Appendix D:
Fish Habitat

Section D.1:
Fish Habitat Memo

MEMORANDUM

TO: **Yvonne Lam, Associate, DTAH**

FROM: **Alex Stettler, Senior Project Manager / Senior Ecologist - Fisheries, WSP**

SUBJECT: **Queens Quay East 30% Design – Yonge Street Slip Infilling Review Memorandum**

DATE: **August 10, 2023**

INTRODUCTION

WSP Canada Inc. (WSP) Ecology was retained by DTAH to undertake a review of the 30% design associated with the proposed infilling of the Yonge Street Slip for the Queens Quay East Expansion Project. The review is focused on the potential impacts to fish and fish habitat and the anticipated implications related to Fisheries Act (FA) approvals, which is reviewed under the direction of Fisheries and Oceans Canada (DFO). Given that the infilling will result in the loss of fish habitat, it is anticipated that a Fisheries Act Authorization (FAA) will be required; however, the authorization will be confirmed through consultation with DFO later in the design process (i.e., 60-90%). WSP offers the following memorandum as documentation of the existing conditions (based on available background information), proposed works, infill footprint, potential off-setting habitat features and permitting recommendations.

AGENCY CONSULTATION

To date, WSP has been involved in preliminary agency consultation through Aquatic Habitat Toronto (AHT) and subsequent follow-up communications with the Toronto and Region Conservation Authority (TRCA) as noted below. On November 5, 2020, the Queens Quay East 30% Design project was presented during the monthly meeting of AHT, which is a platform where projects involving works within the Toronto Harbour are presented to representatives from all levels of government (federal, provincial and municipal) and other organizations who have an interest in all works within the harbour. During this meeting, AHT was briefly introduced to the project including the proposed works and potential impacts. The agencies present are able to ask questions and generally offer insight into potential design issues and permitting requirements to be addressed / considered as the project evolves. It was noted by TRCA that the proposed works, with the associated infilling within the Yonge Street Slip, would result in impacts to fish and fish habitat and are likely to result in a FAA to be issued by DFO. Confirmation of an FAA will be sought from DFO later during detail design once the design progresses to a later phase (i.e., 60-90%) through the submission of a Request for Review (RfR) to DFO.

100 Commerce Valley Drive West
Thornhill, Ontario
Canada L3T 0A1
905-882-1100
wsp.com

When quantifying the impacts of the proposed work to fish and fish habitat within Lake Ontario, the agencies involved (TRCA and DFO) rely on a tool referred to as the H.E.A.T. (Habitat / Ecosystem Assessment Tool) Model. Specifically, the model assesses the habitat to be impacted based on a number of factors (e.g., fish community, water depth, substrate, water quality, existing disturbances, containments, etc.) and provides a numerical output that translates into the amount of habitat that has been removed by the proposed works. This numerical value then becomes the minimal amount of habitat that is required to be created to off-set the proposed impact. Ideally, in order to have a net gain in habitat, more habitat is to be created than is removed. TRCA typically manages the H.E.A.T. Model in conjunction with the DFO on behalf of AHT and offered during the AHT meeting to do so for this project as well.

As such, follow-up consultation with TRCA was undertaken with WSP to review the requirements of the inputs into the model that TRCA would require to determine the off-setting requirements. During this consultation, contacts were established and WSP will engage with the TRCA, DFO and AHT in the future, once the design becomes more refined, and impacts can be confirmed.

YONGE STREET SLIP

Infilling within the Yonge Street Slip is proposed to be constructed for the completion of the Queens Quay East works. The infill will also allow for access to the nearby Westin Motorcourt and Westin Service Entrance, as well as provide improved access to the public realm though the inclusion of connecting pathway along the waterfront, a wave deck and docks for access to the water for recreational activities.

EXISTING CONDITIONS

The Yonge Street Slip is located south of the Yonge Street and Queens Quay East intersection. The west wall was built in 1926 with timber crib and concrete copebeam. The crib is in reasonable condition and the copebeam is in poor condition. The west wall was deemed to have a useful residual life of 25 years in 2008. The north wall was built in 1928 with timber crib and concrete copebeam. The crib is in reasonable condition; however, the copebeam is in poor condition. The north wall was deemed to have a useful residual life of 10 years in 2008. The east wall was built from 1948 to 1950 with steel sheet pile. The sheet pile is in reasonable condition, with noted pitting and spalling at the water line, and the copebeam is in poor condition. The east wall was deemed to have a useful residual life of 10 to 15 years in 2008. A stormsewer outlets into the slip with a 2.6 m wide and 2.0 m high inner dimension and 3.45 m wide by 2.67 m high outer dimension. The outfall of the storm sewer is enlarged with a 5.08 m wide by 4.06 m high outer dimension.

