

- Redtop Panicgrass (Panicum rigidulum)
- Cyrano Darner (Nasiaeschna pentacantha)
- Giant Lacewing (*Polystoechotes punctatus*)
- Ridged Yellow Flax (Linum striatum)
- Sand Panicgrass (*Dichanthelium spretum*)

2.7 Migratory Birds

The *Migratory Birds Convention Act* (MBCA S.C. 1994, C.22) and the Ontario Fish and Wildlife Conservation Act (FWCA S.O. 1997, C.41) prohibits the disturbance and destruction of most birds, their nests and eggs. Environment and Climate Change Canada has developed a number of tools, including the general nesting calendars (http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1) and avoidance guidelines (http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1) to support compliance with the Act.

The General Nesting Period for this site (Nesting Zone C3) is considered by Environment Canada to be from 08 April to 28 August in forested habitats, 12 April to 28 August in open areas, and 08 April to 16 August in wetlands.

2.8 Fisheries and Fish Management Objectives

The Burgess Dam runs across the north channel of the outlet from Lake Muskoka to the Moon River. Lake Muskoka has a surface area of 12,1000 ha, and a maximum depth of 73 m. There is intense urban shoreline development with residential and commercial properties. The water level in Lake Muskoka is controlled by MNRF-owned and operated dams in Bala. The flows and levels are governed by the Muskoka River Water Management Plan. The lake supports a large diversity of sport fish including Brook Trout (*Salvelinus fontinalis*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish (*Coregonus clupeaformis*), Cisco (*Coregomus artedii*), Northern Pike (*Esox lucius*), Burbot (*Lota lota*), Smallmouth Bass (*Micropterus dolomieu*), Largemouth Bass (*Micropterus salmoides*), Walleye (*Sander vitreus*), Pumpkinseed (*Lepomis gibbosus*), Black Crappie (*Pomoxis nigromaculatus*) and Yellow Perch (*Perca flavescens*). Current stocking initiatives include yearly Lake Trout stocking to supplement populations. A disjunct population of Margined Madtoms (*Noturus insignis*) are present in Lake Muskoka. Margined Madtoms are considered rare in Ontario.

The MNRF refers to the section of the Moon River between the outlet of Lake Muskoka to the Swift Rapids downstream as the Bala Reach. This section of the Moon River is "lake-like" and has a surface area of 307 ha. The water levels are regulated by the Ontario Power Generation owned and operated dams at Swift Rapids Generating Station and Moon River Control Dam. This section of the Moon River supports Northern Pike, Smallmouth Bass, Largemouth Bass, Black Crappie, Walleye, Brown Bullhead (*Ameiurus nebulosus*), Emerald Shiner (*Notropis atherinoides*), Hornyhead Chub (*Nocomis biguttatus*), Logperch (*Percina caprodes*), Longnose Dace (*Rhinichthys cataractae*), Pumpkinseed, Rock Bass (*Ambloplites rupestris*), White Sucker (*Catastomus commersonii*), Yellow Perch and Rainbow Smelt (*Osmerus mordax*). Efforts to



successfully re-establish the Walleye population in the Bala Reach began in the early 2000s and included stocking and habitat enhancement. Night Lighting and egg collection was completed in May 2008 by Hatch Energy, where they identified adult Walleye and Walleye eggs downstream of the Burgess Generating Station (Hatch 2009).

The MNRF has identified that there is a known Walleye spawning area from the Burgess Falls downstream towards the main Bala Falls. Smelt and suckers may also be expected to spawn in the area. A map of the identified Walleye spawning area is shown in Appendix B. The MNRF stated that work which may require plant shutdown should be scheduled to avoid the spring spawning period (01 April to 01 June).

Lake Muskoka is a cold-water system, and the Moon River is warmwater. This prohibits work below the natural high-water mark from **October 1 through July 15** (of the following year). Any work that requires shutting off flow through the dam should be scheduled to avoid the spring Walleye spawning period (01 April to 01 June).

Any work below the high-water mark must be assessed for whether it needs to be submitted to DFO for review. If the development has a potential to result in the death of fish or the harmful alteration, disruption, or destruction of fish habitat the project may require an Authorization under the Fisheries Act. To determine whether the proposed development is required to be submitted to DFO and assistance in submitting a project request for review to DFO see: https://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/request-review-demande-d-examen-001-eng.html. Assistance by a qualified Fisheries Scientist is recommended for DFO permitting support.

3. FIELD INVESTIGATION METHODS

The Study Area (Figure 1) was investigated using general reconnaissance methods performed on foot. Aerial imagery of the Study Area was evaluated prior to field assessments to identify priority areas. Survey effort varied across the Study Area depending on the potential for an area to possess Natural Heritage features, as well as the topography and homogeneity of the site.

3.1 Terrestrial Habitat Assessment

The Study Area was walked by Kelly Major, Terrestrial Ecologist and Certified Environmental Professional on 06 May 2020. Mr. Major's qualifications are provided in Appendix C.

Existing terrestrial conditions were established throughout the Study Area through the description of the plant community structure, composition, and condition. Terrestrial habitat was assessed for suitability to support Natural Heritage features, including Species at Risk, Significant Wildlife Habitat and Significant Wetlands. Emphasis was placed on assessing site suitability for species identified within the Natural Heritage Desktop Review, but the site assessment was not limited to these species.



Any habitat found to be suitable for nesting by Barn Swallow (which includes porous vertical surfaces secluded from the rain) was searched with a flashlight for evidence of current or historical nesting. Evidence of Barn Swallow nesting includes the presence of intact nests, remnant nesting scars, whitewash and adults foraging in vicinity. This habitat was also search for evidence of nesting by migratory bird species with similar nesting habitats as Barn Swallow (e.g. Eastern Phoebe; *Sayornis phoebe*). Tall trees on (and overhanging) the Site were searched for evidence of raptor stick nests.

Several restrictions applied to the terrestrial habitat assessment, specifically (1) unless otherwise stated, all observations were visual assessments of the site exterior (2) areas were not assesses that could not be seen from the exterior, (3) only the subject facility and public lands within 120m were assessed; no assessments were performed on adjacent private lands

3.2 Aquatic Habitat Assessment

Moon River and Lake Muskoka were investigated to determine the potential to provide fish habitat. Emphasis was placed on habitat potential to support important or critical habitat to the known (or likely) fish community upstream and downstream of the crossing. The area of investigation focused on the existing crossing and the Study Area upstream and downstream. Areas downstream were searched for evidence of recent nesting or spawning activity. A MNRF License to Collect Fish for Scientific Purposes (License No.1095458) was received, however, no fish sampling occurred during the on-site field assessment.

4. FIELD INVESTIGATION RESULTS

Field Assessments were performed on 06 May 2020 by Bill Tibble (Senior Aquatic Ecologist) and Kelly Major (Terrestrial Ecologist). The qualifications of site investigators can be found in Appendix C. Field photographs are provided below.

4.1 Terrestrial Habitat

Both the north and south sides of the Site are cleared and dominated by manicured domestic grasses (lawn) and disturbance tolerant forbs such as Common Plantain (*Plantago major*), Common Dandelion (*Taraxacum officinale*), Wild Strawberry (*Fragaria vesca*), Common Mullein (*Verbascum thapsus*) and Common Burdock (*Arctium minus*); see Photos A to D. This area is also fringed by scattered shrubs, including Honeysuckle (*Lonicera* sp.), Common Blackberry (*Rubus allegheniensis*), Pin Cherry (*Prunus pensylvanica*), Showy Mountain Ash (*Sorbus decora*) and Red Elderberry (*Sambucus racemosa*). Several large White Pines (*Pinus strobus*) are located in the southeast corner of the site and low Red Maple (*Acer rubrum*) saplings were observed along the south shore.

The Site is bordered on all sides by residential properties. These properties support a mix of native and ornamental tree and shrub species. Residential lands south of the site include semi-



naturalised woodlot fragments dominated by White Pine, Eastern Hemlock (*Tsuga canadensis*), Red Maple, White Birch (*Betula papyrifera*) and Eastern White Cedar (*Thuja occidentalis*).

Habitat suitable for nesting by Barn Swallow and certain migratory bird species exists at the dam outlets (Photo E) and under decking at the powerhouse man-door entrance (Photo F). This habitat was searched and no evidence of active or past nesting was found. There was no Barn Swallow or migratory bird nesting on the outside of powerhouse and dam structure in at the time of the field investigation.

Woody vegetation (trees and shrubs) scattered around the dam site and surrounding Study Area all have the potential to support nesting by migratory bird species. No active bird nests were observed on the Site but thorough searches were not performed and several migratory bird species were observed in within the Study Area, including: Black-capped Chickadee (*Poecile atricapillus*), Palm Warbler (*Setophaga palmarum*) and American Robin (*Turdus migratorius*). No evidence of raptor nesting was found in trees on / overhanging the Site.

