REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

APPENDIX 3-C

Etobicoke Creek Evaluation Process

Date:	4/14/2021	File:	718018
To:	Justin Lee, P. Eng., Region of Peel		
From:	GM BluePlan Engineering Ltd.		
Project:	Wastewater Capacity Improvements in Central Mississauga		
Subject:	Etobicoke Creek Phase 3 Evaluation Process		

TECHNICAL MEMO

Phase 3 of the Class EA process examines the design concept alternatives in implementing the preferred solution. Having identified the preferred sewer route in Phase 1 and 2, this phase focused on defining where the sewer and shaft sites would be located, what they would look like and how they would be built.

This Technical Memo describes the step by step approach in selecting the preliminary preferred design for the Etobicoke Creek section of the proposed solution including selecting the preliminary preferred connection shaft, construction methodology and location of the sewer.

1 STAKEHOLDER CONSULTATION

As part of the MCEA process, GM BluePlan and the Region of Peel continue to consult with key stakeholders. In evaluating the Etobicoke Creek design concept alternatives, the following stakeholders have been involved:

- Toronto and Region Conservation Authority (TRCA)
- City of Mississauga
- Hydro One
- City of Toronto

Feedback received from these key stakeholders has been incorporated into the evaluation process.

2 EVALUATION OF CONNECTION SHAFTS AT ETOBICOKE CREEK

Through Phase 1 and 2 of the Class EA, key connections to existing trunk sewers were required along Queensway East including the upstream connection to the existing Trunk Sewer at Hurontario and downstream connection to the existing East Trunk Sewer at Etobicoke Creek. The process to evaluate the shaft sites along Etobicoke Creek was carried out as a coordinated assessment whereby detailed shaft site requirements were considered in conjunction with the tunneling requirements for the sewer route and construction methodology.

2.1 SCREENING OF LONG LIST OF SHAFT SITE ALTERNATIVES

Connecting the proposed new Queensway sewer to the existing Etobicoke Creek Sewer is a key technical requirement to facilitate the collection of sanitary flow to the G.E. Booth WWTP. The existing Etobicoke Creek Sewer was constructed in the Etobicoke Creek Valley running generally north to south. The sewer facilitates gravity flow of wastewater thus requiring the upstream pipe to be higher than sections downstream. Similarly, for the Queensway Sewer to facilitate gravity flow, the upstream connecting pipe starting at Hurontario Street must be higher than the downstream connection point at Etobicoke Creek. These two slope factors together

limit the location of where the Queensway Sewer can connect to the Etobicoke Creek sewer and achieve the required slope for gravity operations.

A review was completed to screen out connection shaft site alternatives based on technical viability/feasibility. In order to be viable, the constructed sewer pipe would need to achieve a minimum slope of 0.1% to maintain gravity flow and a minimum cleansing velocity. A long list of five connection locations were considered and screened against the technical pass/fail criteria. The connection locations and screening results are provided in Table 1 and Figure 1, respectively.

Table 1: Screening of Long List of Alternative Shaft Sites at Etobicoke Creek

Tunnel Launch Location	Screening Results	Commentary
1A. North (Queensway)	×	- Proposed sewer slope does not meet minimal criteria requirement; not considered technically viable
1B. South (Sherway)	✓	- Proposed sewer slope meets minimal criteria requirement; considered technically viable
1C. North (Little Etobicoke Creek)	×	- Proposed sewer slope does not meet minimal criteria requirement; not considered technically viable
1D. South (Sunnycove)	✓	- Proposed sewer slope meets minimal criteria requirement; considered technically viable
1E. South (QEW)	✓	- Proposed sewer slope meets minimal criteria requirement; considered technically viable

Site 1B, 1D and 1E were technically viable and moved on to a more detailed evaluation.

2.2 Detailed Evaluation of Short List of Shaft Site Alternatives

Following the long list screening, the three viable alternatives were evaluated against each other using the 5-point matrix criteria. The evaluation details and selection of Site 1B as the preliminary preferred shaft site alternative is detailed in Table 2.