The average depth of water within the slip is 8 m and the depth of water at the dockwalls ranges from 5.4 m to 5.8 m. The substrate consists of soft silt and gravel. Further bathymetric and geotechnical surveys will be undertaken to guide the design as it progresses.

There was no direct fish sampling and data available from within the Yonge Street Slip. Fish data from the adjacent Jarvis Street Slip, which is approximately 500 m to the east of the Yonge Street Slip and from the Parliament Street Slip which is approximately 700 m further to the east is present in **Table 1**. Given that the Jarvis Street Slip has a similar fish community as the Parliament Street Slip, it is anticipated that the Yonge Street Slip will have a similar fish community as in the adjacent slips. Overall, the fish community consists of generalist warmwater, coolwater and

coldwater species, with Emerald Shiner (*Notropis atherinoides*) and Alewife (*Alosa pseudoharengus*) as the most common species captured. Native and non-native species make up the fish community within the vicinity of the Yonge Street Slip.

Table 1. Toronto Harbour Fish Community Data Obtained Via Electrofishing and Trapping Conducted by TRCA from 2008 to 2015.

SPECIES	LOCATION(S) CAPTURED	YEAR(S) CAPTURED
Alewife (*Alosa pseudoharengus*)	Parliament Street Slip, Jarvis Street Slip	2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015
Chinook Salmon (*Oncorhynchus tshawytscha*)	Parliament Street Slip	2008, 2010, 2012
Common Carp (*Cyprinus carpio*)	Jarvis Street Slip	2012
Emerald Shiner (*Notropis atherinoides*)	Parliament Street Slip, Jarvis Street Slip	2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015
Gizzard Shad (*Dorosoma cepedianum*)	Parliament Street Slip, Jarvis Street Slip	2009, 2011, 2012, 2013, 2014, 2015
Longnose Gar (*Lepisosteus osseus*)	Jarvis Street Slip	2009
Northern Pike (*Esox lucius*)	Parliament Street Slip, Jarvis Street Slip	2008, 2012, 2014
Rainbow Smelt (*Osmerus mordax*)	Parliament Street Slip, Jarvis Street Slip	2008, 2009, 2014, 2015
Round Goby (*Neogobius melanostomus*)	Parliament Street Slip	2014
Spottail Shiner (*Notropis hudsonius*)	Parliament Street Slip	2008
Threespine Stickleback (*Gasterosteus aculeatus*)	Jarvis Street Slip	2014

PROPOSED WORKS

The infilling will occur with the installation of 900 mm steel pipe pile filled with concrete, reinforced concrete waler, reinforced concrete cap, steel sheet pile, clear stone fill and 219 mm toe pin filled with grout. The existing 1950 mm by 2550 mm combined sewer outfall (CSO) will be extended through the infill to the proposed new dockwall with a new outfall.

FILL FOOTPRINT

The total proposed infill associated with the Yonge Street Slip is 3500 m^2.

OFF-SETTING HABITAT FEATURES

The existing fish habitat in the Yonge Street Slip associated with the infilling and dockwall rehabilitation will be lost. As a result, a fish habitat off-setting plan is anticipated to be required which will consist of the construction fish habitat enhancements features within the slip to

improve the existing habitat present. The following fish habitat enhancement features described below may be implemented as part of the off-setting plan to address the habitat lost. These could include features such as embedded logs and wood debris, roots fans, log cribs, boulder clusters and shoals.

Woody material in the form of brush bundles, dead trees and stumps can be utilized in both shallow and deep areas to provide structural habitat. Aggregate material (rock, rubble, gravel) can be strategically placed in a manner which promotes vertical relief, interstitial spaces and irregular outlines. These will increase habitat diversity, which provides; important nursery areas for immature and juvenile individuals, reduction of predation through improvements in shelter, significant foraging areas and shelter from harsh physical conditions (**Figures 1-8**).

An additional habitat feature that may be used for off-setting is the installation of a live dockwall. A live dockwall consists of 2 rows of staggered concrete ledges at different elevations along the length of the new dockwall or rehabilitated dockwall. The concrete will be textured to provide increased surface area for the establishment of algae, aquatic vegetation and aquatic invertebrates. The live dockwall will aim to provide enhanced habitat and diversity along the entire face of the wall, by adding structure and improved cover at a range of elevations and increased feeding opportunities that are otherwise lacking. Additionally, by utilizing the vertical face of the wall, the habitat feature (i.e., dockwall and ledges) will experience less impacts from ongoing siltation than other options that would include substrate / boulder clusters placed on the lakebed of the slips (**Figures 9-11**).

