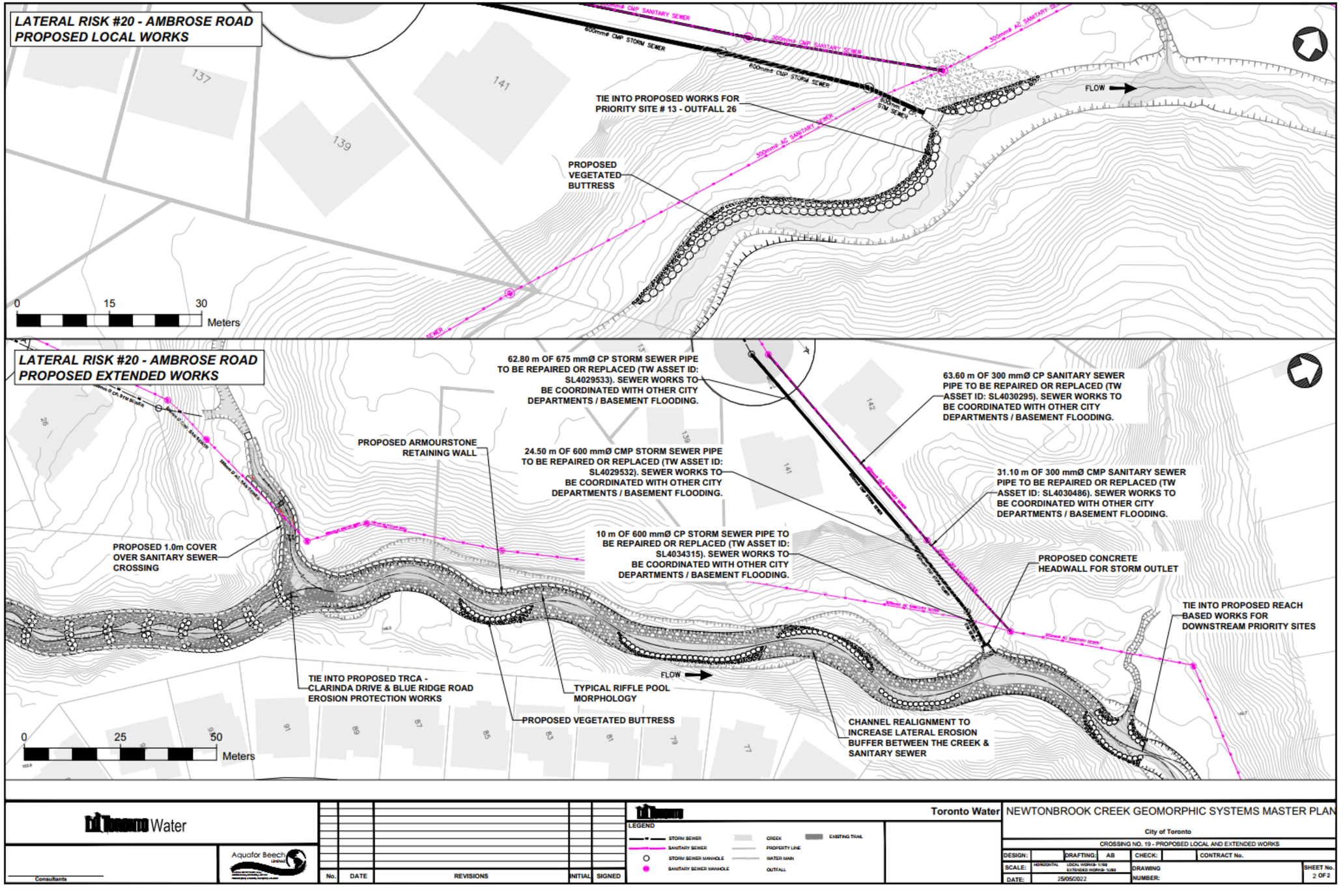

Figure 4-105: Preliminary Design Concepts Alternatives 2 & 3 – Priority Site #21

4.23.2Priority Site #21 – Evaluation of Restoration Alternatives

Restoration Alternatives for Priority Site #21 were evaluated using the methodology outlined in **Section 4.2.** Based on this evaluation process, Alternative 3 - Sub-Reach-Based Works was selected as the preferred alternative.

4.23.3Priority Site #21 – Selection of the Preferred Alternative

As per the evaluation table, the Sub-Reach-Based Works option was selected as the preferred alternative for Priority Site #21 with a total score of 80.53/100. The local works solution was the second preferred alternative with a total score of 62.60/100 while the Do Nothing alternative was the least preferred alternative with a total score of 40.93/100.

Key elements of the Sub-Reach-Based Works alternative include:

- Removal of channel debris, failed erosion control structures (i.e., gabion baskets, armourstone walls, etc.), and failed Toronto Water Infrastructure (i.e., failed outfall and sewer pipe segments).
- Apply approximately 300 metres of channel restoration work using natural channel design principles to establish riffle-pool morphology.
- Mitigate the identified lateral erosion risk to sanitary sewer infrastructure through a combination of minor channel realignment and the construction of a vegetated buttress to provide bank erosion protection.
- Provide 1.0 metres of cover overtop of an exposed sanitary sewer crossing located upstream (Priority Site #14 - SL4029711).
- Mitigate three additional lateral erosion risk sites to sanitary sewer infrastructure (Priority Site #15 - SL4030293, Priority Site #29 - MH4825114957, SL4030369, and Priority Site #36 - SL4030294), through minor channel realignment and the construction of engineered bank treatments (i.e., armourstone walls and vegetated buttresses).
- Repair/Replace approximately 97.30 metres of failed corrugated metal storm sewer pipe and 94.7 metres of failed sanitary sewer pipe, maintaining the same general pipe alignment in planform (Priority Site #13 - OF4824214956). All sewer repair/replacement works must be coordinated with other City departments / basement flooding projects.
- Restoration of a failing slope through regrading and infilling of observed sinkholes and gullies with appropriately compacted fill materials. Apply additional slope stabilization measures (i.e., soil anchors, coir logs, etc.) as defined at the detailed design phase (Priority Site #13 - OF4824214956).
- Undertake Construction along a steep valley slope, including working between private properties on Citation Drive (Priority Site #13 - OF4824214956).
- Replace a failed storm sewer outfall (Priority Site #13 - OF4824214956). Construct an engineered scour pool with an armourstone lined outfall channel that transitions into the main branch of Blue Ridge Creek. Consider routing the outfall channel to transition into Blue Ridge Creek at an oblique angle to help mitigate scouring and erosion at the confluence.
- Retrofit/Repair degraded maintenance hole structures.
- Establish a geomorphically stable transition into existing channel conditions and a TRCA proposed channel restoration project to benefit private properties on Clarinda Drive at the upstream tie-in points.