Figure 1: Shaft Site Alternatives at Etobicoke Creek

Table 2: Detailed Evaluation of Alternative Shaft Sites at Etobicoke Creek

Shaft Site Alternative	1B. South (Sherway)	Screening	1D. South (Sunnycove)	Screening	1E. South (QEW)	Screening
Technical	- Site has sufficient land to meet shaft needs - Good construction access route to site via the east Sherway Drive - Connection shaft location and site on east side of creek is an open level meadow providing good construction staging area - East site located on previously cleared area (recent pipe repair due to accidental rupture of the Etobicoke Creek Sewer) - Connection at this location will facilitate further remediation and improved structural support of the existing pipe - Existing connecting pipe burial depth is shallow (0.5 m) and new sewer depth crossing of the creek will also be shallow requiring an open cut crossing of the creek to facilitate tunneled construction for the pipe on the west side of creek - West side of creek area is relatively flat to facilitate temporary smaller construction compound - Construction will require temporary mitigation to enable open cut construction of creek - Alternative will require long term remediation measures to mitigate the impact of fluvial hazards and safeguard the existing and new pipe against scour, similar to Alternative 1 D - Site does not have any utility conflicts nearby - Less construction risk due to the shorter sewer drive length within the creek valley compared to Alternatives 1 D and 1 E as indicated in the Hydraulic and Geomorphic Hazard Assessment	✓	- Site has sufficient land to meet shaft needs - Does not have an existing construction access route to site; extremely challenging to access for construction from the west due to slope and private properties and would require temporary bridge structure from the east - Site located to the west of Etobicoke Creek - Site is located on significantly sloped surface; increased complexity during construction - Existing connecting pipe burial depth is very shallow (0.1 m) - Site does not have any utility conflicts nearby - Alternative will require long term remediation measures to mitigate the impact of fluvial hazards and safeguard the existing and new pipe against scour, similar to Alternative 1 B - Increased construction risk due to the longer sewer drive length parallel to creek as indicated in the Hydraulic and Geomorphic Hazard Assessment	×	- Site has sufficient land to meet shaft needs - Does not have an existing construction access route to site; access from the east is constrained by the creek and a creek cliff, access from the west would require access through private land and through residential subdivision road network - Site located to the west of Etobicoke Creek - Site is located on relative flat surface - Site does not have any utility assets nearby - Increased construction risk due to the longer sewer drive length parallel to creek as indicated in the Hydraulic and Geomorphic Hazard Assessment	×
Environmental	- Site is located within TRCA regulation limit / floodplain mitigation and remediation plan required for permitting and approvals - Increased potential impacts to fish and fish habitats compared to 1D and 1E; open cut crossing of Etobicoke Creek required - Open cut crossing will require mitigation - Alternative will require long term remediation measures to mitigate the impact of fluvial hazards - Reduced quality of forest habitat and potential to support SAR compared to 1D; disturbance to riparian habitat would be temporary and more readily restorable in the short term - East side is located on highly disturbed / cleared site; west side is located on undisturbed land (natural cover) - Increased number of non-native species and decreased number of mature trees; lower impact to trees at this site	×	- Site is located within TRCA regulation limit / floodplain mitigation and remediation plan required for permitting and approvals - Decreased potential impacts to fish and fish habitats compared to 1E; no open cut crossing of Etobicoke Creek required - No open cut crossing of Etobicoke Creek required - Alternative will require long term remediation measures to mitigate the impact of fluvial hazards - Increased quality of forest habitat (downed woody debris) and potential to support SAR compared to 1B; disturbance to riparian habitat would be temporary, however more challenging to restore to pre-construction conditions - Natural site; low amount of human disturbance	×	- Site is located within TRCA regulation limit / floodplain mitigation and remediation plan required for permitting and approvals - No open cut crossing of Etobicoke Creek required - Significant wildlife habitat - SAR high potential of barn swallow - Cleared meadowlands (residential) - Increased risk to creek due to the longer sewer drive length parallel to creek indicated as indicated in the Hydraulic and Geomorphic Hazard Assessment - Minimal overall impact to natural environment	✓

Shaft Site Alternative	1B. South (Sherway)	Screening	1D. South (Sunnycove)	Screening	1E. South (QEW)	Screening
	- Less risk to creek due to the shorter sewer drive length parallel to creek indicated as indicated in the Hydraulic and Geomorphic Hazard Assessment		- Increased number of native species and mature trees present; higher impact to trees at this site - Increased risk to creek due to the longer sewer drive length parallel to creek indicated as indicated in the Hydraulic and Geomorphic Hazard Assessment			
Social / Cultural	- Good buffer between residential properties and construction site - Site is located within cultural heritage corridor and heritage bridge; potential impacts can be fully mitigated (confirmed though CHEPIA) - No archaeological concern (confirmed through Stage 2 Archaeological Assessment) - Site located off road and pedestrian/cycle pathways minimizing potential impact to traffic/pedestrians at site - Opportunity to improve permanent access to pedestrian/cycle path through project	✓	- Less buffer between residential properties and construction site - Site is located within cultural heritage corridor; no potential impacts (confirmed though CHEPIA) - Site has archaeological potential - Site located off road and pedestrian/cycle pathways but requires new construction access road and bridge creating higher potential for conflict with existing pedestrian/cycle routes	×	- Site located on residential property - Only access to site is through quiet residential area and residential property - Potential perceived construction fatigue (MTO construction works adjacent to QEW) - Site is located within cultural heritage corridor; no potential impacts (confirmed though CHEPIA) - Site has archaeological potential - Site located off road pathways minimizing potential impact to traffic/pedestrians at site	×
Legal	- Site has multiple landowners including City of Mississauga (west site), TRCA (east site) and City of Toronto (access road) – alternative will require the support of Municipal and Review Agency partners and does not require private land acquisition or agreements which is considered higher risk - Access to site is via assumed road - Site is located within TRCA regulation limit and is subject to its policies, permits and approvals will be required - Requires temporary and permanent agreements within City of Toronto lands (Agreement in principle supported through Stakeholder engagement)	✓	- Site is located within TRCA regulation limit and is subject to its policies, permits and approvals will be required - Does not require private land acquisition or agreements which is considered higher risk - Required easement within City of Mississauga lands	✓	- Site is located within TRCA regulation limit and is subject to its policies, permits and approvals will be required - Private residential land use - Requires access and easement within private lands increased risk for land acquisition and agreements	×
Financial	- Lower construction costs related to access compared to other sites due to the site's existing construction access road and previously disturbed land on east side of Creek - Increased cost for temporary mitigation to enable open cut of creek - Similar cost as Site 1D to mitigate post construction fluvial hazards - Lower construction cost of sewer alignment due to shortest length	✓	- Higher construction costs related to access compared to Site 1 B - Increased cost related to construction of temporary bridge - Similar cost as Site 1B to mitigate post construction fluvial hazards - Increased construction cost of sewer alignment due to increased length	×	- Higher construction costs compared to 1B due to the construction of access road and required easement on private lands - Increased construction cost of sewer alignment due to longest length	×
Key Differentiators	- Good existing construction access route to site via the east paved road (Sherway) - Minimized construction and environmental risk due to the shorter sewer drive length - Enables mitigation to structurally improve existing sanitary pipe and access road		- Located to the west of Etobicoke Creek - Does not have an existing construction access route to site; extremely challenging construction access from east and west - Existing connecting pipe burial depth is very shallow and will require mitigation for hydraulic and geomorphic hazards (common with 1B)		- Located to the west of Etobicoke Creek - Does not have an existing construction access route to site; extremely challenging construction access from east - Site is privately owned; increased acquisition risk gaining construction and permanent access	