The footprint (or area) of the selected fish habitat enhancements features has to exceed the footprint of the habitat lost to create a net benefit. As such, habitat features that have a multi-dimensional shape (e.g., log cribs and shoals) should have their habitat off-setting value calculated based on its surface area that is available to fish use and not on the footprint it occupies on the lakebed. For instance, the habitat off-setting value attributed to a live dockwall should be derived from the length and height of the new wall face, including an additional area from the concrete ledges protruding from the new dockwall face to account for habitat present on both the top and underside of the ledges. By taking the vertical component of the fish habitat enhancement feature into account, a smaller physical area than the actual size of the area lost can be used to achieve an overall net benefit to fish and fish habitat.

If the proposed fish habitat enhancement features anticipated to be installed throughout the Yonge Street Slip does not exceed the footprint for the habitat lost, off-site off-setting or compensation will have to be considered to off-set the impacts to the existing fish habitat. The Jarvis Slip will be reviewed as a potential location for off-site off-setting if suitable off-setting cannot be accommodated with the Yonge Street Slip. To determine the final impacts to fish habitat and the associated amount of off-setting required, TRCA will be engaged to complete the H.E.A.T. model assessment later in the design phase.

FISH HABITAT ENHANCEMENTS FEATURES EXAMPLES

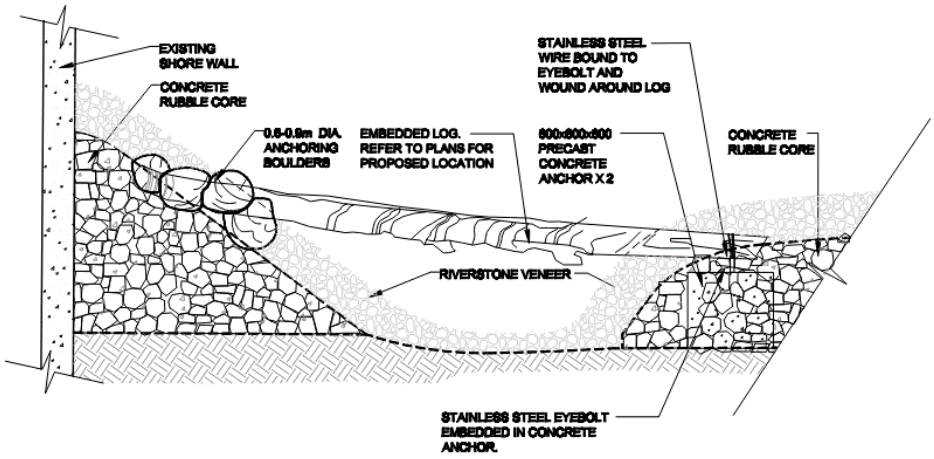

Figure 1. Embedded log with precast concrete anchor.

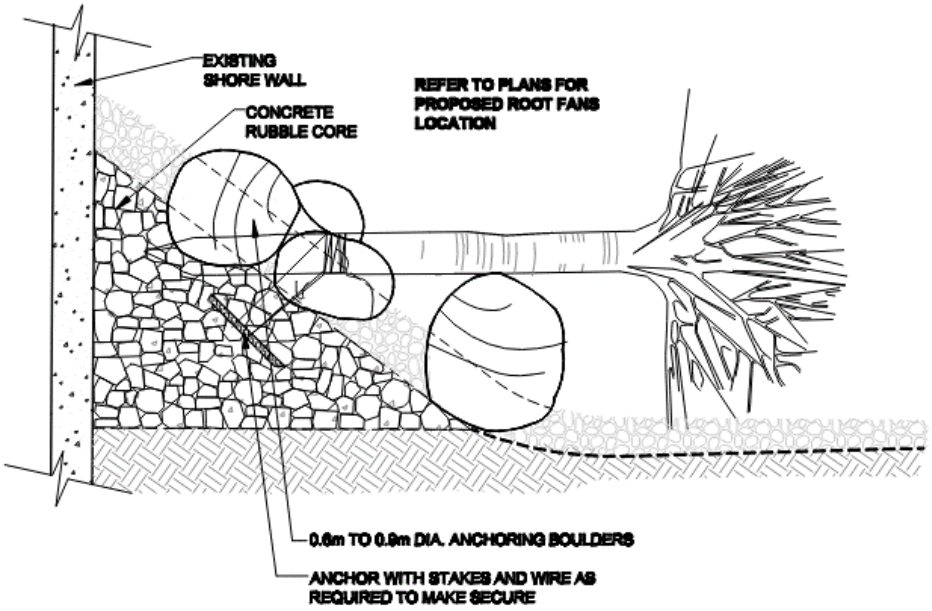

Figure 2. Root fans anchored in rubble core.