The powerhouse could support day roosting by bats, including up to three Endangered bat species: Little Brown Bat, Eastern Small-footed Bat and Northern Long-eared Bat (taxa). Males, and non-gravid females, of many bat species, including the endangered *Myotis* species, will make use of vertical surfaces sheltered from the sun and rain, crevices on built structures (e.g. cracks in masonry, eves, gaps in facia) as well as uninhabited building interiors for transient daytime roosting. No evidence of bat occupation (e.g. adult bats, holes / cracks discoloured by grease and urine, feces) was observed from the outside of the facility but the facility interior was not searched.

No other candidate terrestrial SAR or SWH habitat was observed within the Study Area.





Photo A – Dam structure and south bank including access road and staging area as seen from the north bank.



Photo B – South side of the Study Area including dam access road and staging area.



Photo C – Dam structure and north bank including River Street (left of frame).



Photo D – Open habitat south of River Street and west of the dam structure.



Photo E – Dam outlets were searched for nesting by bird species, including Barn Swallow.



Photo F – The undersides of decking on site was searched for nesting by bird species.



4.2 Aquatic Habitat

Directly downstream of the dam outlet there is a plunge pool (Photo G). Old gabion baskets line the right downstream bank immediately downstream of the dam (Photo H) which were slightly unstable. Further downstream the right downstream bank is stabilized with an installed boulder wall, transitioning to a boulder bank which was likely historically placed for bank protection. The left downstream bank immediately downstream of the dam is stabilized with a boulder wall. Gravel extends from the wall into the channel. Undermining was identified on the left downstream bank, and the bank eventually becomes exposed boulders with debris scattered throughout the gradually sloping banks. The habitat downstream transitions from cobble riffles (Photo I) and runs (Photo J), to shallow bedrock cascades. The watercourse widens into the Bala Reach and flows downstream to the Moon River. Spawning habitat for Walleye and Sucker species was identified from the base of the dam downstream until the substrate transitions from cobble to bedrock. While completing the site assessment, staff observed White Sucker spawning in the gravel and cobble habitat 5-10m downstream of the dam.

The watercourse upstream of the dam is dominated by deep pool habitat (Photo K), with the highest flow evident along the right downstream bank. Directly upstream of the powerhouse the right upstream bank is undercut and slightly unstable. A floating barrier is in the watercourse upstream of the powerhouse. A culvert enters the watercourse from under River Road on the right downstream bank upstream of the powerhouse. The right downstream bank upstream of the dam is composed of cobbles and boulders. Substrate upstream of the dam is predominately sand, silt, gravel and detritus (Photo L). The MNRF has indicated that upstream of the dam provides spawning habitat for Marginated Madtom. Madtoms prefer structure for spawning, including large boulders and sunken logs. The water level was deep, and in-water structure was difficult to identify.





Photo G – Directly downstream of the dam



Photo I - Boulder cascade downstream of the dam



Photo K - Deep pool habitat upstream of the dam



Photo H – Gabion baskets and placed boulders on the right downstream bank downstream of the dam



Photo J – Run habitat and cobble / gravel bed directly downstream of the dam



Photo L – Water levels and substrate abutting the concrete dam face upstream



5. PROPOSED WORK

The Proposed Work and construction sequence is outlined below.

ESC and Isolation:

- Place turbidity curtain as per OPSD 219.260 upstream of the power generation building, encompassing the north shoreline and north abutment of the dam which will have work completed below the high-water mark.
- Place turbidity curtain as per OPSD 219.260 upstream of the dam along the southern dam abutment for the approximately 7m southern extension of the dam. A cofferdam will also be placed if required, connecting the turbidity curtain to the edge of the new dam extension on the south side of the project upstream of the current dam face.
- A proposed cofferdam will be placed downstream of the generation building, and downstream of all proposed in-stream work to isolate the downstream area.
- All isolated areas will be salvaged for fish prior to work commencing.
- Heavy duty silt fence as per OPSD 219.130 along all shorelines, including along the downstream banks, at the downstream edge of the spillway, and surrounding the top of the slope of the upstream work areas.
- Remove all ESC measures once Site is stabilized at the conclusion of the project.

Dam Face:

- Raise existing dam crest (225.93m) (non-overflow section) to El. 226.50m
- Remove trees within approximately 2m of the dam on south shore. Strip topsoil and place granular fill at maximum 2:1 slope, and cover with 150mm of topsoil and native seed.
- Extend dam on upstream south shore
 - Existing dock to be removed
 - Extend by 6.6m with a crest elevation of El. 226.50m
 - Backfill new extension with granular A.
- Replace chain link fence on top of concrete dam

Emergency Spillway:

- Remove vegetation within the spillway channel. The spillway invert will be set at the current dam crest at approx. elevation El. 226.0 m. Topsoil will be removed within the spillway channel down to existing granular fill, grounding grid to be left in place.
- Install spillway channel via Cast-in place walls pinned to bedrock. Spillway channel to be infilled with 750 mm spillway rip rap over non-woven geotextile.
- Remove existing laneway atop of the spillway and reinstall 4.5m wide access road connecting the existing gate to the power generation station.
- Install two 150mm perforated subdrain with filter socks at the bottom of the spillway under the proposed laneway.
- The emergency spillway will activate under the Inflow Design Flood (1/100 years) event.
 The proposed rehabilitation of the dam will not change the operational parameters and function but will improve the protection of environmental features during extreme floods.

Embankment Wall:



- Place a 10m long x 0.60m wide embankment wall placed into bedrock along the north shoreline east of the generation building.
 - Remove wood posts and steel sections of guard rail
 - Backfill with Granular A. Install 150mm perforated subdrain with filter sock to a minimum slope of 0.5%.
 - Fill around east end of retaining wall to elevation 226.2m (approx. 3.0m).
 - Place riprap in front of retaining wall to ensure stabilization along the bottom
- Place concrete retaining wall along left and right bank downstream of the generation building.

Bank Protection:

- Place bank protection on right downstream bank, downstream of dam southwest of new retaining wall.
 - Place non-woven geotextile on the bank.
 - Bank protection will include 750mm thick rip rap (same size as spillway rip rap)
 - Existing boulders on the bank will remain

6. IMPACT ASSESSMENT AND MITIGATIONS

The below mitigation measures will be adopted for the duration of the Project and are referenced on the E1 design drawings.

6.1 Mitigations

- Soil works will be scheduled to avoid wet, windy and rainy periods to the maximum extent possible. In the event of forecasted heavy rain events (≥7.5mm rain / hour) exposed soils will be stabilized with temporary ESC measures (geotextile, tarps, etc.)
- The site supervisor will hold a meeting of all equipment operators working at the site to make them aware of the environmental concerns and measures set out in this plan to control sediment.
- Equipment shall be cleaned of all contaminates prior to being brought on site.
- Work below the high-water mark will only be conducted during approved MNR timing windows to protect fish.
- The contractor is required to develop and implement an Erosion and Sediment Control
 Plan that includes effective erosion and sediment control measures, measures for
 managing water flowing into the site, site isolation measures, and regular inspection and
 maintenance of erosion and sediment control measures
- To the maximum extent possible, no sediments shall enter the water during any aspect of the work. Short-term introduction of sediment shall be kept to the lowest practical level and there should be no long-term sources of sediment from this completed project.



- Erosion and sediment control measures will be removed once the site is stabilized.
- The in-water work area will be isolated using turbidity curtains / temporary cofferdams, and all fish will be salvaged and relocated outside of the works.
- If required, de-watering of the isolated in-water work area will occur prior to work below the high-water mark and after the fish salvage.
- Proper fish screens according to DFO Interim Guidelines will be used at the intake and outlet of the de-watering pumps. All de-watering flow will be pumped into a settling basin or de-watering trap to ensure any disturbed particles do not re-enter the watercourse.
- The Contractor will ensure machinery arrives on site in a clean condition and maintained free of leaks, invasive species and noxious weeds.
- Washing and servicing of machinery will be completed >30m away from the watercourse and shall be done in such a way as to prevent any deleterious substances from entering the water. Fueling of machinery will be completed in the designated fueling area using fuel containment measures to contain spillage.
- At all times store, handle and dispose of all materials used or generated (e.g. organics, soils, woody debris, temporary stockpiles, construction debris, etc.) in a manner that prevents entry to any water body. Temporary storage and stockpiling of materials must take place a safe distance from any water body; these materials must be stabilized or otherwise contained. Any lay down or soil piles subject to water erosion and the subsequent transmission of disturbed soil particles into the adjacent surface waters shall be surrounded by a silt fence to prevent any migration of soil into the adjacent surface waters. Silt fences shall be constructed prior to any material being placed.
- Avoid riparian vegetation removals unless indicated on the design drawings. Use existing
 trails whenever feasible. If removal is necessary, minimize clearing, protect adjacent
 vegetation and use proper clearing techniques. Where possible use techniques that allow
 the root system to stay intact; this helps bind the soil and encourages rapid colonization
 of low-growing plant species.
- Re-stabilize unstable or banks disturbed during construction to pre-construction conditions
 or better. This may include vegetation or rock protection. Temporary measures (i.e.
 biodegradable materials) may be incorporated to provide interim stabilization until
 vegetation is fully established.