4.24 Priority Site #22 – Lateral Risk to Sanitary Sewer Downstream of Finch Avenue and Bayview Avenue

Priority Site #22 is located in Reach N2 of Newtonbrook Creek, about 50 metres downstream of the Culvert Outlet that conveys flows under the Bayview Avenue at Finch Avenue intersection. This segment of Newtonbrook Creek has been anthropogenically straightened downstream of the culvert opening through the construction of an engineered channel with armourstone bed and bank treatments. A 675 mm diameter sanitary sewer crossing, identified previously as priority site #9, is effectively exposed within the armourstone bed.

Downstream of the sewer crossing, the armourstone bank treatments have become outflanked and started to fail. This has contributed to the partial exposure of a sanitary sewer maintenance hole in the bank of the creek. The inletting sanitary sewer line is offset roughly 2.0 metres from the edge of the channel, representing a lateral erosion risk to sanitary infrastructure should the channel continue to erode and widen at this location. Considering the current poor-fair condition of the armourstone bank treatments, the projected time to contact is approximately twenty-three (23) years. There is an opportunity to address this lateral erosion risk, as well as the vertical erosion risk to the sanitary sewer crossing upstream through the application of the same local and/or sub-reach-based works design alternatives. A photo illustrating the site-specific channel conditions at this priority site is presented in **Figure 4-106**.

Figure 4-106: Outflanked and Failing Armourstone Retaining Wall Posing Lateral Erosion Risk to 675 mm Diameter Sanitary Sewer, Partial Exposure of Sanitary Sewer Maintenance Hole Present

Sanitary Sewer parameters relevant to this priority site are summarized in **Table 4-25** with a drawing illustrating the existing conditions of the project site presented in **Figure 4-107**.

Table 4-25: Summary of Priority Site #22 Sanitary Sewer Parameters

Parameter	Sanitary Trunk Sewer
Toronto Water Asset ID	SL4033483
Year of Construction	1960
Diameter	675
Lateral Depth of Cover	2.0 m
Estimated Time to Contact	22.81 years
Condition of Bank Protection Works	Poor – Outflanked Armourstone Retaining Wall that is Starting to Fail

4.24.1Priority Site #22 – Description of Restoration Alternatives

Alternative 1: Do Nothing – The estimated depth of the sewer at this location, indicates the sewer is positioned below the existing channel bed affording the sewer both lateral and vertical cover. Nevertheless, over time as the channel continues to widen & deepen, and the armourstone bed and bank treatments continue to fail, the sanitary sewer may become exposed. Future emergency works may be required if the exposed sewer begins to show signs of structural degradation (i.e., spalling, cracking, slumping, etc.). The downstream maintenance hole will also continue to become further exposed overtime and by extension more vulnerable to damage due to exposure to hydrodynamic forces.

Alternative 2: Local Works – Remove the failing armourstone bed and bank treatments and apply channel engineering works for about 70 metres of channel length within reach N2. The works will start at the culvert crossing and extend downstream, establishing a cascade-pool morphology constructed of grouted armourstone ribs and engineered substrate. Both banks will be lined with a new set of armourstone retaining walls, extended beyond the length of the original structures to mitigate lateral erosion related risks to sanitary sewer infrastructure. Any erosion behind the proposed retaining wall will be infilled with approved materials, regraded and then stabilized through the application of coir-matting and restoration plantings. An engineered scour pool will be constructed immediately downstream of the culvert to provide energy dissipation and erosion control, as well as at the downstream extents of the proposed local works solution to facilitate a smooth transition into existing channel conditions. This solution will address erosion related risks to sanitary sewer infrastructure at this priority site, as well as priority site #9.

Alternative 3: Sub-Reach-Based Works – Apply the local works solution described above as part of a proposed 650 metres of channel restoration work intended to increase the depth of cover over four (4) sanitary sewer crossings (priority sites #5, #6, #7 & #9), mitigate lateral erosion risks to sanitary sewer infrastructure at five (5) locations (priority sites #8, #19, #21, #22 & #26), and allow for the rehabilitation of two (2) storm sewer outfalls (priority sites #53 & #65). Targeted realignment of the channel coupled with the implementation of engineered bank treatments will also help to alleviate potential erosion related risks to the pedestrian trail system. The proposed channel restoration works will include a combination of cascade-pool and riffle-pool morphology, coupled with engineered bank treatments (vegetated buttresses, and armourstone retaining walls), designed with the intent of building the creek up to establish a minimum of 1.0 metres of additional cover overtop of all applicable sanitary sewer crossings, and limit the protection of the sewer crossing's dependence on the long-term stability of any downstream grade control structures.