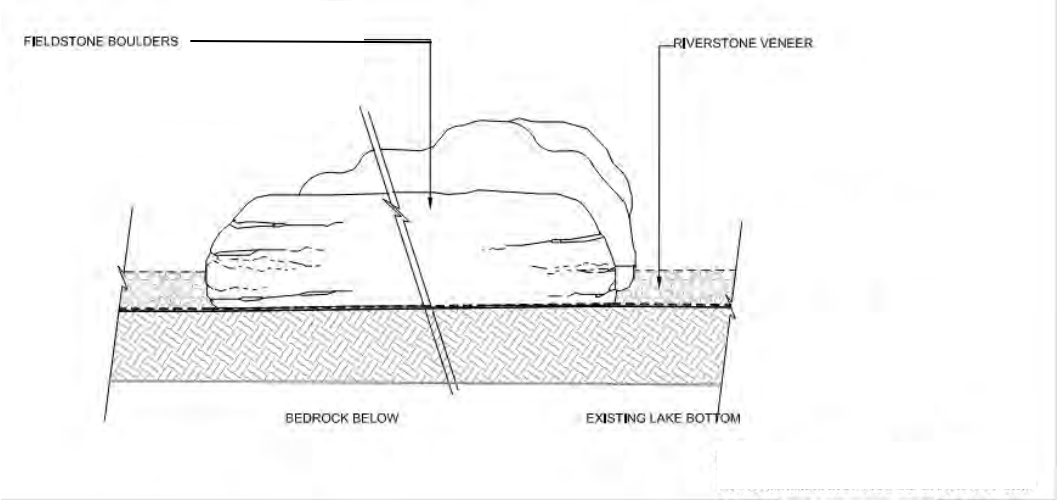

Figure 3. Boulder cluster.

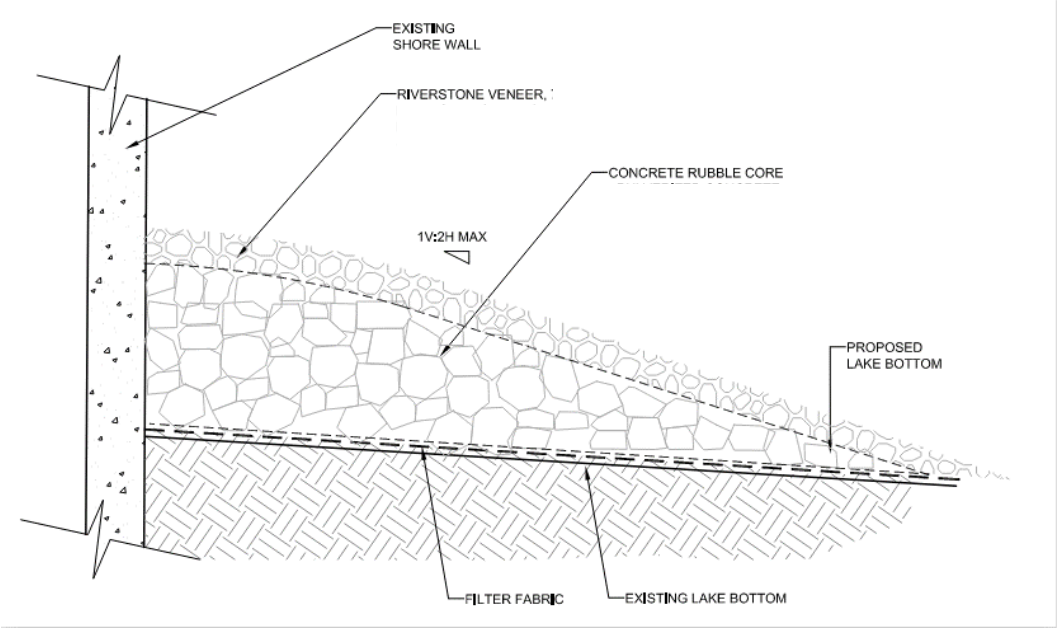

Figure 4. Shoal with concrete rubble core.

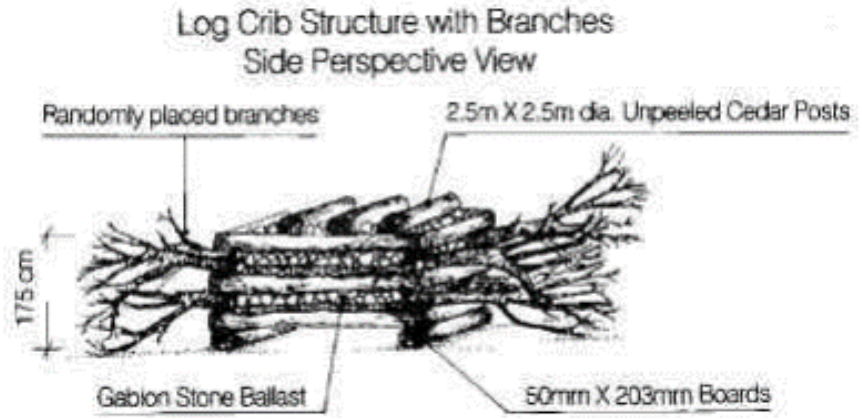

Figure 5. Submerged log cribs (cribs can be filled with rubble and augmented with brush in order to provide shelter for a variety of fish).