6.2 Impact Assessment and Mitigation

Table 3 – Impact Assessment and Mitigations for Construction Options

Consists Of	Potential Impacts (in the absence of Mitigation)	Mitigations
 Dam Crest Raise and Spillway Construction Downstream veg removal Strip top organic soil Partially raise dam crest on north and south dam sections (Non-overflow section) Install emergency spillway (Rip Rap channel and cast in place spillway training walls) Replace DS fill materials Regrade middle dam section DS and add rock/riprap for erosion protection Repair large transverse cracks in existing dam Concrete slab at powerhouse repaired and anchored 	 Harm to migratory birds. Removal of woody vegetation, if performed while migratory birds are nesting, could result in harm to active migratory bird nests, eggs and young. Change in sensitive fish habitat. Diverting overflow downstream may result in alteration to sensitive fish habitat required for critical life functions. Change in fish habitat. Placement of rip-rap below the highwater mark will alter fish habitat. Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring. 	 Nesting Period: avoid clearing from 12 April to 28 August. Alternatively, inspect woody vegetation immediately prior to removal and retain any tree or shrub that is supporting an active migratory bird nest. Minimize the clearing of vegetation. Clear only what is necessary to accomplice the undertaking. Incorporate existing vegetation into the final plan where possible. Regreen de-vegetated areas where feasible. Direct spillway to non-sensitive habitat. Direct the outlet of the spillway downstream of the cobble / gravel spawning bed. The outlet should be located at the bedrock cascade as to prevent scour and resuspension of soft sediment.
Powerhouse Refurbishment and Reinforcement Fill scour areas in foundation with non-shrink grout Grout and anchor the cracks developed in powerhouse base Reinforce the powerhouse structure with 9 DYWIDAG anchors Repair / Replace the roof Replace structural bracing in the powerhouse building	 Harm to Barn Swallow or migratory birds. No evidence of Barn Swallow or migratory bird nesting was found on the powerhouse, but habitat is suitable. Should nesting occur in the future, maintenance and upgrades to the powerhouse could result in harm to active nests, eggs and young. Harm to bats. Bats could day-roost within the existing powerhouse. If present, renovations within the structure could harm endangered species. Change in fish habitat. Excavation and placement of fill below the high-water mark will alter fish habitat. Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring. In-water work. The replacement of the dam and powerhouse will result in work below the high-water mark. This impact cannot be eliminated; however, refurbishment will result in less time working in-water than a full replacement. 	the existing powerhouse, but habitat is suitable. Inspect the structure again immediately prior to undertaking the work. Endangered Species Act registration is required if Barn Swallow nests are found on the powerhouse and if any activity is to be undertaken that will harm the nests or harm / harass Barn Swallows. A Barn Swallow Mitigation Plan would need to be prepared by a qualified person in support of registration under this Act. • Avoid active migratory bird nests. No evidence of migratory bird nesting was found on the existing powerhouse, but habitat is suitable. Avoid maintenance and upgrades during the General Nesting Period: from April 12 to August 28. Alternatively, inspect the exterior and interior of the existing powerhouse prior to maintenance and upgrades and only proceed if active migratory bird nests are not present. The proponent may choose to inspect the interior of the powerhouse prior to April 12 for evidence of past nesting. If nesting has occurred in the past, the proponent can exclude migratory birds from re-entering the structure.



Consists Of	Potential Impacts (in the absence of Mitigation)	Mitigations
	Changes in flow. Complete isolation of the dam and powerhouse for removal may result in changes to flow downstream.	
 Install a drainage ditch upstream of the retaining wall to divert the surficial run-off water from River Street Drill drainage holes and install drainage pipes along the base of the existing concrete retaining wall. 	 Harm to migratory birds. Removal of woody vegetation, if performed while migratory birds are nesting, could result in harm to active migratory bird nests, eggs and young. Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring 	Nesting Period: avoid clearing from 12 April to 28 August. Alternatively, inspect woody vegetation immediately prior to removal and retain any tree or shrub that is supporting an active migratory bird nest.



7. SUMMARY

The potential impacts of the proposed works and mitigation strategies which should be adopted to control these impacts are presented in Table 3.

Construction of the non-overflow dam section require the removal of woody vegetation, which could result in harm to migratory birds. To minimize these impacts, it is advised that clearing of vegetation be kept to a minimum, and that vegetation should only be cleared outside of the General Nesting Period. Constructing a spillway, may result in changes to fish habitat. Impacts should be controlled through minimizing in-water work, implementing proper isolation techniques and ESC measures, controlling deleterious substances, and abiding by all DFO and MNRF guidelines and permitting requirements. The spillway construction should be designed as to not discharge to sensitive fish habitat and minimize potential high-velocity flows directly into the downstream fish habitat. Any discharge should be directed downstream towards the bedrock cascade, preventing scouring, suspension of soft substrate and changes to spawning habitat in the cobble / gravel beds directly downstream of the dam.

Refurbishing the dam and powerhouse could result in impacts to nesting birds, specifically Barn Swallow, and roosting bats. Although there was no evidence of roosting bats, or migratory bird nests on the structure during the field assessment, all active bird nests and roosting bats should be avoided. Work should be avoided during the General Nesting Period or while bats are active (April 15 to September 30). In-water work is required for both powerhouse / dam section options. The proposed works must be submitted to DFO for approval, and in-water work areas must be isolated, fish must be salvaged, and MNRF in-water timing guidelines should be followed.

The construction proposed on the River St. retaining wall is not likely to result in impacts to fish and fish habitat. If work is being completed within 30m of the watercourse, erosion and sediment control measures should be used to control any sediment from entering the watercourse. If any clearing is required, it should occur within the General Nesting Period.

Based on TULLOCH's understanding of the Site conditions, the proposed works, and through implementation of the proposed mitigations, it is our opinion that the Project can be completed safely and with minimal to no negative impacts on the natural environment.



8. CLOSING

TULLOCH Environmental, a division of TULLOCH Engineering Inc. (TULLOCH), was retained by The Township of Muskoka Lakes to complete an Existing Conditions and Environmental Impact Assessment (EC/EIA) in support of the Burgess Dam and Generating Station rehabilitation / replacement in Bala, ON. This report outlines the results of a Natural Heritage Desktop Review, field investigations on the Site and an assessment of anticipated environmental impacts. It also provides mitigation strategies to avoid or minimize project impacts.

The undersigned is pleased to provide this report as a record of our services and findings. If you have any questions or if we can be of further assistance in this matter, please do not hesitate to contact us.

Sincerely,

Tulloch ENVIRONMENTAL, a division of TULLOCH Engineering Inc.

Report Prepared By:

Bill Tibble, M.Sc., E.P.

Sr. Aquatic Ecologist

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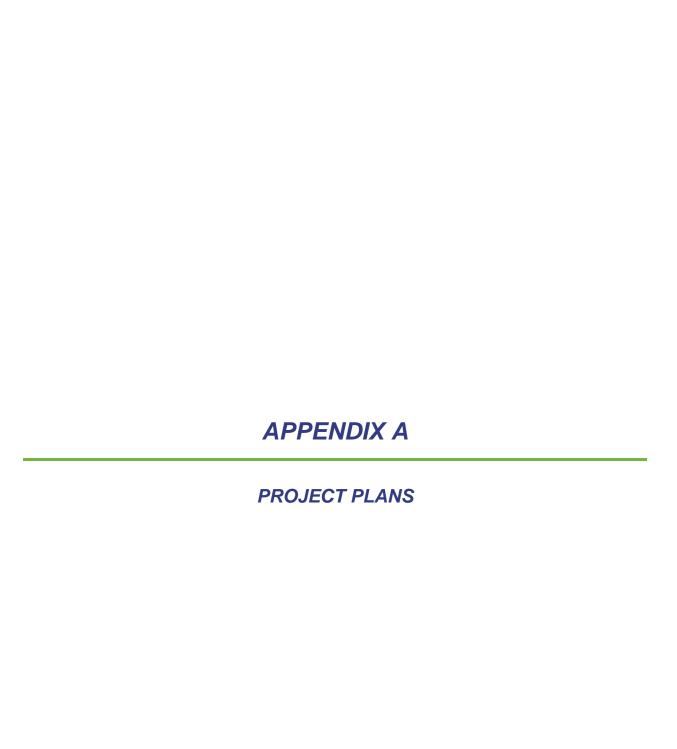
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TOWNSHIP OF MUSKOKA LAKES

