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NORTH EAST SCARBOROUGH COMMUNITY & CHILD CARE CENTRE, TORONTO, ONTARIO

Publicly funded project value: $66.9 million
Construction commencement: April 2022
Construction completion: July 2025

Dewatering Contract value: $1.1million
Commissioning Date: June 30, 2022
Decommissioning: July 2023

The site for this project is located in a densely populated area in an east Toronto district referred to as Scarborough. The site itself, once a soccer field and children's playground, is nestled between a public works yard and a firehall with access to the south side of site off a busy feeder roadway and from a subdivision side street to the northeast.

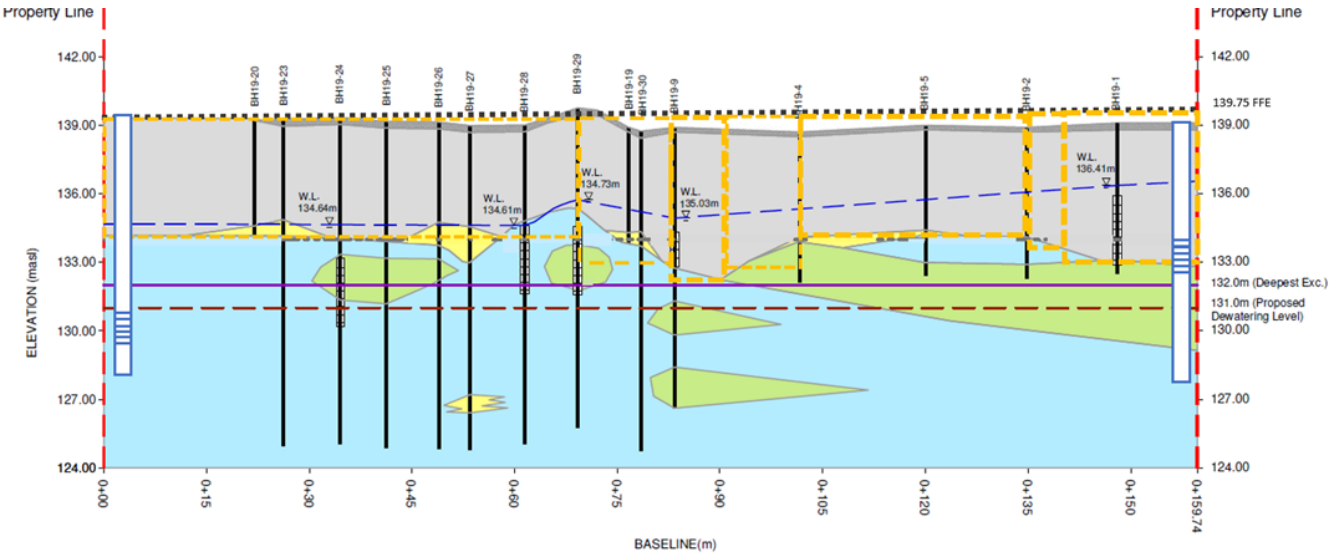
The project requiring dewatering comprises the construction of a 3-storey community centre with a partial deep basement, parking areas, site servicing, installation of four chamber systems to manage stormwater and permanent site drainage. The facility design boasts a 25-lane indoor swimming pool, leisure pool, recreational gymnasium space large enough to accommodate an indoor cricket pitch, community rooms, a childcare facility and outdoor rooftop green spaces for leisure activities. An outdoor skateboard park and multiple play spaces is also offered by this facility space. The North East Scarborough Community Recreation & Child Care Centre will be the City of Toronto's first Net Zero Energy and Emissions Community Recreation Facility.

The dewatering design challenges posed by this project included:

- a shallow unconfined aquifer atop Till and Silty Clay soil at inverts **above** the footing depths of the principle structure proposed swimming pool;
- the project specified a requirement of "dry" construction conditions at the base of the excavations;
- the general contractor did not want to perform supplemental sump pumping;
- settlement of any kind was not permitted so the dewatering system must not pump fines of any kind;
- the general contractor and consultants elected to open cut the excavation (without shoring);

- groundwater is encountered at approximately 4.6 meters below ground surface (BGS) with the lowest depth footings at 10.5m BGS;
- set back from the excavation around the perimeter for dewatering must be 12.5 to 20.5 meters;
- sub-cuts or benching not an option due to limited space and need for construction access around the excavation.

Knowing that preservation of the bearing capacity of the soils was of paramount importance for both the structural design and to support the crane on site during construction, the dewatering design needed to ensure that the system created a complete cut-off to groundwater infiltration to prevent the silts from dilating as construction progressed. Notably, the site investigation documents stated *"Dewatering will be required prior to any excavations below the groundwater table. Otherwise, it will result in an unstable base and flowing sides."*



The critical considerations for the design of the dewatering system included ensuring the functionality of the system with well placement as far away from the excavation as deemed practical while ensuring that all soils would be adequately impacted. Wells needed to be installed without being problematic to the sequencing of construction by other trades. Initially, zonal wellpoints were considered to save cost but the proposed distance of ±12.5M from the footings was outside of the range of influence to guarantee adequate dewatering.

Approaching localized system implementation in sequence to facilitate the installation of the footings was suggested by the architectural consultant, but due to the existing interface condition, drawdown would be restricted to a point well above the final excavation depth, so a typical dewatering plan did not make sense. Ultimately, a unique strategy was proposed.

Considering the range of influence across an interface condition for adequately dewatering the soils is limited such that the further away from the well, the less dry the excavation will be, that groundwater identified atop the Till/Silty Clay layer would need to be removed and recharge or re-infiltration from the surrounding aquifer would need to be cut off to prevent the excavation from continuously re-filling, our system was designed to

ensure that pumping rate for dewatering exceeded the recharge rate. In essence, the dewatering system would need to create a cut-off similar to what would have been provided by shoring while also drying out the internal soils to preserve the bearing capacity of the founding soils and ensuring a safe, dry excavation.

Aquatech Dewatering installed a perimeter ELECTRIC EDUCTOR system comprising ±378LM installed 12.5M from the foundation at the east, south and west wall alignments and approximately 20.5M at the north end. Pre-drilling and jetting methodology was used to Wells were spaced at ±3M C-C with screens at the Silty Clay interface at Elev.±133.3m ASL, wherever the interface condition existed. If the interface elevation varied, the screen located also varied to ensure there would be no bleed across into the excavation. The system was fully commissioned June 30, 2022, and is expected to be decommissioned July 2023.

Three 50hp turbine pumps are installed in an 18k Gallon Weir tank to power the eductor system. Essentially, two pumps run the system with built-in redundancy to ensure that if one pump fails, the third will back up to permit time for response by Aquatech personnel to perform maintenance/repairs without jeopardizing the site.

Drilling and jetting is performed in a small trench located outside of the proposed building footprint to control the water and spoils. Tracked mud is not permitted from site access roads to City of Toronto roadways.

A temporary trench was excavated at the north end of the site to confirm the groundwater level.

Above: the system functions very well to capture the groundwater across the interface. The excavation is completely dry and did not require any localized systems (i.e.: interior wellpoints) for the crane pad.

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Severe weather is inherent to projects located in Ontario, Canada. The winter season typically begins in November and lasts until the end of April so measures must be taken to ensure that components do not freeze. At this site, glycol heaters, insulated tarps and pea stone gravel bags are installed to keep the header pipes and tank (including the pumps) nice and warm despite overnight temperatures averaging -15°C throughout the season.

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