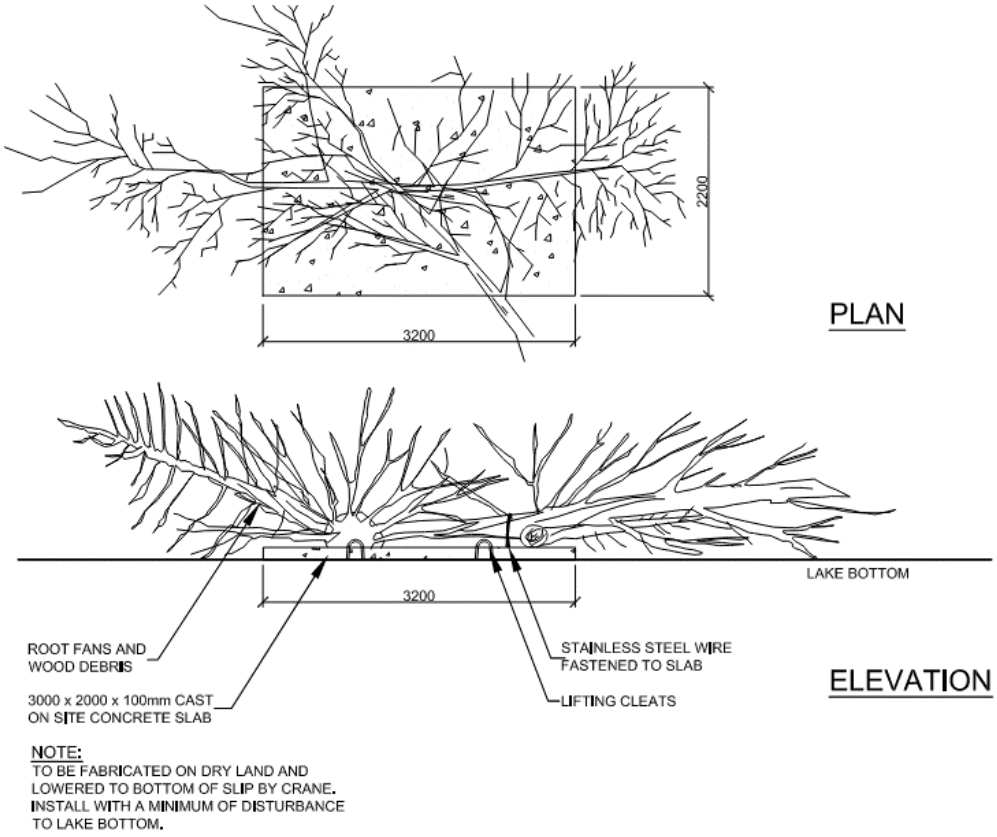

Figure 6. Modular habitat shelter structure.

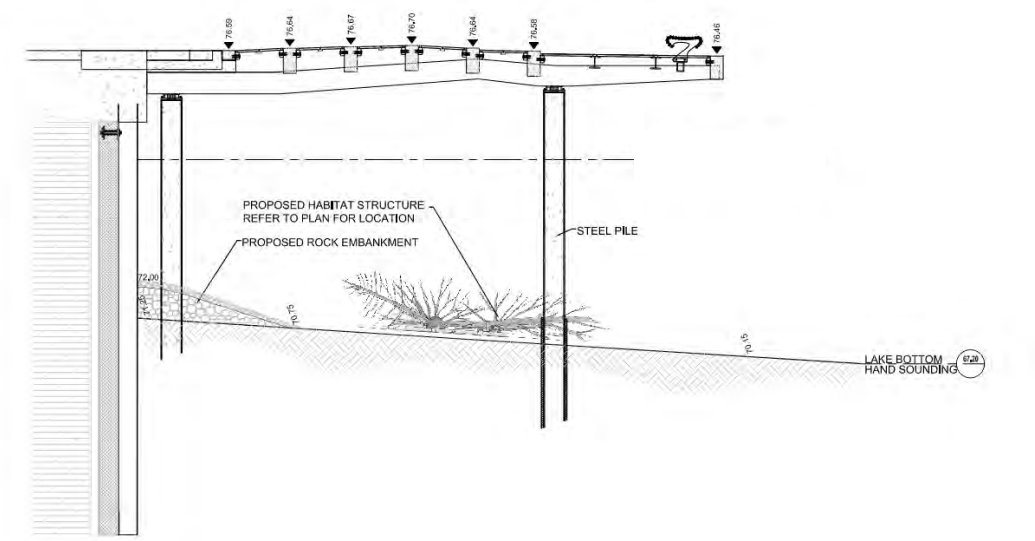

Figure 7. Enhancement features under a deck with modular habitat shelter structure.