LITTLE BURGESS GENERATING STATION

1 BAILEY STREET
PORT CARLING, ONTARIO

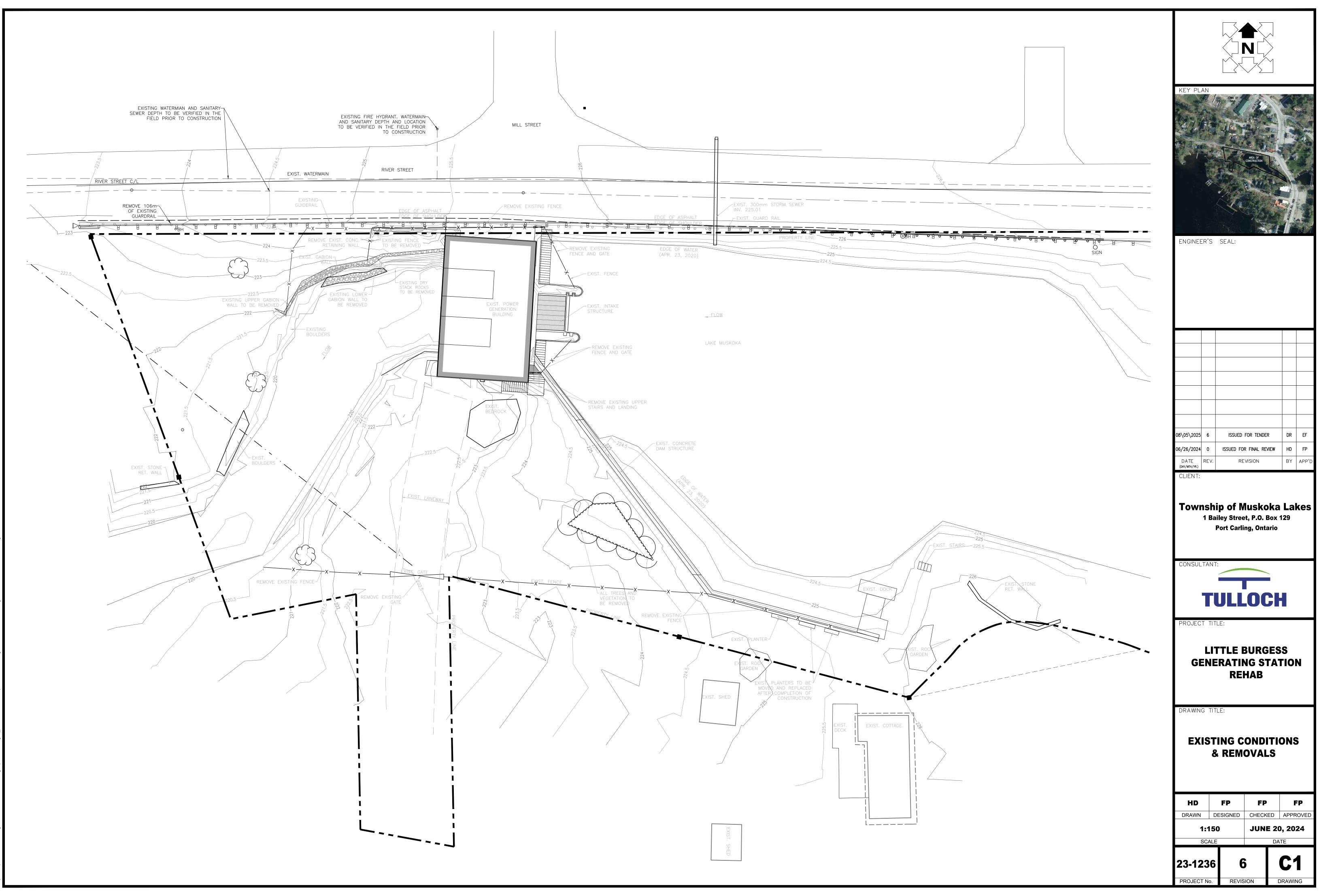


KEY PLAN SCALE=1:1000

LIST	OF DE	RAWINGS
No.	Rev.	DRAWING DESCRIPTION
C1	11	Existing Conditions & Removals
C2	6	Spillway Plan
С3	6	Spillway Sections & Details
C4	6	Spillway, Dam Raise & Dam Extension Plan
C5	6	Spillway, Dam Raise & Dam Extension Section & Details
C6	6	Concrete Embankment Wall
C7	6	Laneway Grading & Details
C8	6	River Street Road Reconstruction Plan & Profile Sta. 0+940 to 1+091
E1	6	Sediment & Erosion Control Plan
S1	1	General Arrangement, Elevations & Retaining Wall Detail
S2	1	Retaining Wall Sections
S3	1	Foundation Upgrades & Roof Framing Plans
S4	1	Foundation Upgrades & Roof Framing Details
S5	1	Removal Photos
G1	6	General Notes