Preliminary concept drawings illustrating Alternative 2 and Alternative 3 are provided in **Figure 4-108.**

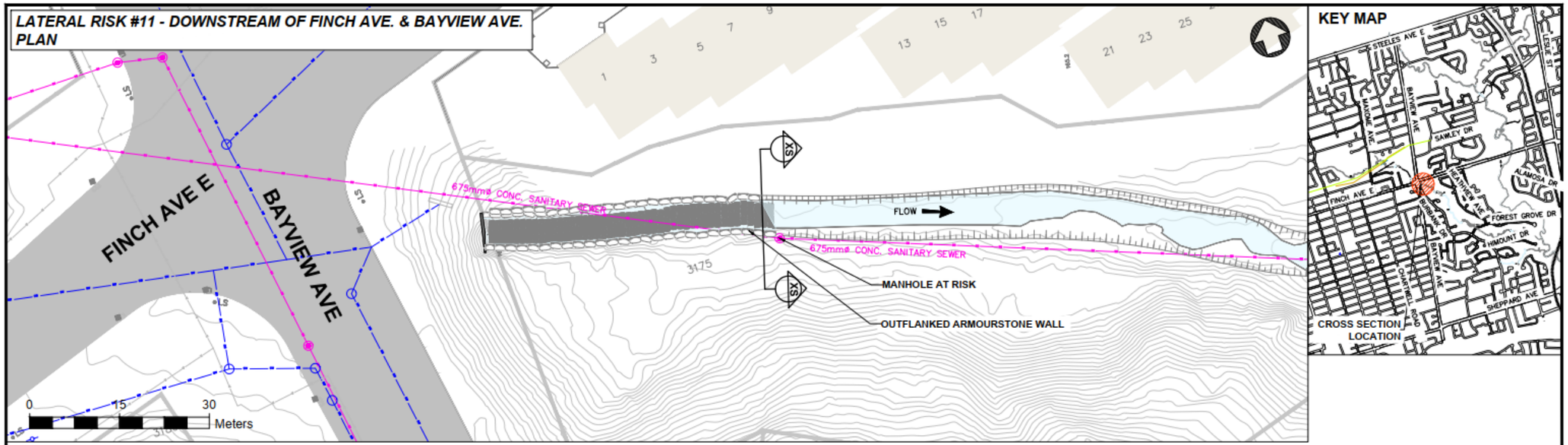

Figure 4-107: Existing Conditions – Priority Site #22

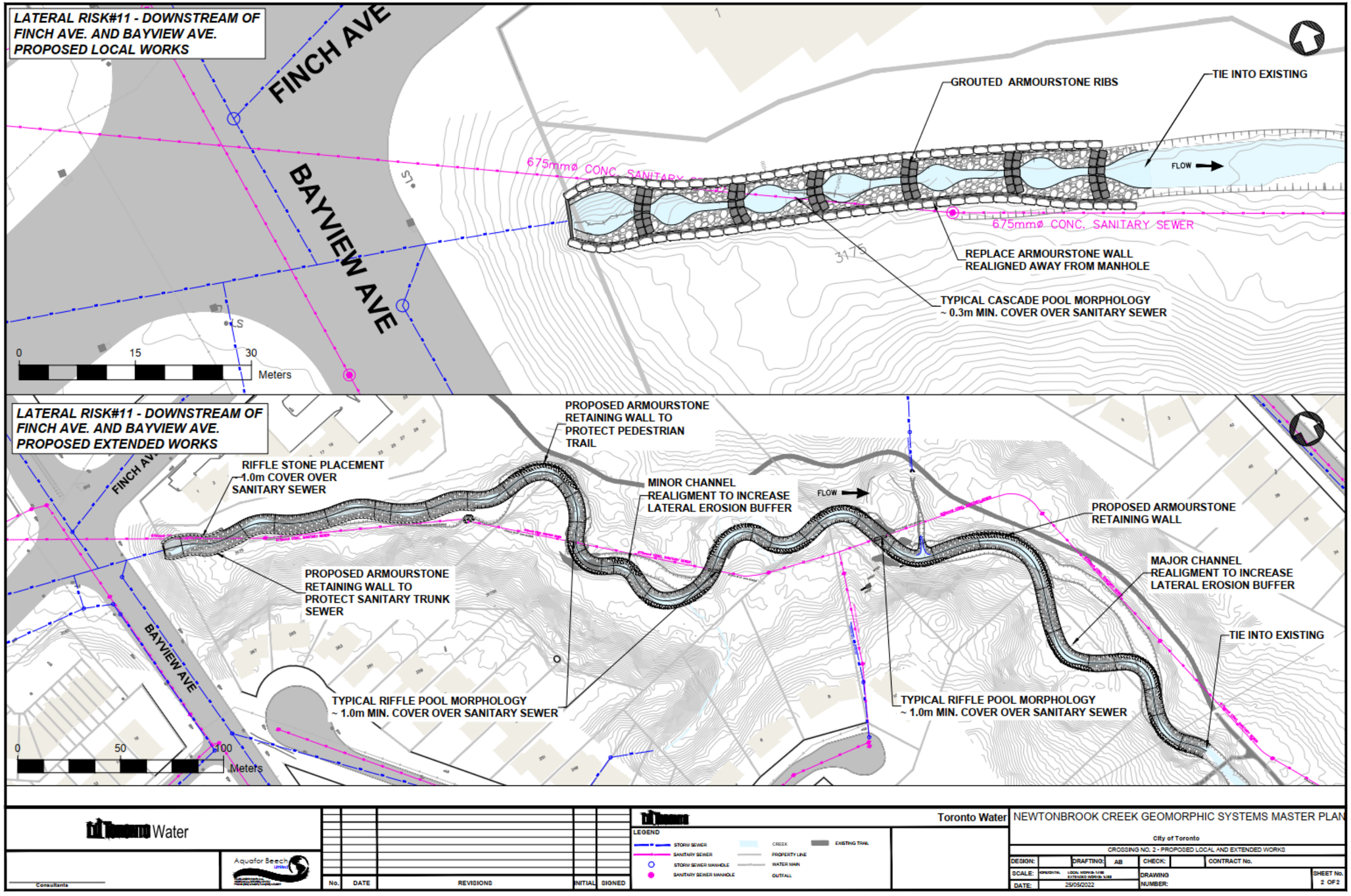

Figure 4-108: Preliminary Design Concepts Alternatives 2 & 3 – Priority Site #22

4.24.2Priority Site #22 – Evaluation of Restoration Alternatives

Restoration Alternatives for Priority Site #22 were evaluated using the methodology outlined in **Section 4.2.** Based on this evaluation process, Alternative 3 - Sub-Reach-Based Works was selected as the preferred alternative.