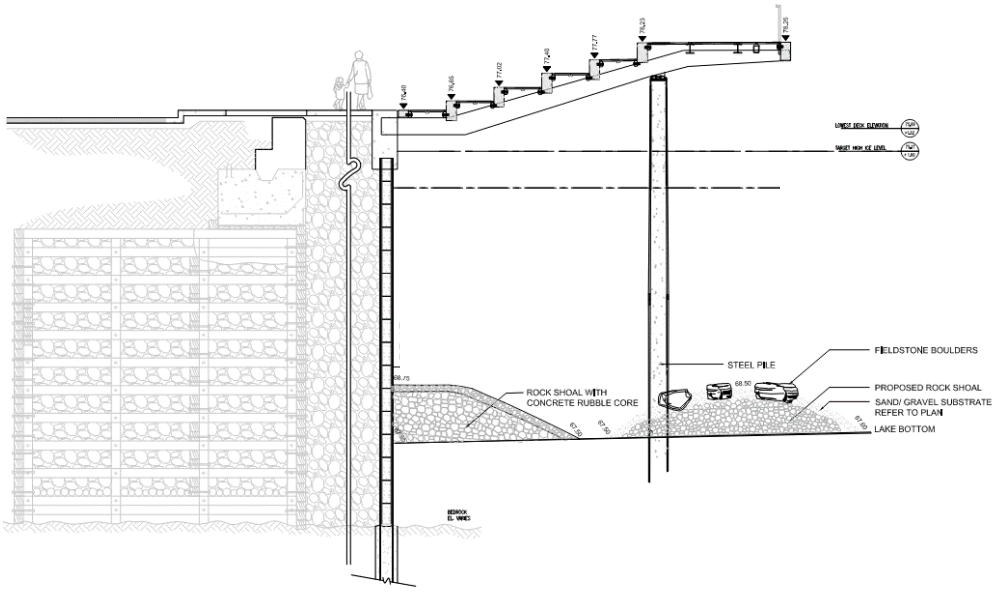

Figure 8. Enhancement features under a deck with boulder clusters.

Figure 9. Live dockwall (Seattle Waterfront Project).

Figure 10. Live dockwall (Seattle Waterfront Project).

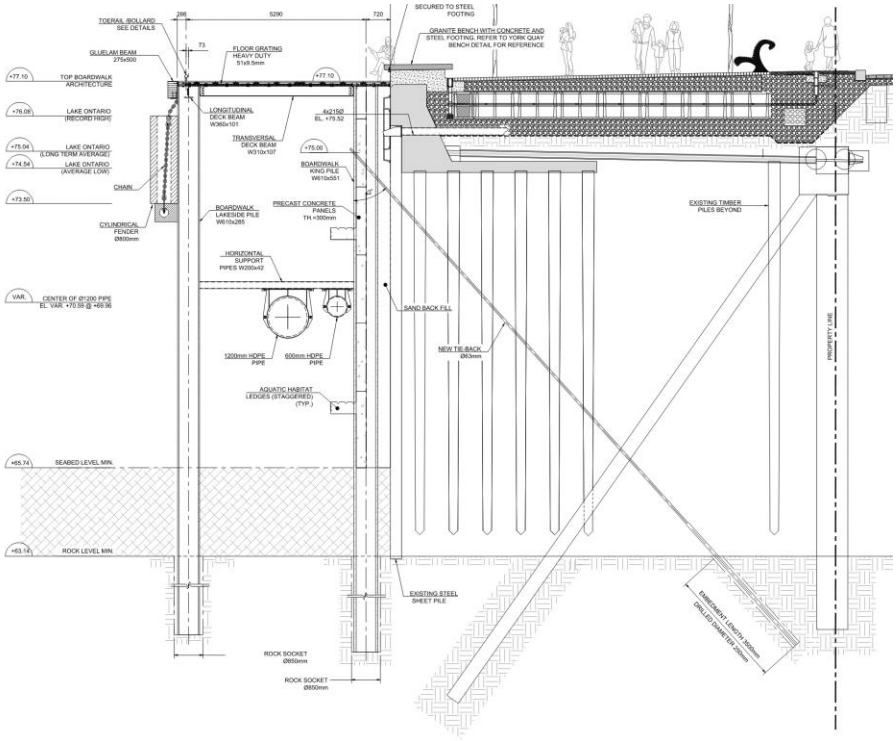

Figure 11. Cross section of dockwall and aquatic habitat ledges.