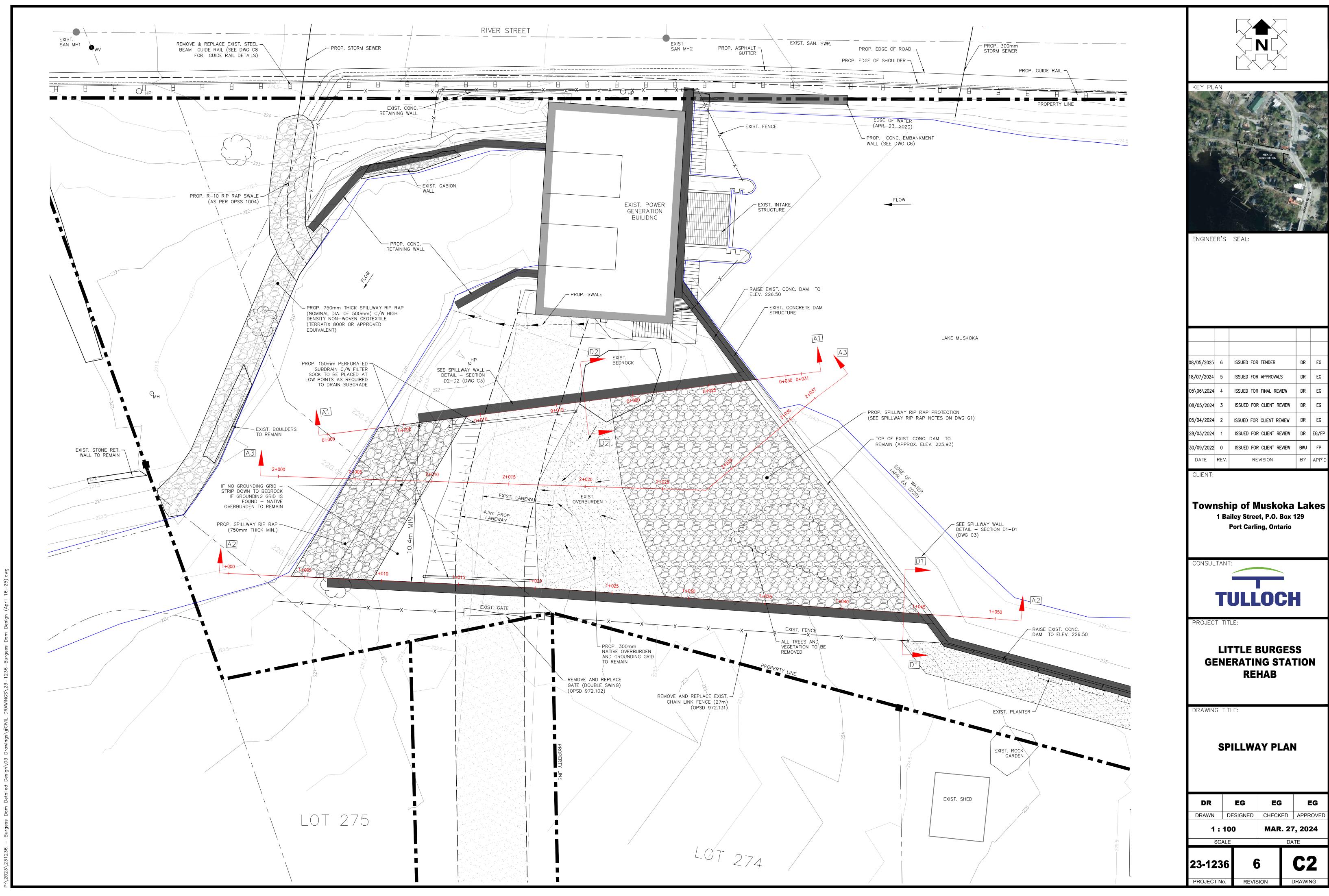




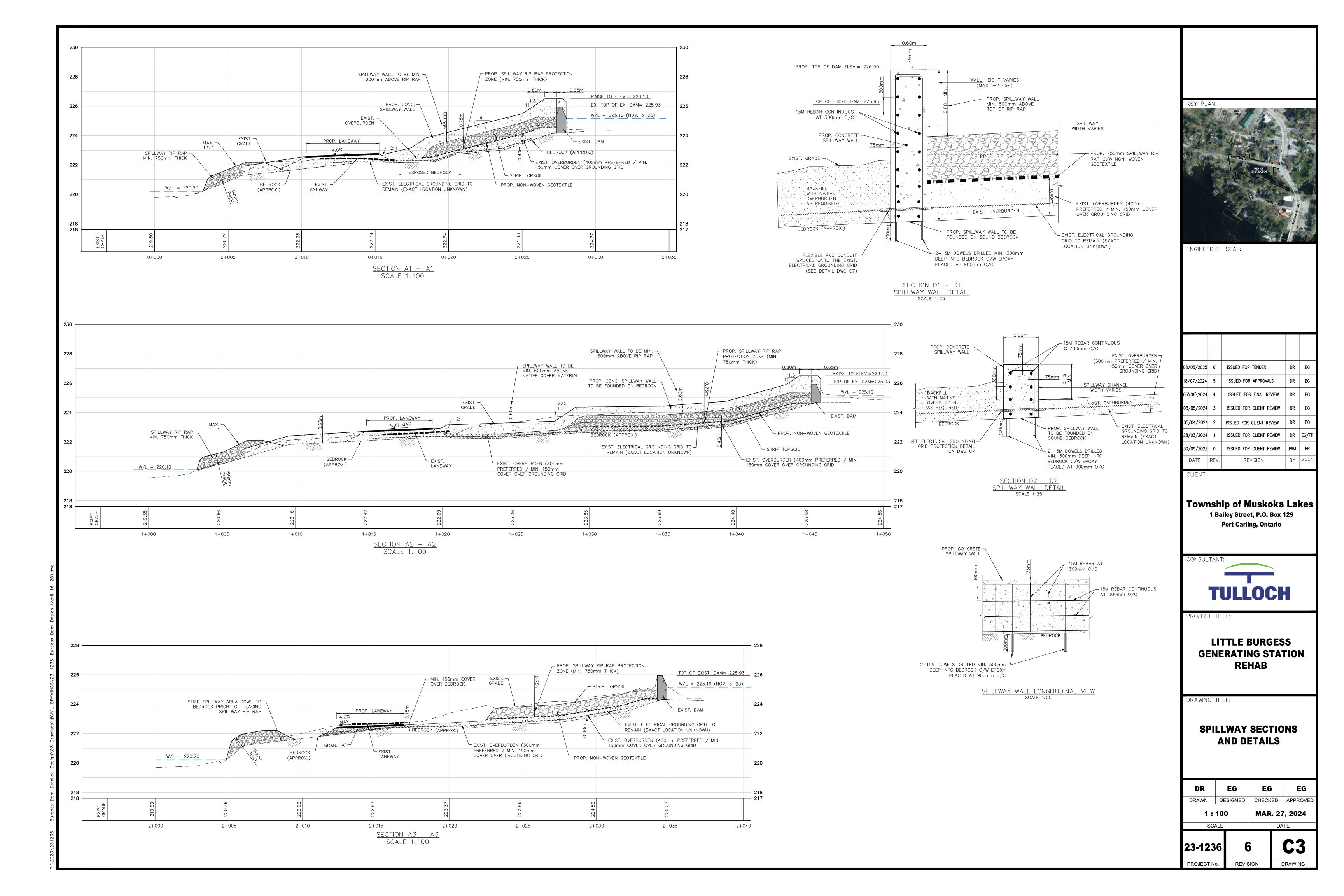


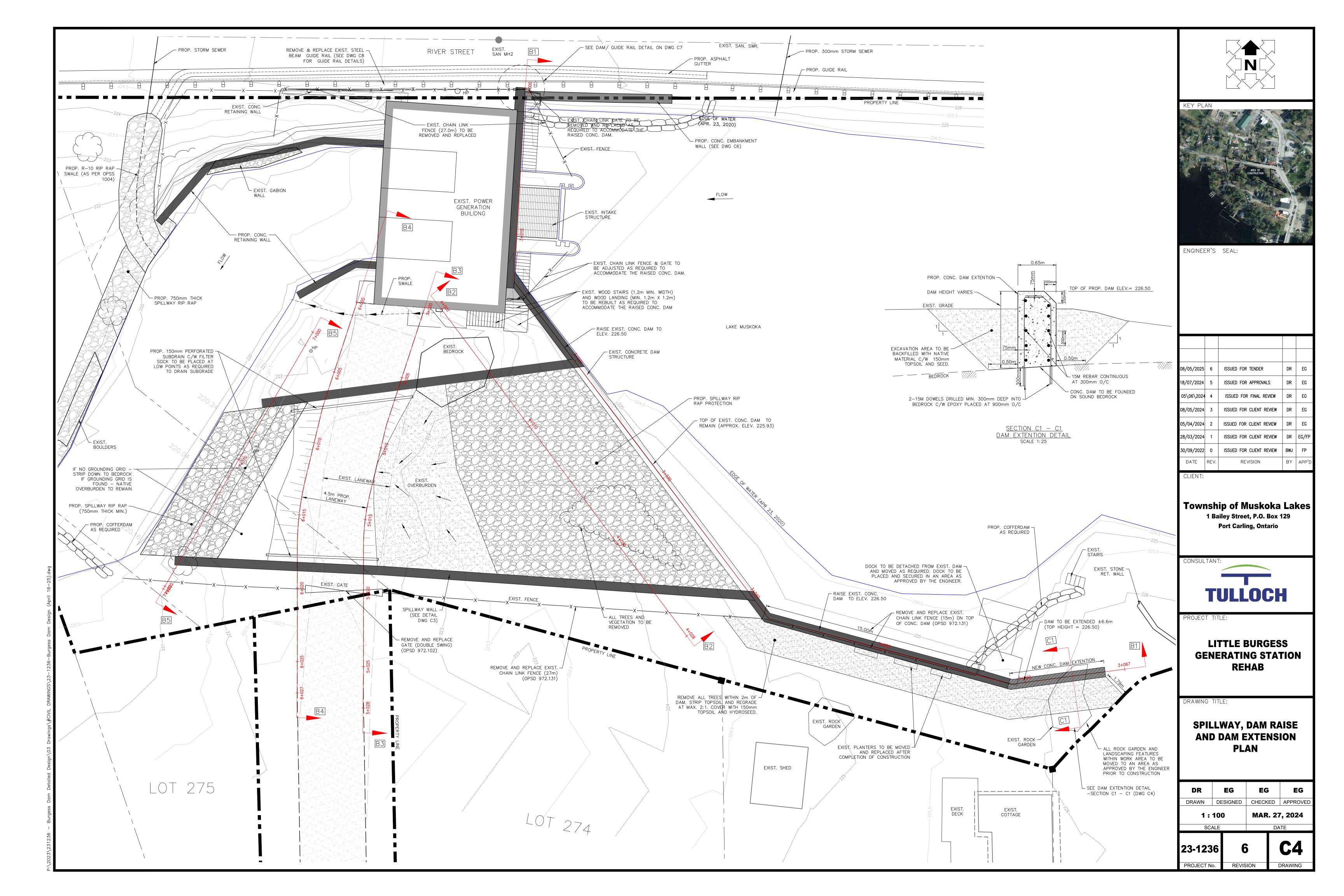
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