Shaft Site Alternative	**1B. South (Sherway)**	**Screening**	**1D. South (Sunnycove)**	**Screening**	**1E. South (QEW)**	**Screening**
	- Existing connecting pipe burial depth is shallow and will require mitigation for hydraulic and geomorphic hazards (common with 1D) - Located to the east of Etobicoke Creek; crossing of Etobicoke Creek required		- Increased construction and environmental risk due to the longer sewer drive length		- Construction access through small residential roads required creating high socio-economic impact - Increased construction risk due to the longer sewer drive length	
Overall Screening Results	Preferred Site		Screened Out		Screened Out	

3 CONSTRUCTION METHODOLOGY

There are a number of alternative construction methodologies identified for the preliminary preferred design concept.

The project team considered three construction methodologies to construct the gravity sewer:

a. **Tunnel Boring Machine (TBM)** uses specialized boring equipment to excavate beneath the surface of the road right of way and to install the sewer pipe. In contrast to micro-tunneling, use of a TBM produces a larger tunnel diameter, operates at greater depths, and can accommodate longer tunnel driving lengths (that result in fewer shafts required). A TBM is suited for boring in various soil and rock strata, favouring straight alignments which minimize turns.
b. **Micro-tunneling** uses drilling technology to install underground sewer pipes. In comparison to tunnel boring machines, micro-tunneling accommodates smaller diameter tunnels, operates at shallower depths, and requires an increased number of access shafts.
c. **Open Cut Construction** requires a trench to be dug in the road right of way and the sewer pipe installed in the trench. Unlike tunnel boring machines and micro-tunneling which operate underground, open cut construction can result in significant community and traffic impacts as it causes surface disruption.

The construction methodologies consider sewer length, depth, environmental features, crossings, existing sanitary connection point, required diameter of the sewer and existing site conditions. It was determined that trenchless construction, tunneling, was the preferred construction methodology meeting all the technical requirements, depth, size and minimizing environmental impact.

The proposed size of the sewer is 1800 mm within the Etobicoke Creek Valley. The depth of the sewer was driven by the need to achieve a gravity sewer between the required upstream and downstream connection points in the existing wastewater system. The preliminary preferred design concept assumes a tunneling approach through bedrock and overburden at a depth ranging from ~5 m to ~18 m below ground surface within the Etobicoke Creek Valley. This approach will minimize surface disturbance and impacts to natural features and wildlife habitat within the Etobicoke Creek Valley.

Due to the construction complexity at the Etobicoke Creek connection point and following the results of environmental investigation including fluvial hazards review, geomorphology study and topographical survey, open cut construction was considered the preliminary preferred method of construction for the creek crossing due to the risk of bedrock fracture if tunneled. This construction methodology will require further refinement, a commitment to further supporting investigations, permitting and approvals and appropriate remediation to be determined during detailed design in coordination with Review Agencies.

4 EVALUATION OF REFINED SEWER ROUTE ALIGNMENT (ETOBICOKE CREEK VALLEY)

The evaluation of the refined sewer route involved the identification of the conceptual alignment of the sewer along the Etobicoke Creek Valley from the shaft site at Queensway/Etobicoke Creek (Site 2A) to Sherway Drive/Etobicoke Creek (Site 1B).

The decision-making for the alignment of the sewer worked simultaneously with the evaluation of the access shafts, as the selection of one bears a strong influence on the other.

4.1 SCREENING OF LONG LIST OF ALIGNMENT ALTERNATIVES

Further to the review, evaluation and selection of Alternative 1B as the preferred Etobicoke Creek sewer connection and construction compound location, a long list of sewer alignment alternatives was generated between Site 1B and the shaft and construction compound located on the northside of the Queensway and west of the bridge. Refer to Figure 2.

All sewer alignment alternatives require crossing of the Etobicoke Creek in order to connect the proposed new sewer to the existing sewer which is situated on the eastside of the Creek. Having completed supporting studies including the fluvial hazards study it was established that the new pipe would have approximately 1.05 meters of cover between top of pipe and the existing creek bed. Secondly, following the completion of a topographical survey and preparation of plan and profiles for the new sewer alternative alignments it was established that construction on the west side of the creek could be undertaken using trenchless technology to minimize the potential for impact to the environment.

These two factors were used to establish the pass/fail criteria to screen long list to short list alternatives. The criteria were as follows:

- To mitigate risk of bedrock fracture during construction alternatives should not require tunneled crossing of the creek.
- In order to minimize the potential for environmental impact to the valley natural features, alternatives should not require open cut construction of the sewer from the west of the creek to the Queensway shaft compound

Table 3 and the accompanying map (Figure 2**)** outline the long list of alignment alternatives and the results of the pass/fail screening criteria.