STANDARD CONSTRUCTION MITIGATION MEASURES

The follow is a list of typical standard construction mitigation measures that may be applied when working in and/or near water to address potential impacts to fish and fish habitat.

STANDARD PROTECTION MEASURES

- Where possible, undertake works, undertakings and activities on land.
- Ensure proper erosion and sediment control measures are installed prior to the start of work and are routinely inspected with maintenance and improvements undertaken in a timely fashion as required.
- The in-water work area will be isolated using an acceptable isolation measures (i.e., turbidity curtain) and fish will be excluded from the in-water work area.
- Undertake a fish removal from the within the isolated work area.
- Materials placed below the high-water mark must be inspected to ensure they are free of excessive fine sediment and debris, and any contaminants prior to installation.
- Where stockpiles of rock or soil are required for long periods of time, the stockpile surfaces will be maintained to stabilize and prevent wash-outs, as well as being surrounded by a row of siltation fencing.
- Machinery and equipment used will arrive on-site in a clean condition, free of fluid leaks, invasive species and noxious weeds.

- Machinery, except marine-based equipment (e.g., barges) are to be washed, refueled and serviced a minimum of 30 m from any waterbody.
- Washing, refuelling and servicing of barges will be undertaken in a manner with suitable spill protection measures present to prevent fuel or deleterious materials from entry into the waterbody. These activities will be avoided during windy or wavy conditions or when the risk of a spill is increased.
- Machinery will be operated in a manner to minimize the risk of deleterious materials from entering any waterbody.
- Fuel will be stored a minimum of 30 m from the waterbody or an appropriately designated fueling area and in a manner, that will minimize the risk of fuel being spilled or released and entering the waterbody.
- The Contractor will be required to have a spill kit on site and have an emergency response plan in the event of a chemical release, including fuels and oils.
- Heeding weather advisories and scheduling work to avoid wet, windy and rainy periods.

TIMING WINDOWS

In-water timing windows are typically used to restricted in-water construction activities to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. As such, the in-water timing window for the Toronto Harbour based on previous projects within the harbour is from June 1 to September 14 (the period that in-water works are allowed to occur). However, based on the described habitat within the Yonge Street Slip, this location does not provide habitat to support fish spawning, nor are they located in a migration corridor (i.e., the Keating Channel for access into the Don River). For these reasons, the opportunity to waive the in-water timing can be perused with the reviewing agencies if the in-water portion of the project schedule cannot be accommodated within the June 1 to September 14 time period.

TURBIDITY MONITORING PLAN

A turbidity monitoring plan may be required when working outside of the in-water timing window or when isolation of the in-water work area can not be achieved. Turbidity monitoring plans monitor turbidity levels within the surface water to satisfy certain thresholds for protection of the aquatic environment. The Canadian Council of Ministers of the Environment (CCME) and Canadian Environmental Quality Guidelines (CEQG) require that a maximum increase of 8 Nephelometric Turbidity Units (NTU) from background levels at any one time is acceptable when background turbidity levels are between 8 NTUs and 80 NTUs. If required, the site-specific details of the plan can be designed, but typically involve the following criteria.

1. Sampling stations are established at one location downstream of the construction site, and one location upstream of the construction site. Sampling Locations should be based on a review of aerial imagery for the area surrounding the proposed construction site.
2. The daily turbidity values are recorded at the proposed sampling locations. If the turbidity levels at the downstream monitoring station are within 8 NTU of the turbidity levels at the upstream monitoring station, work may continue to proceed, and turbidity monitoring will continue at a frequency required.

3. If the difference between the downstream turbidity level and the upstream turbidity level is greater than 8 NTU, a visual assessment will be undertaken to determine if wind and/or wave action in the harbour, or alternate sources, may be influencing turbidity levels, as has been observed in previous turbidity monitoring programs for near-shore work. In the event that the difference between the downstream turbidity level and the upstream turbidity level is greater than 8 NTU, which is attributable to the construction activities, the turbidity monitoring frequency will be increased as per the approved plan.
4. If the difference between the downstream turbidity level and the upstream turbidity level is greater than 8 NTU and continues to exceed for 8 consecutive tests or 8 hours, work will cease until turbidity readings at the downstream monitoring station are below turbidity readings at the upstream monitoring station or additional mitigation measures are undertaken to control turbidity (i.e., turbidity curtain, modified construction practices, monitoring weather, etc.).
5. If, at any time, turbidity levels at the downstream monitoring station exceed 100% of upstream monitoring turbidity levels, which are attributed to the construction activities, work will cease immediately until turbidity levels decrease and the difference between the downstream turbidity level and the upstream turbidity levels is less than 8 NTU. If these types of exceedances occur too frequently, additional turbidity measures will be considered as a contingency.