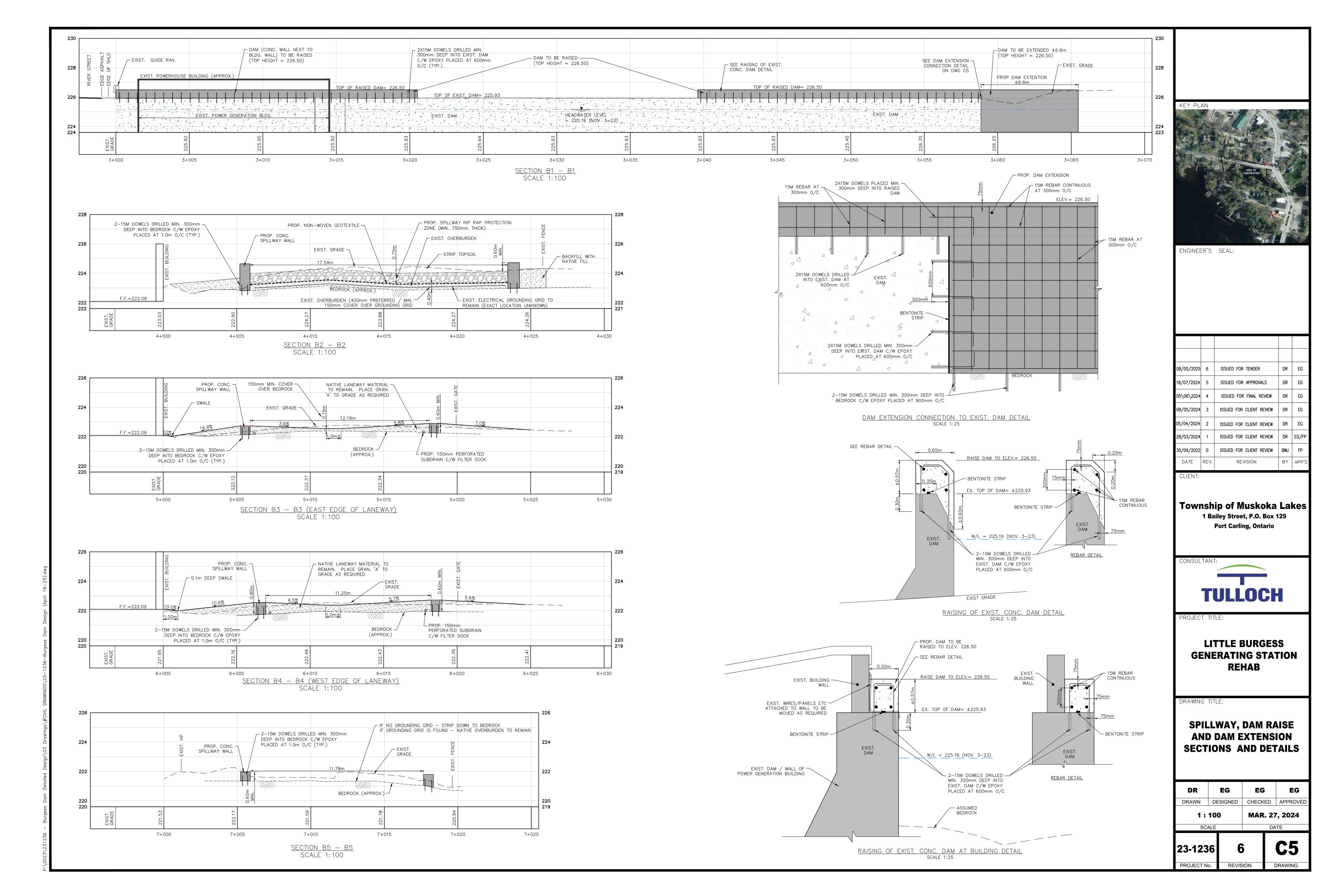
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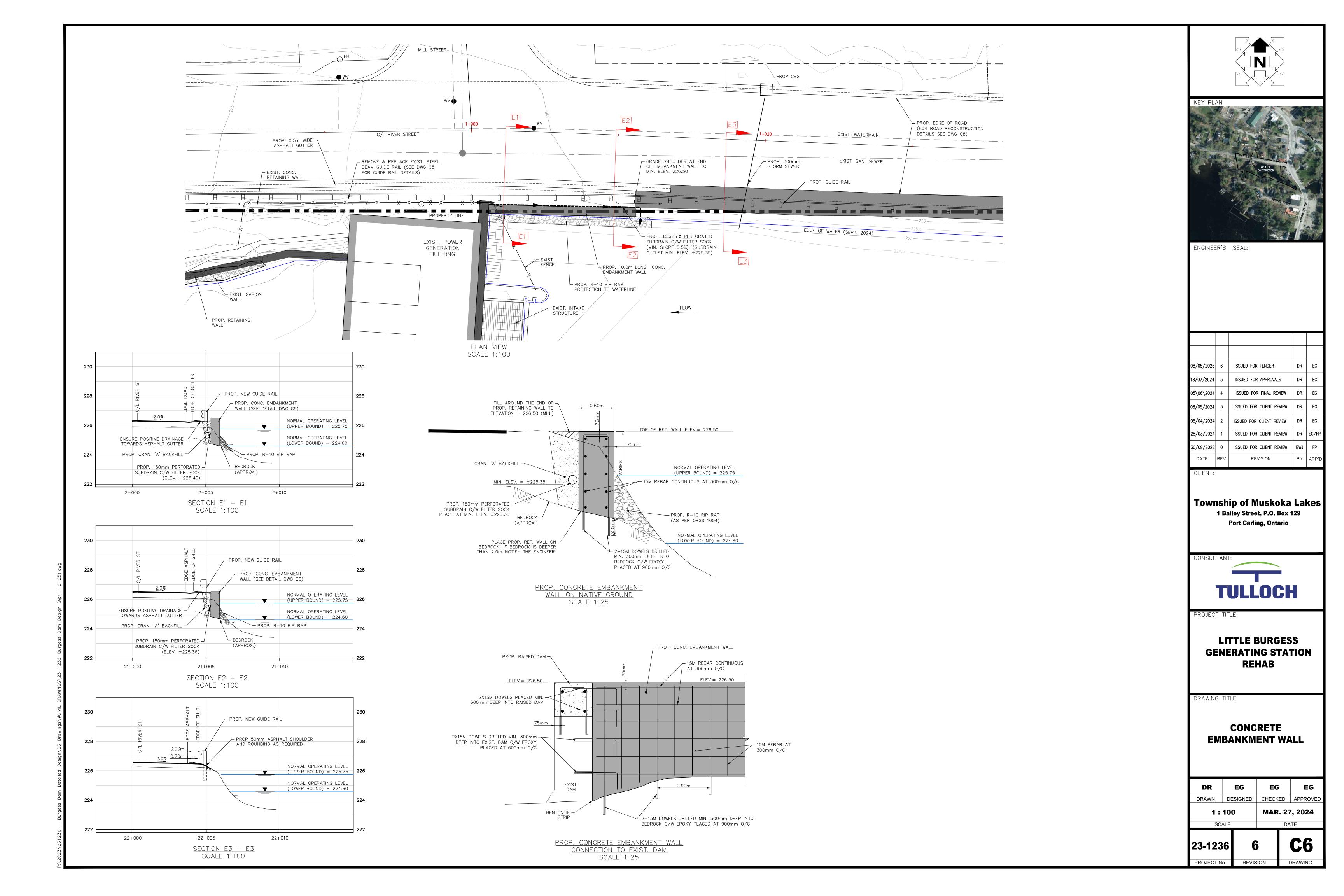