Table 3: Screening Results for Etobicoke Creek Alignment

Alternative	Creek Crossing Methodology	Location of Tunnel Launch / Receiving Pit	Description of Sewer alignment to Queensway shaft compound	Screening Results
A	No open cut trenchless crossing	East side of creek	• No open cut section across creek • Tunnel construction between east side of creek and Queensway • Alignment within Etobicoke creek Valley	✘
B	Open Cut with Liner	East side of creek	• Requires open cut section across creek • Requires a tunnel liner under creek • Tunnel construction between east side of creek and Queensway • Alignment within Etobicoke creek Valley	✓
C	Open Cut	West side of creek	• Requires open cut section across creek • Tunnel between west side of creek and Queensway • Alignment within Etobicoke creek Valley	✓
D	Open Cut	West side of creek & Greenhurst	• Requires open cut section across creek • Requires two shaft compounds one on Greenhurst and second on west side of creek • Tunnel construction between west side of creek and Greenhurst • Tunnel construction between Greenhurst and Queensway • Partial alignment within Etobicoke Creek Valley and second stretch within ROW and boulevard	✓

Alternative	Creek Crossing Methodology	Location of Tunnel Launch / Receiving Pit	Description of Sewer alignment to Queensway shaft compound	Screening Results
E	Open Cut (creek & valley)	West side of creek & Greenhurst	• Requires open cut section across creek • Open cut section continues into the valley towards Greenhurst • Tunnel construction between Greenhurst to open cut, reverse and tunnel north to Queensway • Partial alignment within Etobicoke Creek Valley and second stretch within ROW and boulevard • Requires extended open cut section within Valley	✘

Alternatives B, C and D moved forward to the more detailed evaluation.

Figure 2: Alignment Alternatives at Etobicoke Creek

Note: **Figure 2** presents the conceptual design of the alignment alternatives at Etobicoke Creek. Further refinement will be conducted during detailed design.

4.2 DETAILED EVALUATION OF SHORT LIST OF ALTERNATIVES

The following factors have been considered and are common among all technically viable alternatives:

1. Bypass construction of the existing sewer required to facilitate connection and enable larger staging area on the east side of the creek and west side of existing sewer
2. Temporary diversion and coffer damming of the Etobicoke Creek required to facilitate crossing
3. Mitigation required to minimize creek meander, erosion and scour close to the existing and proposed sewer and manhole as outlined in the Fluvial Hazards Analysis and Report and to be confirmed through detailed design and permitting and approvals
4. Temporary impact to the local environment during construction and will require mitigation, determined through detail design and permitting and approvals
5. Open cut construction required within the creek
6. Construction management plan will look to minimize impact to public access areas and to trails and access road
7. Mitigation will be required to minimize potential vibration impact to Heritage Bridge at Sherway Drive as per findings of the Cultural Heritage Impact Assessment
8. No impact to archaeologic features is anticipated as per the completed Stage 2 Study
9. Etobicoke Creek and Valley are within TRCA permit regulation limits permitting and approvals are required
10. Construction within Etobicoke Creek will require DFO permitting and approvals prior to construction
11. Coordination with City of Mississauga is required for site access and easements
12. Coordination with City of Toronto is required for site access and easements
13. Need for fluvial hazard remediation and costs similar for all alternatives

<u>Detailed Evaluation Rating System</u>

- 1 = High Risk of Impacts
- 2 = Moderate Risk of Impacts
- 3 = Low Risk of Impacts

Table 4: Detailed Evaluation of Etobicoke Creek Alignment Alternatives

Construction Methodology	B. Open Cut with Liner across Etobicoke Creek; Tunnel between East Side of Creek and Queensway *(*Figure 3*)* (Etobicoke Creek Valley)	Score	C. Open Cut Pipe across Creek; Tunnel between West Side of Creek and Queensway *(*Figure 4*)* (Etobicoke Creek Valley)	Score	D. Open Cut Pipe across Creek; Tunnel between Greenhurst Ave to Open Cut, Reverse and Tunnel North to Queensway *(*Figure 5*)* (Greenhurst)	Score
Technical	- Design will require setback from Queensway bridge piers to avoid conflict however alternative has adequate area to achieve this and thus not considered a constraint - Alternative enables tunnel entry on the east side of the creek and avoids need for compound on the west side - Alternative does not cross any existing above or below ground utilities at tunnel compound, reducing potential for construction conflict - Alternative requires open cut construction across the creek and laying of a sewer liner/sleeve to enable tunneling drive from the open site 1B - Alternative requires tunnel machinery to cross creek increasing potential construction risk to creek and increased construction complexity - Alternative requires an increased curved sewer alignment which may limit tunneling methodology - Improved flow hydraulics with straighter sewer alignment compared to Alternative D - Topographic survey, planned tunnel depth and alignment shows adequate depth of tunnel to minimize impact to environmental features on west side of creek (common to all)	2	- Design will require setback from Queensway bridge piers to avoid conflict however alternative has adequate area to achieve this and thus not considered a constraint - Alternative requires an east and west compound with tunnel entry on the west side; tunnel machinery and mobilization will need to cross creek to access shaft compound on the west - Alternative does not cross any existing above or below ground utilities at tunnel compound, reducing potential for construction conflict - Alternative requires open cut construction across the creek and laying of a sewer, with tunneling drive from the west side of creek - Alternative does not require tunneling to cross creek reducing potential construction risk to creek and reducing construction complexity - Alternative may require shaft/manhole on both sides of creek requiring enhanced fluvial hazard mitigation - Alternative enables a straighter sewer alignment construction from the west compound and therefore does not limit tunneling methodology - Improved flow hydraulics with straighter sewer alignment compared to Alternative D - Topographic survey, planned tunnel depth and alignment shows adequate depth of tunnel to minimize impact to environmental features on west side of creek (common to all)	3	- Alternative requires an east and west compound at the Creek and Greenhurst Ave - Alternative may require manhole on both sides of creek requiring enhanced fluvial hazard mitigation - Alternative requires tunnel launch on Greenhurst where there are existing overhead Hydro One wires and transmission tower, increased construction conflict - Alternative enables tunnel entry outside of the creek - Alignment requires additional shaft site on Greenhurst - Increased turns on Greenhurst adds construction complexity as compared to straighter tunneling alternatives B and C - Tunneling downhill from Greenhurst to west side of creek; potential to retrieve tunnel machinery from west side of creek as opposed to reversing tunnel machinery - Poorer flow hydraulics due to bends in alignment; flow east then southwest - Topographic survey, planned tunnel depth and alignment shows adequate depth of tunnel to minimize impact to environmental features on west side of creek (common to all)	1
Environmental	- Requires open cut construction of the creek causing impact and need for mitigation (common to all) - Construction within the floodplain and meander belt, alternative will require fluvial hazard and scour remediation (common to all) - Following construction compound will require natural environment remediation program with opportunity to improve habitat and plant native species (common to all) - Alternative requires a crossing of the creek with tunnel machinery which increases the risk to creek integrity - Alignment shows adequate depth of tunnel to minimize impact to environmental features however increased risk compared to Alternative D	1	- Requires open cut construction of the creek causing impact and need for mitigation (common to all) - Construction within the floodplain and meander belt, alternative will require fluvial hazard and scour remediation (common to all) - Following construction compound will require natural environment remediation program with opportunity to improve habitat and plant native species (common to all) - Alternative does not require crossing of the creek with tunnel machinery - Alignment shows adequate depth of tunnel to minimize impact to environmental features however increased risk compared to Alternative D	1	- Requires open cut construction of the creek causing impact and need for mitigation (common to all) - Construction within the floodplain and meander belt, alternative will require fluvial hazard and scour remediation (common to all) - Following construction compound will require natural environment remediation program with opportunity to improve habitat and plant native species (common to all) - Alignment shows adequate depth of tunnel to minimize impact to environmental features however decreased risk compared to Alternatives B and C with reduced alignment length within valley	2