FISHERIES ACT APPROVALS AND TIMELINES

The federal FA is under the jurisdiction of DFO. Its focus is to protect fish and fish habitat. Following the passage of Bill C-68, new fish and fish habitat protection provisions of the FA came into force as of August 28, 2019. The new provisions are:

- provide protection for all fish and fish habitats;
- restore the prohibition against 'harmful alteration, disruption or destruction of fish habitat' (HADD); and,
- prohibit activities, other than fishing, that cause 'the death of fish'.

Proponents are responsible for planning and implementing works, undertakings or activities in a manner that avoids harmful impacts, specifically the death of fish and HADD of fish habitat. Any activities taking place in waterbodies that DFO has determined are exempt, that comply with any of the Standards and Codes of Practice developed by DFO or can follow the DFO prescribed Measures to Protect Fish and Fish Habitat to avoid causing a HADD in fish habitat, the activity may proceed without DFO review.

In the event that a project cannot be feasibly relocated or redesigned to eliminate the HADD of fish habitat, mitigation measures and or habitat off-setting may be required. Any activity which is assessed to cause a potential HADD of fish and/or fish habitat must be submitted to DFO for review, to determine requirements for an Authorization under the FA.

With regard to the infilling of the Yonge Slip, a destruction and alteration of fish habitat is anticipated to occur with the new in-water footprint, which falls under a HADD. Therefore, a DFO RfR will likely need to be submitted to DFO in order for them to review the proposed works and impacts and assess whether a FAA is required. The RfR application can take several months for DFO to review and respond. If DFO determines a FAA will not be required, they will issue a

Letter of Advice (LoA). However, if DFO determines a FAA is required, an Application Form for the Issuance of an Authorization must be submitted to DFO. At a minimum, this application must include:

- Description of the existing fish and fish habitat conditions present;
- Description of the works, including construction methodology;
- Description of the impacts (i.e., area of impact), proposed mitigation and monitoring plans;
- H.E.A.T. Model results and proposed habitat off-setting plan, monitoring plan and success evaluation criteria; and
- A Letter of Credit (LoC).

Once DFO receives the application, they have 60 calendar days to review the application and deem if it is complete. During this 60 calendar day period, DFO has **one** opportunity to seek clarification and request additional information to be provided to facilitate their review. If DFO requires further information beyond what is provided based on their request, the application is rejected, and the review process is re-started once the revised application is re-submitted with new review timelines.

However, if DFO deems the application to be complete, they have an additional 90 calendar days to issue or decline the request for a FAA.

RECOMMENDATIONS

Based on DFO's approval process and review timelines, a submission to DFO should be made to DFO as soon as the associated design has been completed to a level that is acceptable for DFO to initiate their review (i.e., 60-90%).

NEXT STEPS

The following is a brief description of the next steps to be undertaken to obtain the required FA approvals.

1. Continue refining the design through the design process.
2. Provide a project update to the reviewing agencies by attending an upcoming AHT meeting to elicit agency input and comments to the design.
3. Once the design obtains a level when impacts have been established and can be assessed (i.e., 60-90%), the TRCA will be contacted and will work with the design team to run the H.E.A.T. Model to determine equitable off-setting measures for the proposed works. The H.E.A.T. Model needs to be completed before the submission of an RfR to DFO, as the submission's proposed off-setting measures need to be informed by the model results.
4. Confirm the proposed impacts and infill footprint and make the submission to DFO. Given the likelihood of a FAA to be required for the slip works, the RfR submission should be made to DFO a minimum of one (1) year in advance of the anticipated in-water construction start date.

SUMMARY

The above memo provides a brief description of how the proposed Queens Quay East Expansion Project will navigate through the FA. Given that the project is anticipated impact fish and fish habitat to require an FAA, examples of fish habitat features have been included as options to be

selected in the development of a fish habitat off-setting plan and will result in a net overall gain. As the design of the project progresses to allow the proposed impacts to be finalized, additional agency consultation will be undertaken with TRCA and DFO to confirm approval requirements, obtain agency buy-in to the process and ultimately secure the anticipated required FAA.

Alex Stettler, H.B.Sc., PMP
Senior Project Manager / Senior Ecologist - Fisheries, WSP