4.24.3Priority Site #22 – Selection of the Preferred Alternative

As per the evaluation table, the Sub-Reach-Based Works option was selected as the preferred alternative for Priority Site #22 with a total score of 81.47/100. The local works solution was the second preferred alternative with a total score of 59.73/100 while the Do Nothing alternative was the least preferred alternative with a total score of 40.93/100.

Key elements of the Sub-Reach-Based Works alternative include:

- Removal of channel debris and failed erosion control structures (i.e., armourstone grade control structures, armourstone retaining walls, and gabion baskets).
- Apply approximately 650 metres of channel restoration work using natural channel design principles to establish riffle-pool morphology.
- Where feasible, lower and regrade channel banks to restore floodplain connectivity.
- Mitigate the identified lateral erosion risk to sanitary sewer infrastructure through the construction of a new armourstone retaining wall.
- Address a major lateral erosion risk to an exposed sanitary sewer maintenance hole (Priority Site #8 - SL4033483) through a combination of minor channel realignment and construction of an armourstone retaining wall.
- Mitigate three additional secondary lateral risk sites (Priority Site #19 - SL4032401, Priority Site #20 - SL4031887, MH4918613545, SL4031888 and Priority Site #26 - SL4031857) through a combination of channel realignment and the construction of vegetated buttress bank protection works.
- Increase the depth of cover overtop of four exposed sanitary sewer crossings (Priority Site #5 - SL4031857, Priority Site #6 - SL4031887, Priority Site #7 - SL4031887 and Priority Site #9 - SL4033483) to a minimum of 1.0 m.
- Address potential future erosion related risks to the pedestrian trail system and private properties through the construction of toe erosion protection works at select locations.
- Rehabilitation of two storm sewer outfalls and their associated outfall channels (Priority Site #53 - OF4902413782 and Priority Site #65 - OF4907413839).
- Establish a geomorphically stable transition into existing channel conditions at the upstream and downstream tie-in points.
- Apply restoration plantings to compensate for construction-related vegetation removals and to help stabilize regraded slopes.

4.25 Priority Site #23 – Lateral Risk to Sanitary Sewer at Hi Mount Drive.

Priority Site #23 is located in Reach BR-1 of Blue Ridge Creek, approximately 150 metres upstream of the creek's confluence with the Don River. This reach of Blue Ridge Creek is actively widening, creating a series of lateral erosion risks to the 300 mm sanitary sewer that runs parallel to the creek through the valley corridor.

At this priority site location, active bank and slope erosion has reduced the lateral erosion buffer between the creek and the sanitary sewer to roughly twelve (12) meters. No engineered bank protection works have been implemented at this location, and the exposed bank materials are highly erodible. The projected time to contact is approximately forty (40) years. Given that the time to contact is relatively high (greater than 20 years), this erosion risk can be viewed as a lower risk site, that should either be addressed individually in the medium to long term, or more immediately though the implementation of a sub-reach-based solution that is designed to address several other higher priority sites with more imminent risk horizons. A photo illustrating the site-specific channel conditions near this priority site is presented in **Figure 4-109.**

Figure 4-109: Representative Site conditions Near Priority Site #23

Sanitary Sewer parameters relevant to this priority site are summarized in **Table 4-26** with a drawing illustrating the existing conditions of the project site presented in **Figure 4-110**.

Table 4-26: Summary of Priority Site #23 Sanitary Sewer Parameters

Parameter	Sanitary Trunk Sewer
Toronto Water Asset ID	SL4053177
Year of Construction	1977
Diameter	300
Lateral Depth of Cover	12.0 m
Estimated Time to Contact	40.27 years
Condition of Bank Protection Works	NA - No Bank Protection Works Present

4.25.1Priority Site #23 – Description of Restoration Alternatives

Alternative 1: Do Nothing – Over time as the channel continues to widen the sanitary sewer will become exposed. Given the height of the sewer within the bank, there is potential for the sewer to become undermined as the toe of the bank continues to erode. Future emergency works may be required if the exposed sewer begins to show signs of structural degradation (i.e., spalling, cracking, slumping, etc.).

Alternative 2: Local Works – Construct a vegetated buttress on the northerly bank, roughly 40 metres in length, centered around the point of minimum lateral cover. The vegetated buttress will help mitigate lateral bank erosion and protect sanitary sewer infrastructure. The slope behind the buttress will be regraded to smoothly transition into existing conditions, and will also be stabilized through the application of coir-matting and restoration plantings.

Alternative 3: Sub-Reach-Based Works – Apply natural channel design principles for an extended length of approximately 275 metres intended to build the creek back up and stabilize this segment of Blue Ridge creek from a geomorphic perspective. The proposed works will extend from the Creek's confluence with the East Don River, upstream to the confluence with Reach BR2, and will include a combination of riffle-pool morphology coupled with a mixture of engineered bank treatments (vegetated buttresses and armourstone retaining walls). Adjustments to the longitudinal profile, planimetric alignment and typical channel dimensions will look to stabilize the creek and provide increased lateral cover to the sanitary trunk sewer that runs through the Blue Ridge Creek Valley Corridor. These works will integrate the restoration of the failed storm sewer outfall at Hi Mount Drive identified above as priority site #12, while also addressing additional lateral risk sites #17 & #18, which have been defined as priority sites #23 & #40 respectively. These works are intended to tie-into a second sub-reach-based works alternative, intended to address priority sites #13, #14, #15, #21, #29, and #36 by restoring the remaining upstream portion of Reach BR1.