Construction Methodology	B. Open Cut with Liner across Etobicoke Creek; Tunnel between East Side of Creek and Queensway (Figure 3) (Etobicoke Creek Valley)	Score	C. Open Cut Pipe across Creek; Tunnel between West Side of Creek and Queensway (Figure 4) (Etobicoke Creek Valley)	Score	D. Open Cut Pipe across Creek; Tunnel between Greenhurst Ave to Open Cut, Reverse and Tunnel North to Queensway (Figure 5) (Greenhurst)	Score
Social / Cultural	- Construction is removed from residential areas minimizing noise, air, vibration, odour and traffic impacts compared to Alternative D	3	- Construction is removed from residential areas minimizing noise, air, vibration, odour and traffic impacts compared to Alternative D	3	- Construction required in residential area causing noise, air, vibration, odour and traffic impacts compared to Alternative B and C	1
Legal	- Sewer alignment requires permit and easement across Hydro One Corridor but as alignment is within valley area and tunneled; not considered onerous - Construction will require DFO and TRCA permitting and approvals (common to all alternatives) - Alternative will require temporary access and permanent easement agreements with multiple parties – City of Mississauga, TRCA, City of Toronto and Hydro One (common to all alternatives) - Shaft compound not located near any overhead wires or transmission towers; no setback conflicts anticipated with Hydro One infrastructure	3	- Sewer alignment requires permit and easement across Hydro One Corridor but as alignment is within valley area and tunneled; not considered onerous - Construction will require DFO and TRCA permitting and approvals (common to all alternatives) - Alternative will require temporary access and permanent easement agreements with multiple parties – City of Mississauga, TRCA, City of Toronto and Hydro One (common to all alternatives) - Shaft compound not located near any overhead wires or transmission towers; no setback conflicts anticipated with Hydro One infrastructure	3	- Construction will require DFO and TRCA permitting and approvals (common to all alternatives) - Alternative will require temporary access and permanent easement agreements with multiple parties – City of Mississauga, TRCA, City of Toronto and Hydro One (common to all alternatives) - Construction will require shaft compound on Greenhurst Ave within Hydro One corridor and closer to overhead wires and transmission tower increasing potential for construction conflict and permitting	2
Financial	- Alternative minimizes number of turns during tunneling reducing cost compared to Alternative D but complexity of creek crossing sleeve increases costs compared to C	3	- Alternative minimizes number of turns during tunneling reducing cost compared to Alternative D and reduced complexity of creek crossing decreasing costs compared to B	3	- Alternative has higher number of turns during tunneling and shaft compounds increasing cost compared to Alternatives B and C - Alternative has increased cost for extra deep shaft on Greenhurst	2
Overall Scoring	12		13 – Preliminary Preferred Alignment		8	

The preliminary preferred alignment profile and Etobicoke Creek cross section are provided in Figure 6 and Figure 7, respectively. A topographical survey was conducted within the Etobicoke Creek Valley to confirm elevations. The results are included in the profile (purple dashed line).