Preliminary concept drawings illustrating Alternative 2 and Alternative 3 are provided in **Figure 4-111.**

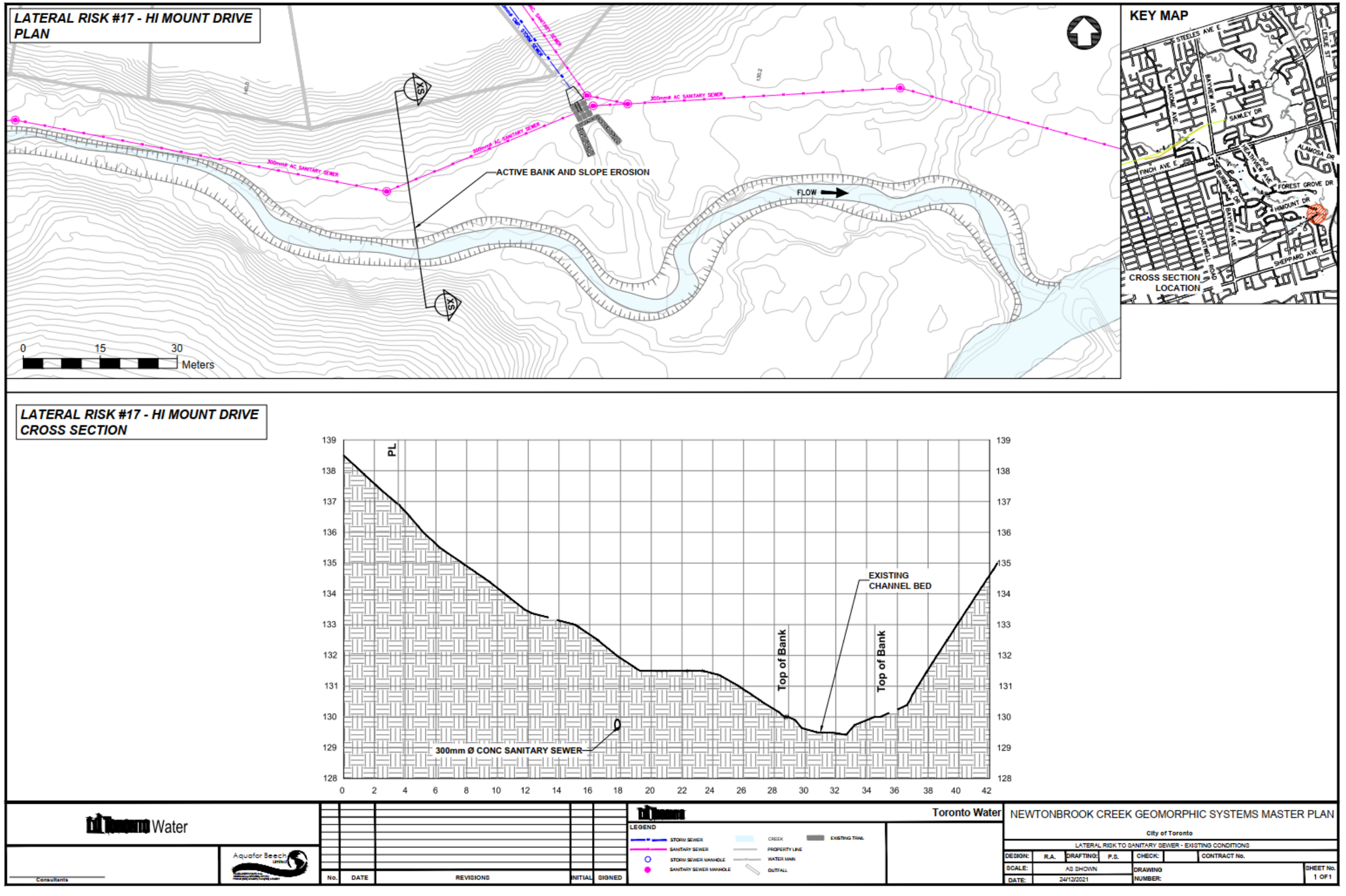

Figure 4-110: Existing Conditions – Priority Site #23

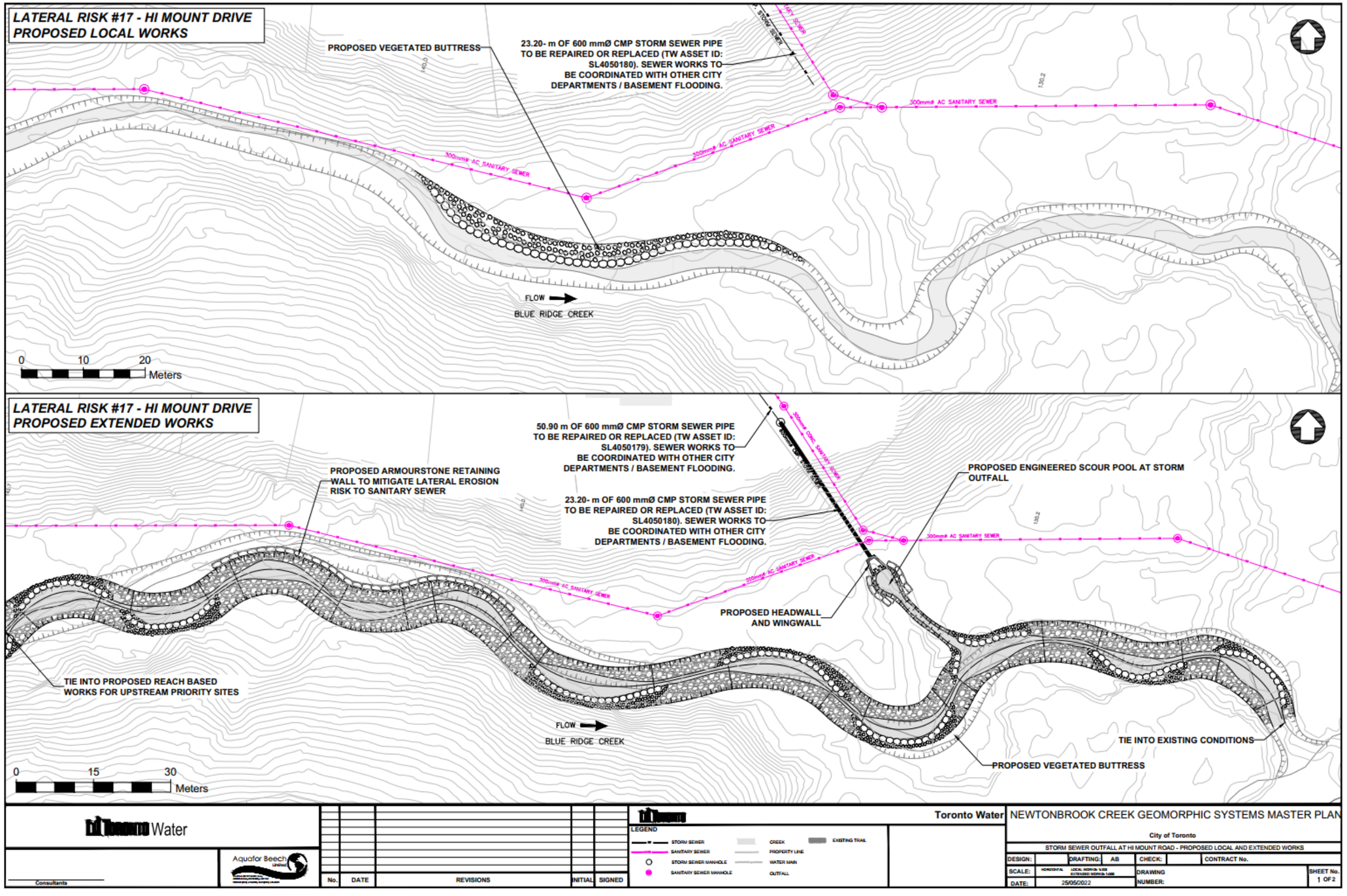

Figure 4-111: Preliminary Design Concepts Alternatives 2 & 3 – Priority Site #23

4.25.2Priority Site #23 – Evaluation of Restoration Alternatives

Restoration Alternatives for Priority Site #23 were evaluated using the methodology outlined in **Section 4.2.** Based on this evaluation process, Alternative 3 - Sub-Reach-Based Works was selected as the preferred alternative.

4.25.3Priority Site #23 – Selection of the Preferred Alternative

As per the evaluation table, the Sub-Reach-Based Works option was selected as the preferred alternative for Priority Site #23 with a total score of 80.53/100. The local works solution was the second preferred alternative with a total score of 61.27/100 while the Do Nothing alternative was the least preferred alternative with a total score of 40.93/100.

Key elements of the Sub-Reach-Based Works alternative include:

- Removal of channel debris, failed erosion control structures (i.e., gabion baskets), and failed Toronto Water Infrastructure (i.e., failed outfall and storm sewer pipe segments).
- Apply approximately 275 metres of channel restoration work using natural channel design principles to establish riffle-pool morphology.
- Where feasible, lower and regrade channel banks to restore floodplain connectivity.
- Mitigate the identified lateral erosion risk to sanitary sewer infrastructure through minor channel realignment and construction of vegetated buttress bank protection works.
- Address an additional lateral erosion risk to sanitary sewer infrastructure (Priority Site #40 - SL4051741), through minor channel realignment and the construction of engineered bank treatments (i.e., armourstone walls and vegetated buttresses).
- Help benefit private properties by providing toe erosion protection at select locations.
- Repair/Replace approximately 74 metres of failed corrugated metal storm sewer pipe, maintaining the same general pipe alignment in planform (Priority Site #12 - OF4830215159). All sewer repair/replacement works must be coordinated with other City departments / basement flooding projects.
- Replace the failed outfall structure (Priority Site #12 - OF4830215159). Construct an engineered scour pool with armourstone lined outfall channel that transitions into the main branch of Blue Ridge Creek. Consider routing the outfall channel to transition into Blue Ridge Creek at an oblique angle to help mitigate scouring and erosion at the confluence.
- Restoration of a failed slope (Priority Site #12 - OF4830215159) through regrading and infilling of observed sinkholes and gullies with appropriately compacted fill materials. Apply additional slope stabilization measures (i.e., soil anchors, coir logs, etc.) as defined at the detailed design phase.