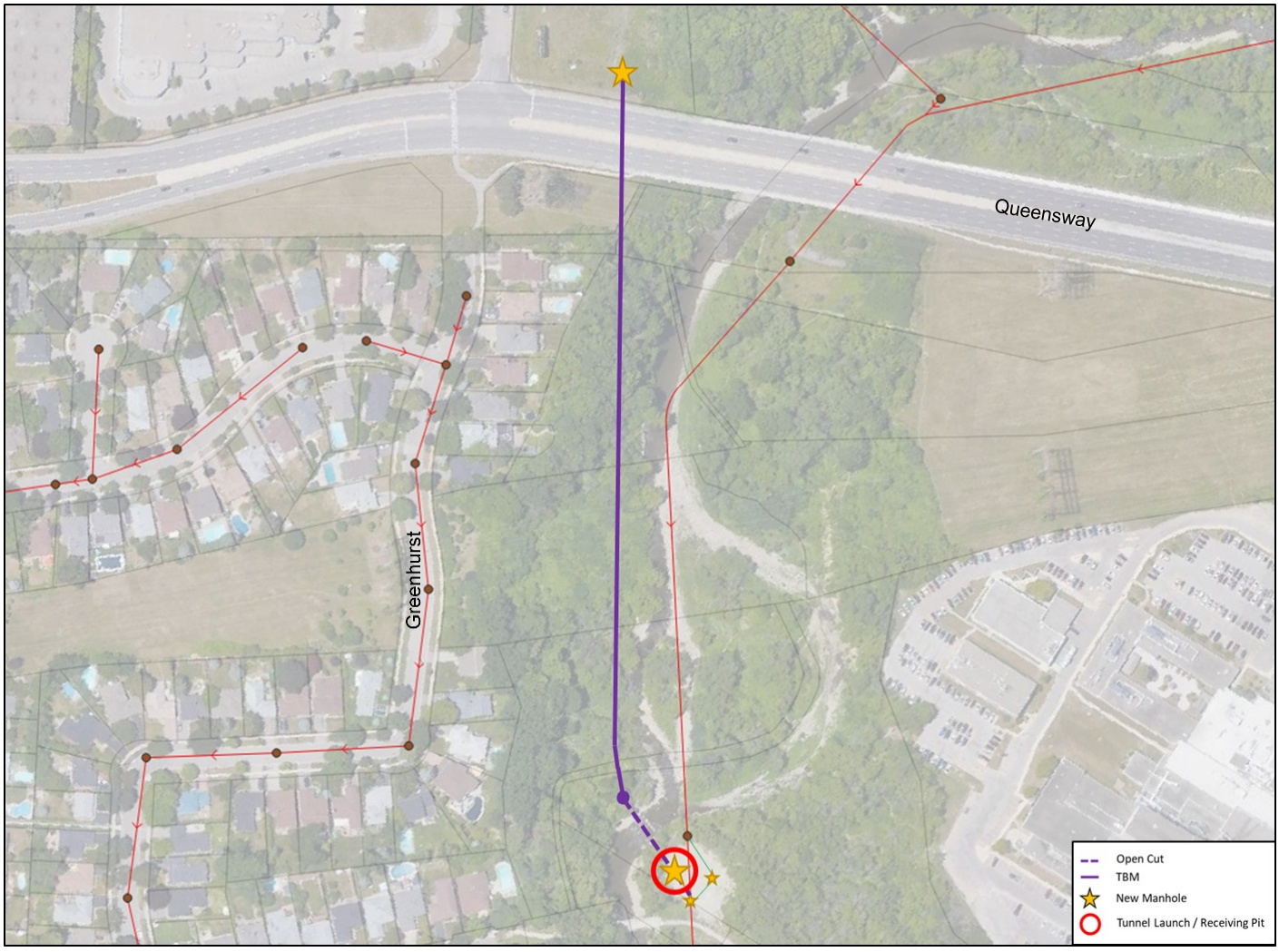

Figure 3: Alignment Alternative B

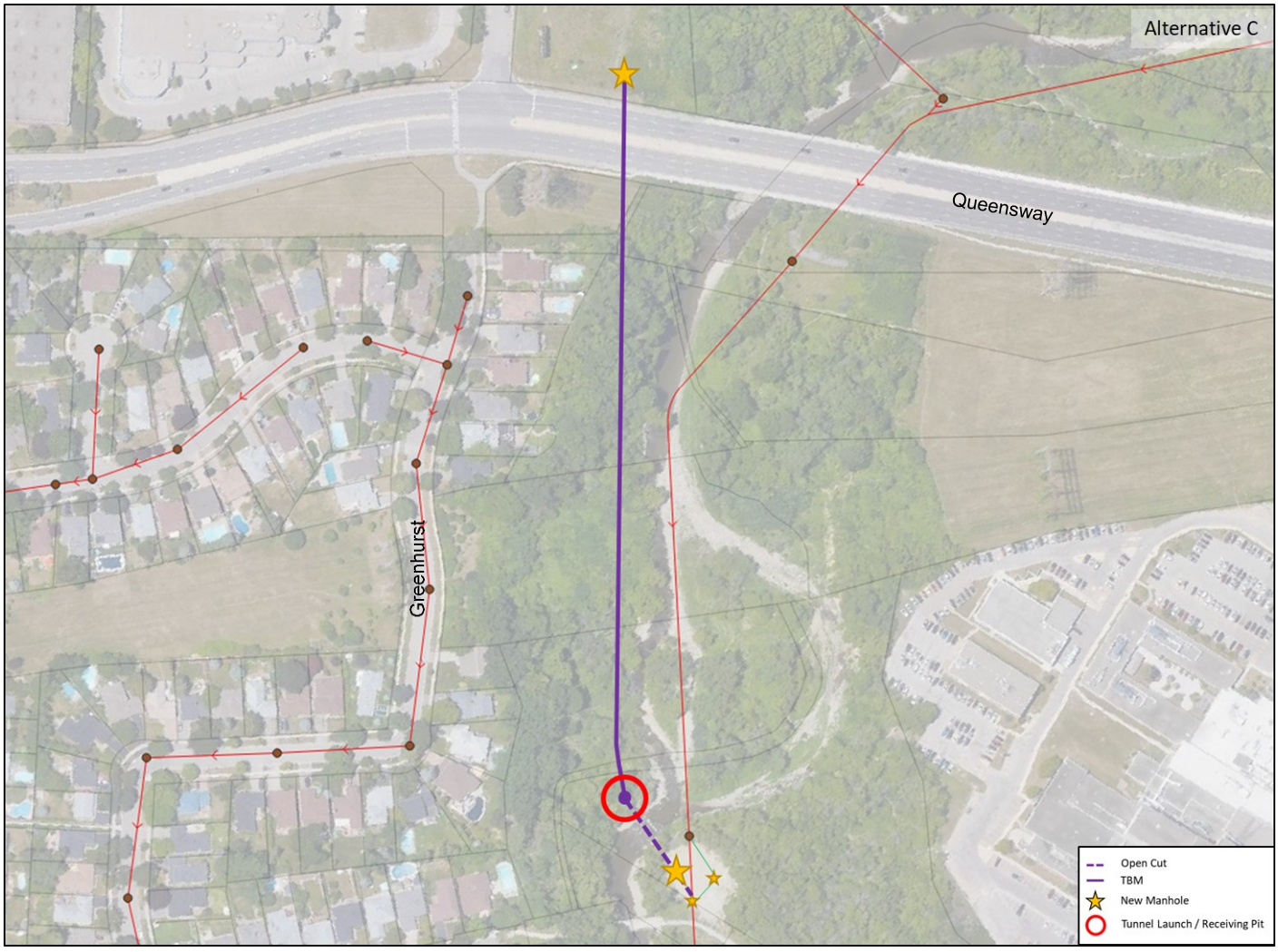

Figure 4: Alignment Alternative C

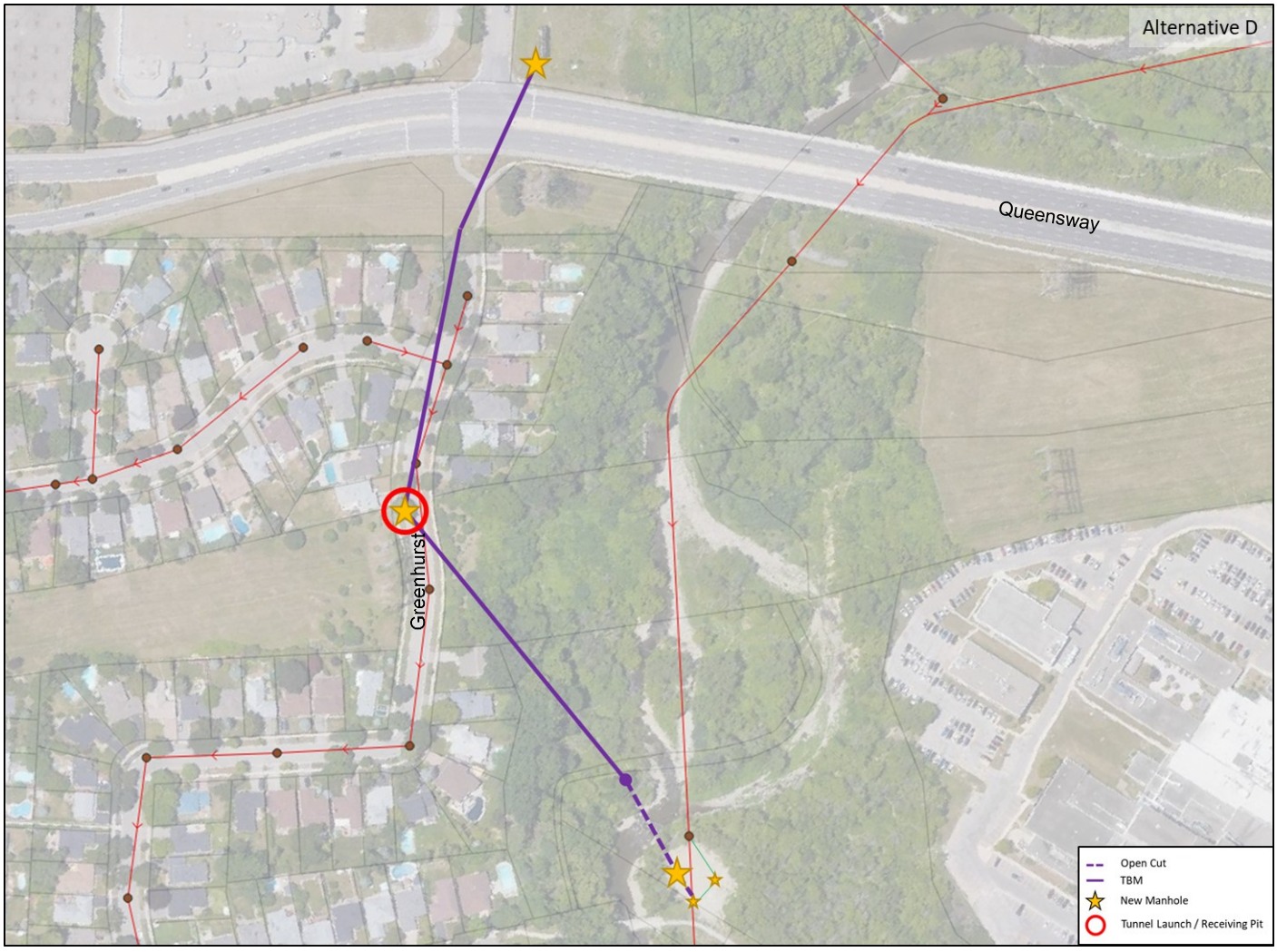

Figure 5: Alignment Alternative D

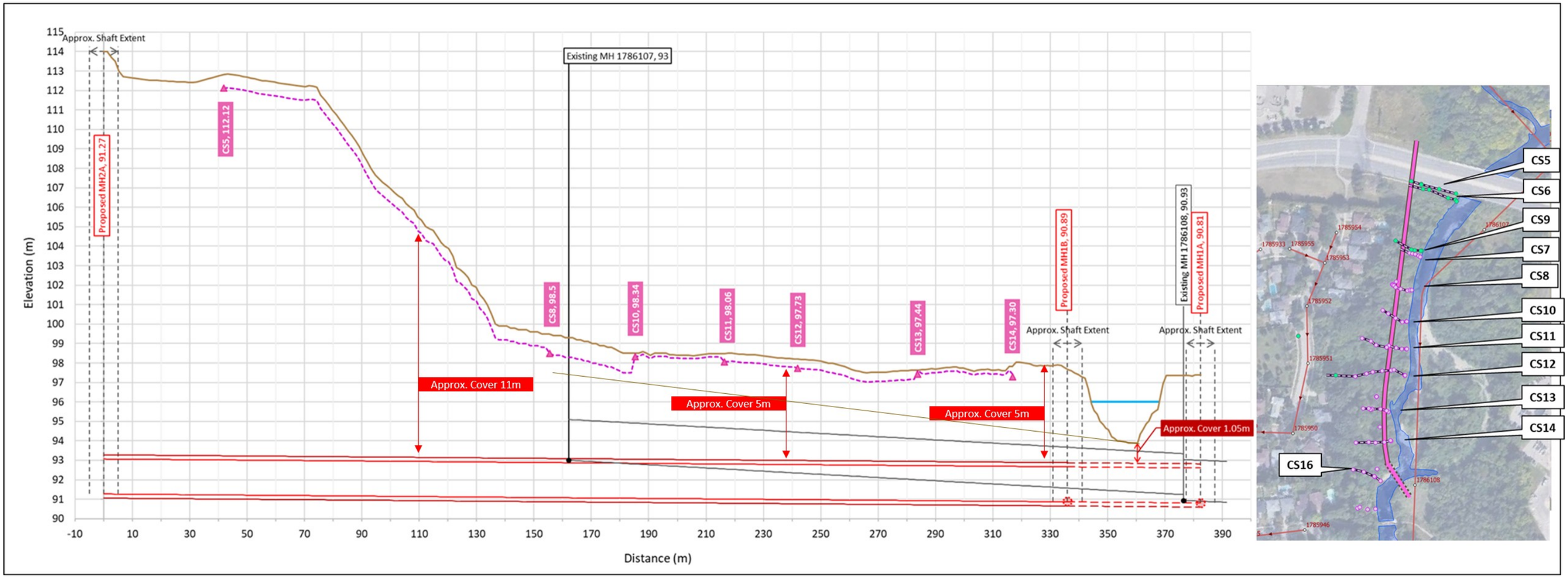

Figure 6: Preliminary Preferred Alignment – Etobicoke Creek Valley Profile