- Transition into a second sub-reach-based works project upstream intended to address Priority Site #13 - OF4824214956, Priority Site #15 - SL4030293, Priority Site #21 - SL4030487, Priority Site #29 - MH4825114957, SL4030369, and Priority Site #36 - SL4030294
- Apply restoration plantings to compensate for construction-related vegetation removals and to help stabilize regraded slopes.

4.26 Priority Site #24 – Lateral Risk to Sanitary Sewer Downstream of Forest Grove Drive

Priority Site #24 is located in Reach N1 of Newtonbrook Creek, immediately downstream of the Forest Grove Culvert Crossing. Expansion of flows exiting the culvert, has resulted in the formation of a large scoured area downstream. The channel is notably wider at this location. Erosion along the northerly bank has created a lateral erosion risk to the 675 mm diameter sanitary trunk sewer that runs through the Newtonbrook Creek valley corridor. Part of the eroding bank is lined with a deteriorated gabion basket retaining wall that provides minimal erosion protection, while the rest of the bank is unprotected. The estimated depth of lateral cover is 10.5 m, and the projected time to contact is forty-three (43) years.

Given that the time to contact is relatively high (greater than 20 years), this erosion risk can be viewed as a lower priority risk site, that should either be addressed individually in the medium to long term, or more immediately though the implementation of a sub-reach-based solution that is designed to address several other higher priority sites with more imminent risk horizons. A failed storm outfall discharges to the channel along the opposite (southerly) bank. This outfall has been identified as priority site #3. Given the close spatial proximity of these sites, there is an opportunity to restore both sites through a single capital project. A photo illustrating the site-specific conditions near this priority site is presented in **Figure 4-112**.

Figure 4-112: Representative Site Conditions Near Priority Site #24.

Sanitary Sewer parameters relevant to this priority site are summarized in **Table 4-27** with a drawing illustrating the existing conditions of the project site presented in **Figure 4-113**.

Table 4-27: Summary of Priority Site #24 Sanitary Sewer Parameters

Parameter	Sanitary Trunk Sewer
Toronto Water Asset ID	SL4033584
Year of Construction	1960
Diameter	675
Lateral Depth of Cover	10.5 m
Estimated Time to Contact	43.25 years
Condition of Bank Protection Works	Partial Coverage with Gabion Baskets in Poor Condition

4.26.1Priority Site #24 – Description of Restoration Alternatives

Alternative 1: Do Nothing – The estimated depth of the sewer at this location, indicates the sewer is positioned below the existing channel bed affording the sewer both lateral and vertical cover. Nevertheless, over time as the channel continues to widen & deepen, and the armourstone bed and bank treatments continue to fail, the sanitary sewer may become exposed. Future emergency works may be required if the exposed sewer begins to show signs of structural degradation (i.e., spalling, cracking, slumping, etc.).