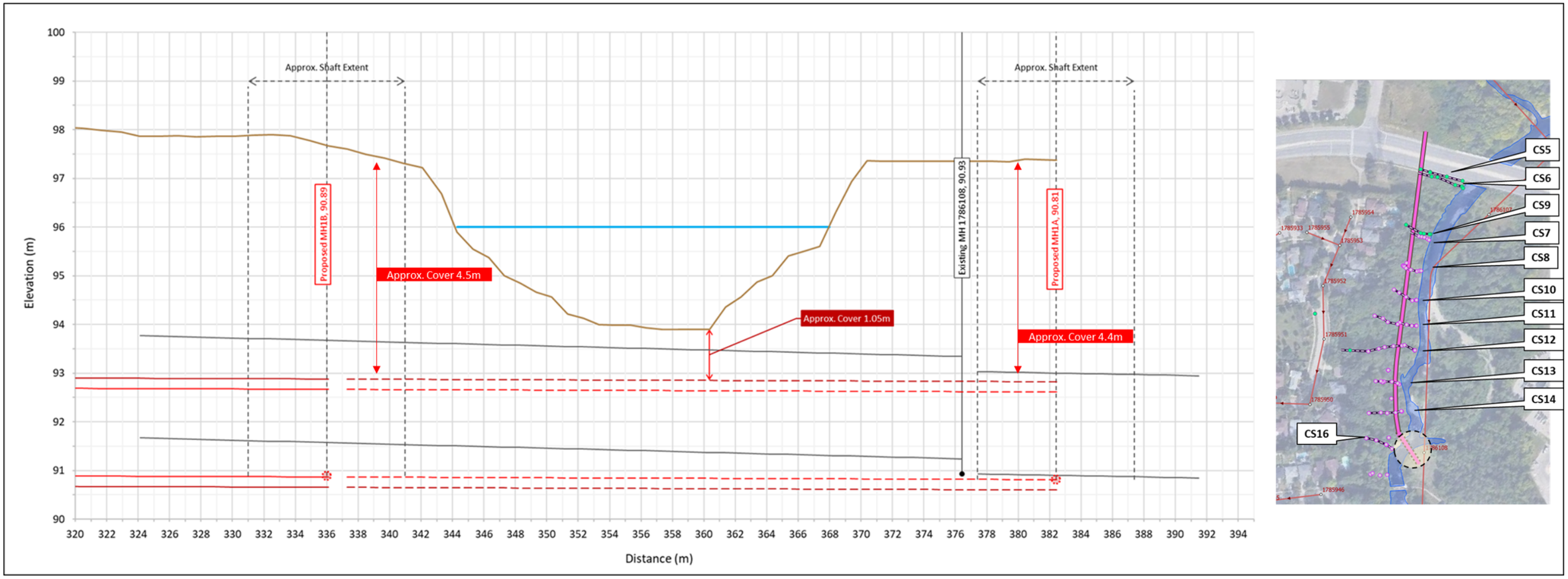

Figure 7: Preliminary Preferred Alignment – Etobicoke Creek Open Cut Cross Section

5 PRELIMINARY RECOMMENDATIONS

The preliminary preferred solution includes:

- Selection of Site 1B as the East Trunk connection point
- Selection of Alignment C which includes:
    - Open cut construction to cross Etobicoke Creek
    - Second construction compound on west side of Etobicoke Creek to facilitate tunneling alignment
    - Tunneling alignment from Queensway to west of Etobicoke Creek within the Etobicoke Creek Valley with approx. minimum 4-5m cover
- Fluvial hazard remediation for existing pipe and proposed infrastructure