Alternative 2: Local Works – Construct an armourstone retaining wall with vegetated boulder toe protection along the eroding bank, roughly 35 metres in length, centered around the point of minimum lateral cover. The partially buried retaining wall will help mitigate lateral bank erosion and protect sanitary sewer infrastructure. The slope behind the armourstone wall will be regarded to smoothly transition into existing conditions, and will also be stabilized through the application of coir-matting and restoration plantings.

Alternative 3: Sub-Reach-Based Works – The lateral erosion risk will be addressed by implementing an armourstone retaining wall with vegetated boulder toe protection as described above in Alternative 2: Local works. In addition, the failed storm sewer outfall on the opposite bank will also be restored by removing three (3) segments of the failed CMP pipe (total length of approximately 88 m), as per the City's recommendation, and replacing them with a new set of concrete pipes maintaining the same pipe alignment in planform. Care must be taken to construct the pipes with appropriate bedding and backfill materials, as per City standards, to prevent future failure. The exposed storm sewer maintenance hole should be retrofitted to incorporate new inlet and outlet pipes with any structural deficiencies/damage repaired. Erosion sinkholes and gullies to be infilled with engineered fill and appropriately compacted. The failing stone retaining wall and outlet channel will be removed, along with any accumulated debris, and replaced with a new concrete headwall with armourstone wingwalls. The new outfall will discharge into an engineered scour pool that drains into a newly constructed outfall channel composed of an engineered substrate mix, with armourstone retaining walls along the bank, and designed to flow into the creek at an oblique angle.

Preliminary concept drawings illustrating Alternative 2 and Alternative 3 are provided in **Figure 4-114.**

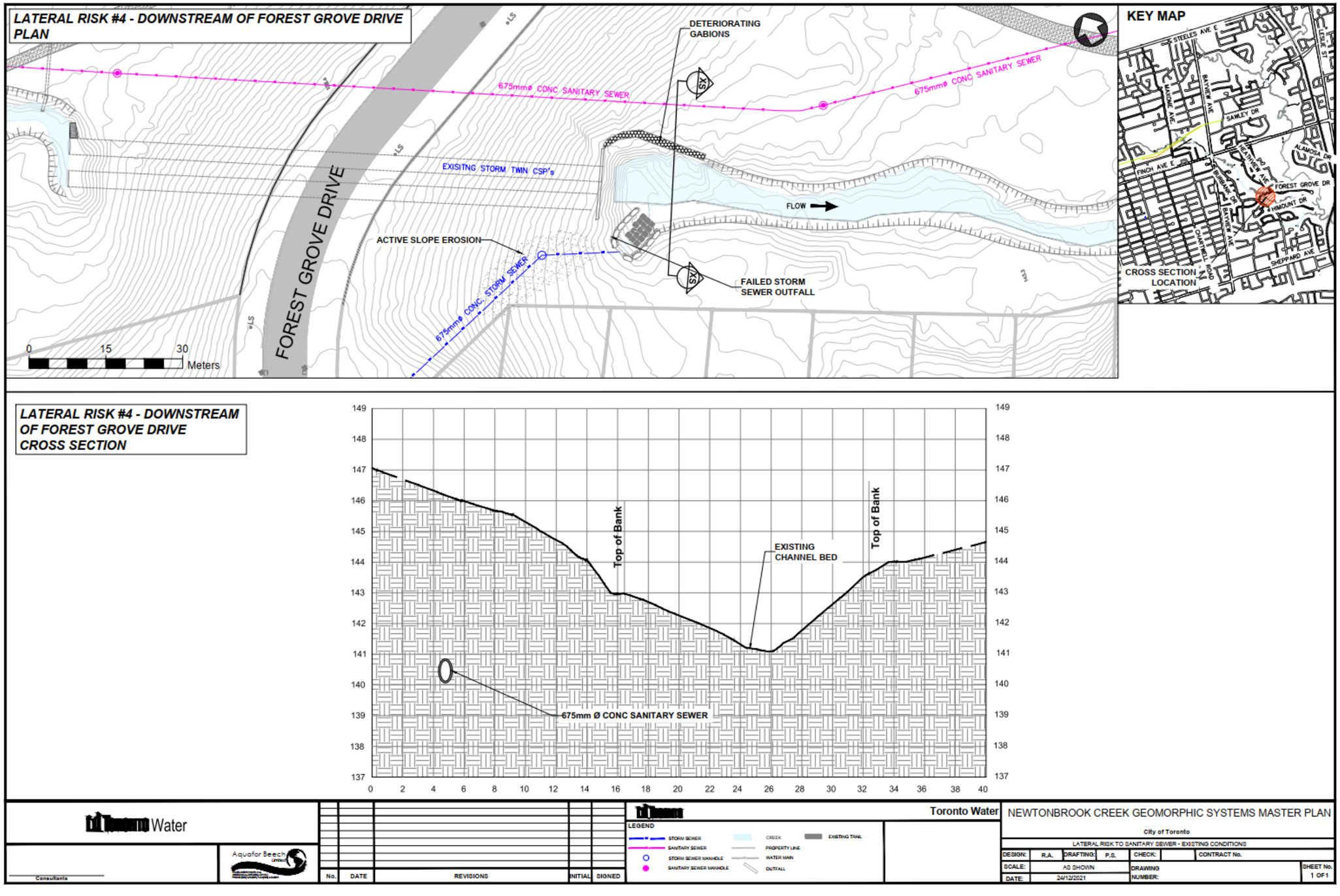

Figure 4-113: Existing Conditions – Priority Site #24

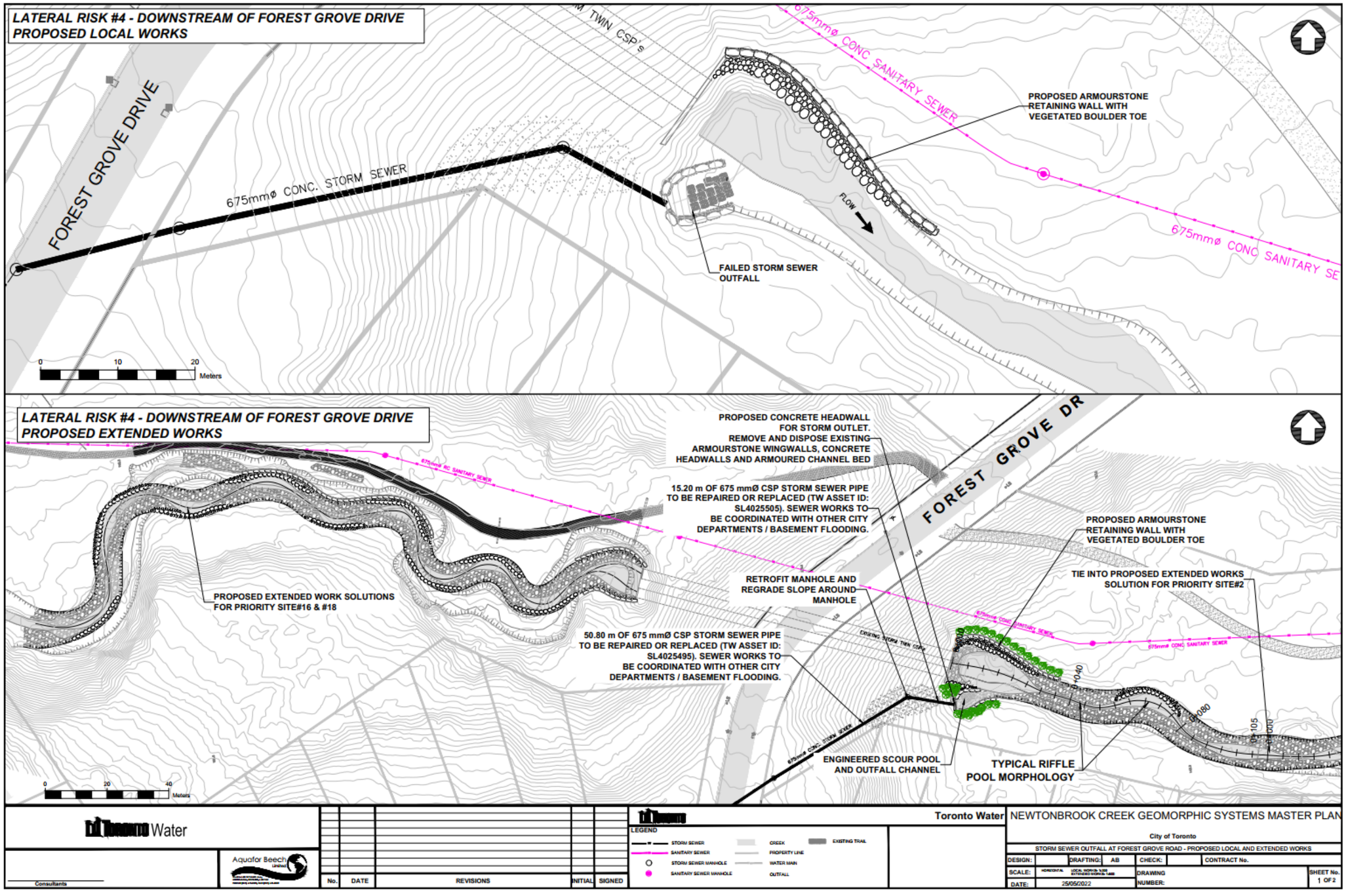

Figure 4-114: Preliminary Design Concepts Alternatives 2 & 3 – Priority Site #24

4.26.2Priority Site #24 – Evaluation of Restoration Alternatives

Restoration Alternatives for Priority Site #24 were evaluated using the methodology outlined in **Section 4.2.** Based on this evaluation process, Alternative 2 - Local Works was selected as the preferred alternative.

It should be noted the evaluation of alternatives for this site assumed the local works solutions for Priority Sites #3 and #24 would be bundled into one capital works project to help achieve schedule and cost efficiencies.

4.26.3Priority Site #24 – Selection of the Preferred Alternative

As per the evaluation table, the Local Works option was selected as the preferred alternative for Priority Site #24 with a total score of 79.20/100. The sub-reach-based works solution was the second preferred alternative with a total score of 74.80/100, while the Do Nothing alternative was the least preferred alternative with a total score of 40.40/100.

The selection of the local works solution for this site (Priority Site #24) assumes the local works solutions for Priority Sites #3 and #24 are to be bundled into one capital works project to help achieve schedule and cost efficiencies

Key elements of the Local Works alternative include:

- Removal of channel debris, failed erosion control works (i.e., stone lined outfall channel, gabion basket bank treatments, etc.), and failed Toronto Water Infrastructure (i.e., failed outfall and storm sewer pipe segments).

- Mitigate the lateral erosion risk to sanitary sewer infrastructure through the construction of a buried armourstone retaining wall with vegetated buttress toe protection.

- Retrofit/repair an exposed storm sewer maintenance hole as needed (Priority Site #3 - OF4854214333).

- Repair/Replace approximately 88 metres of failed corrugated metal storm sewer pipe, maintaining the same general pipe alignment in planform (Priority Site #3 - OF4854214333). All sewer repair/replacement works must be coordinated with other City departments / basement flooding projects.

- Restoration of a failed slope (Priority Site #3 - OF4854214333) through regrading and infilling of observed sinkholes and gullies with appropriately compacted fill materials. Apply additional slope stabilization measures (i.e., soil anchors, coir logs, etc.) as defined at the detailed design phase.

- Replacement of a failed outfall structure (Priority Site #3 - OF4854214333). Construct an engineered scour pool with an armourstone lined outfall channel that transitions into the main branch of Newtonbrook Creek at an oblique angle.

- Establish a geomorphically stable transition into existing channel conditions where engineered works adjoin the natural channel corridor.

- Apply restoration plantings to compensate for construction-related vegetation removals and to help stabilize regraded slopes.