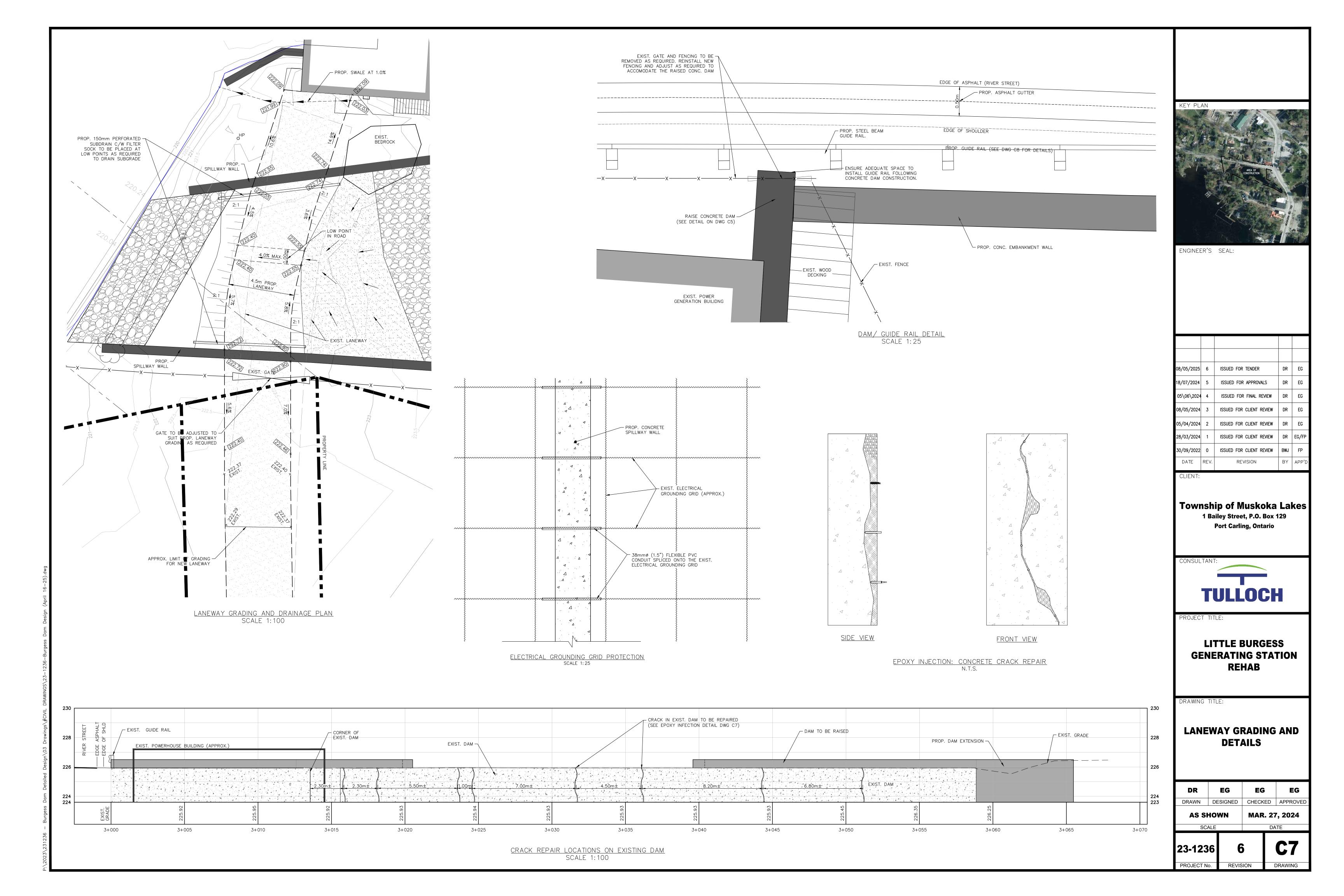
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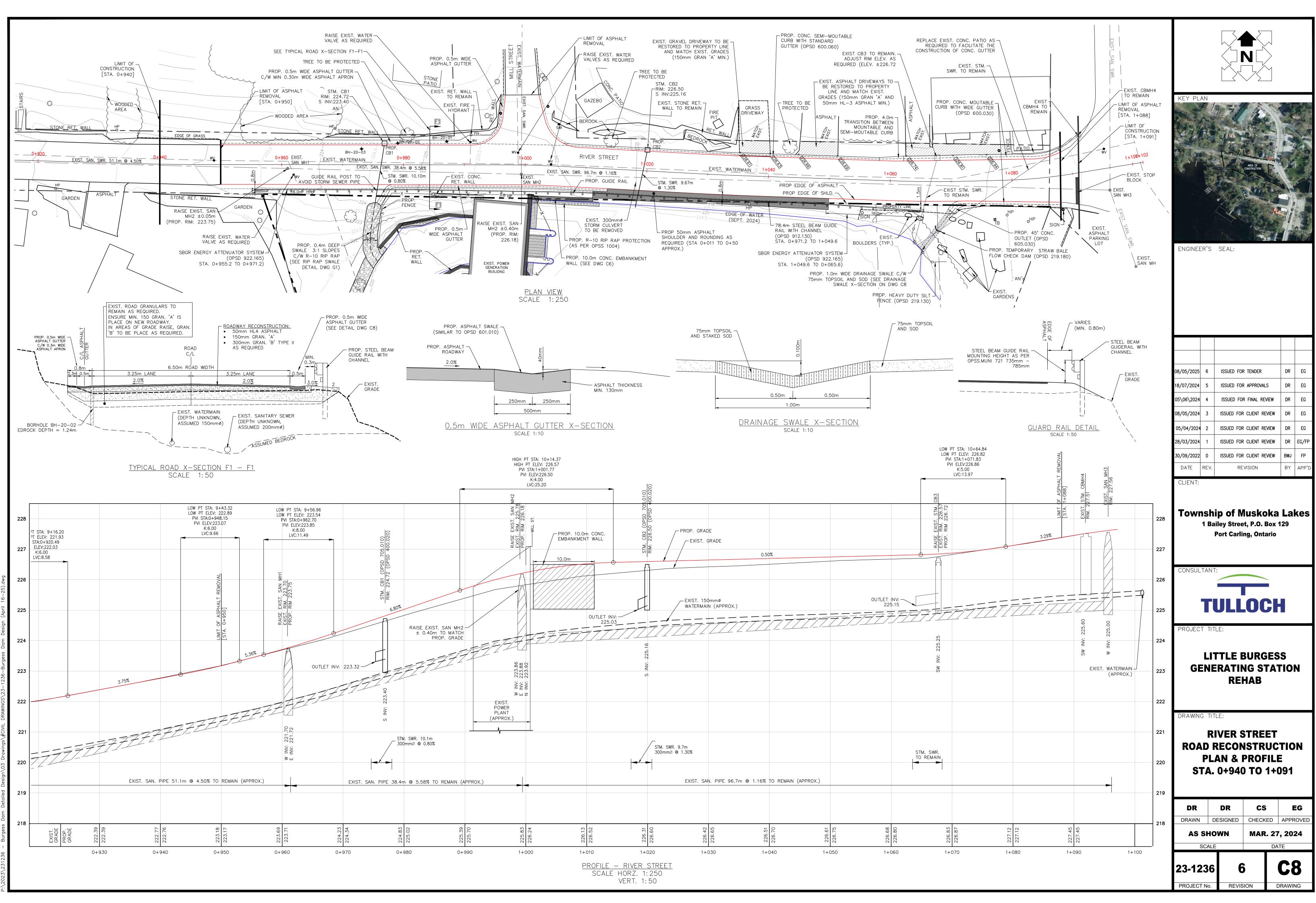




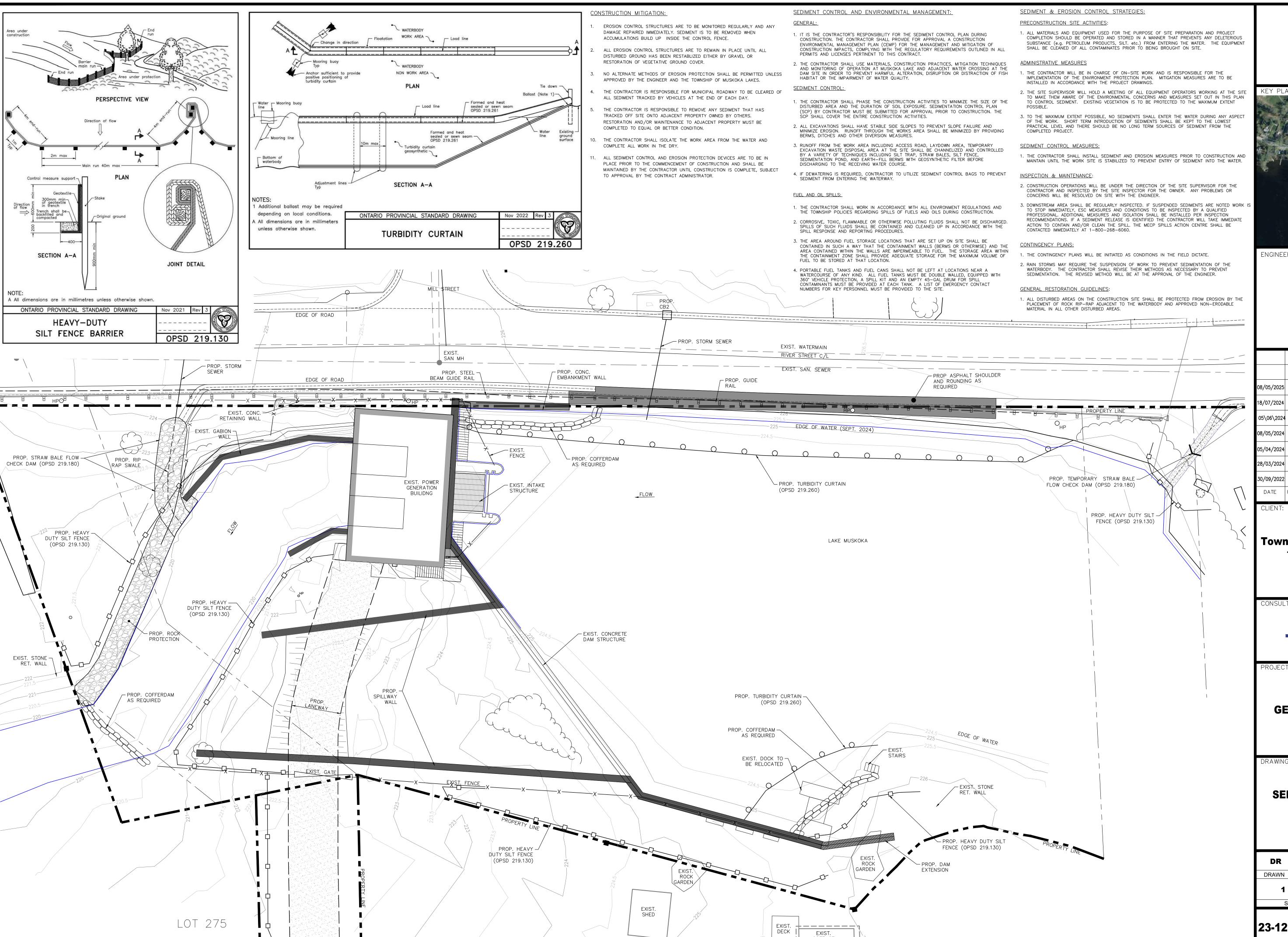








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ENGINEER'S SEAL:

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4	ISSUED FOR FINAL REVIEW	DR	EG
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1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
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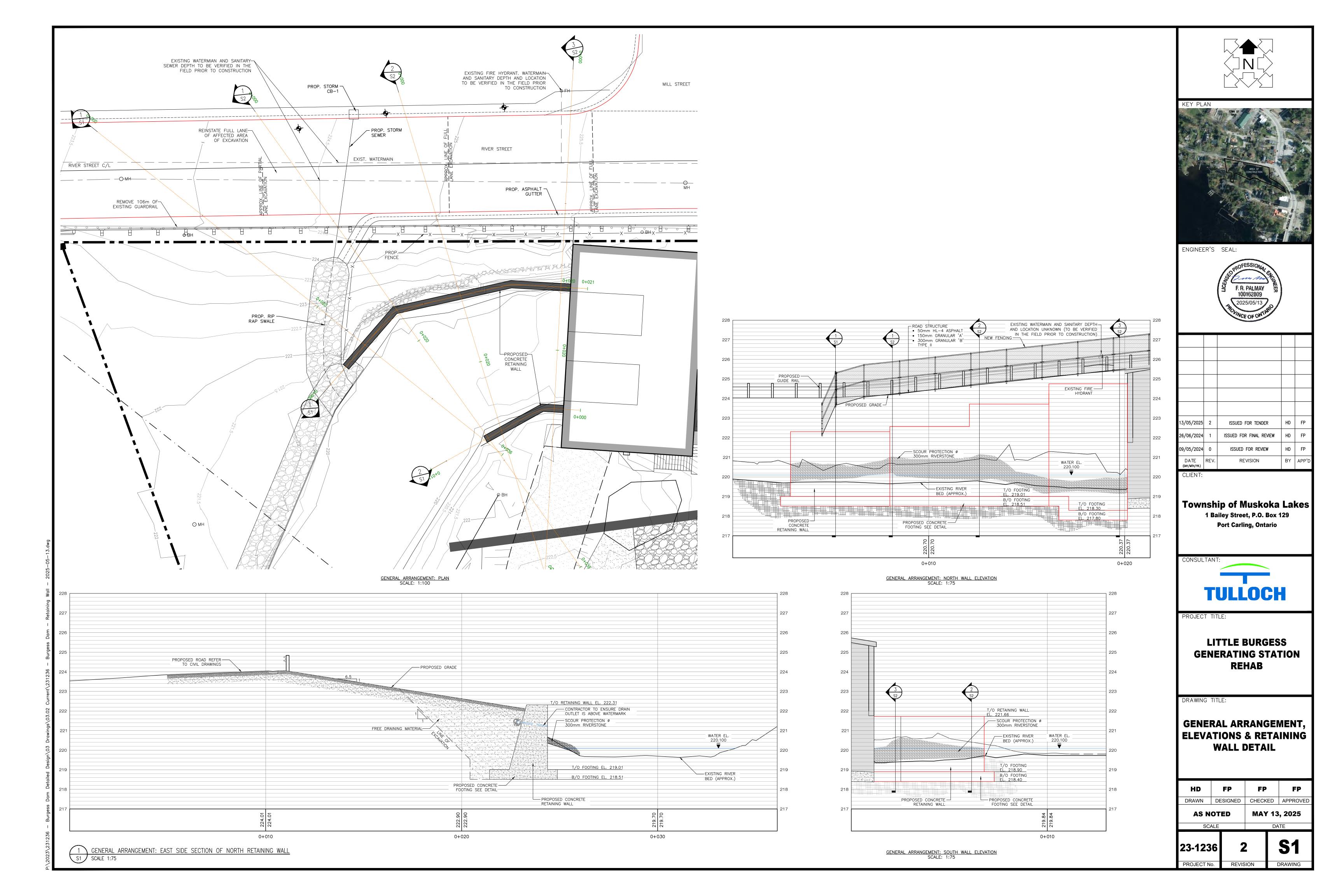
LITTLE BURGESS GENERATING STATION REHAB

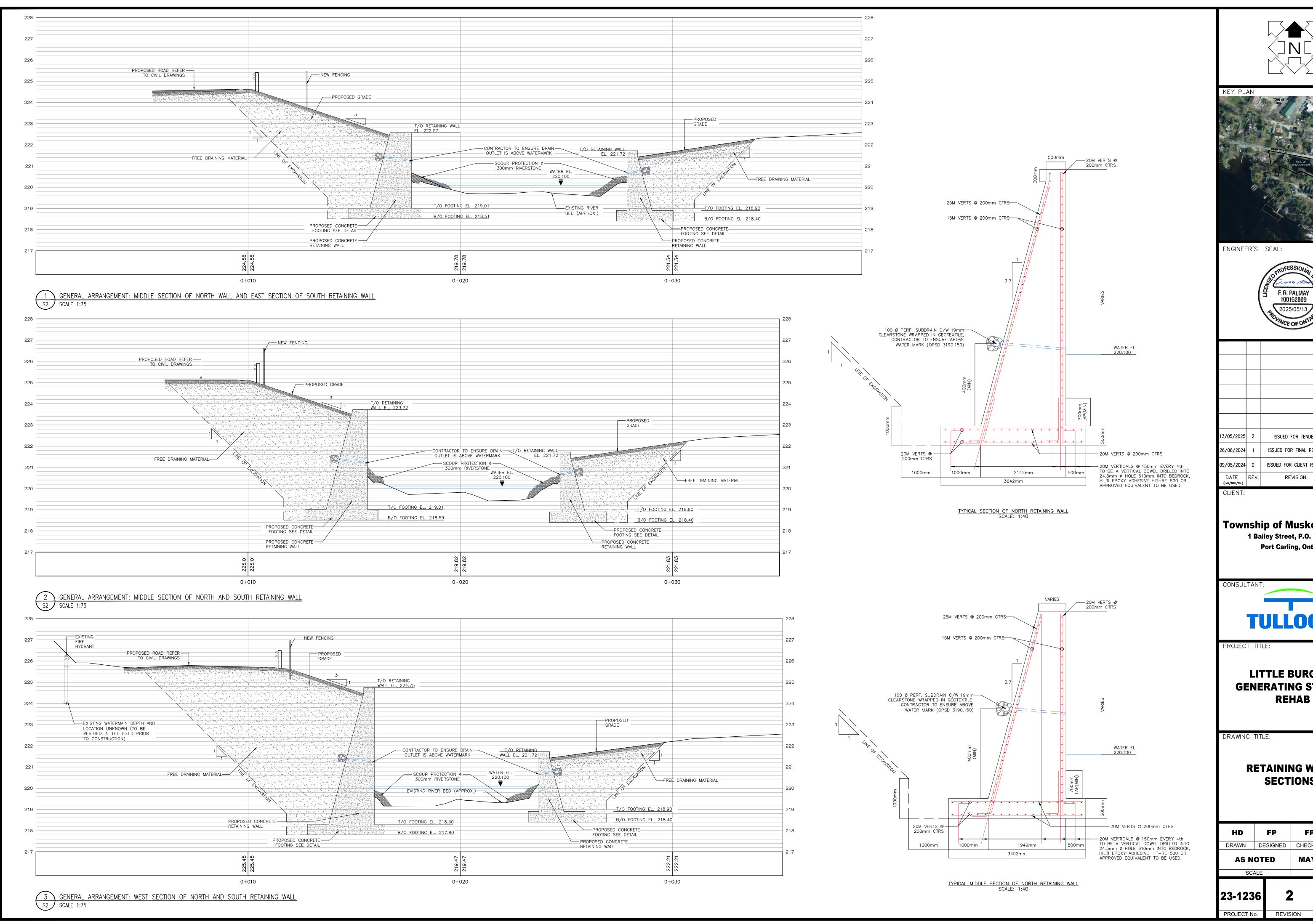
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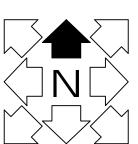
SEDIMENT & EROSION CONTROL PLAN

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26/06/2024	1	ISSUED FOR FINAL REVIEW	HD	FP
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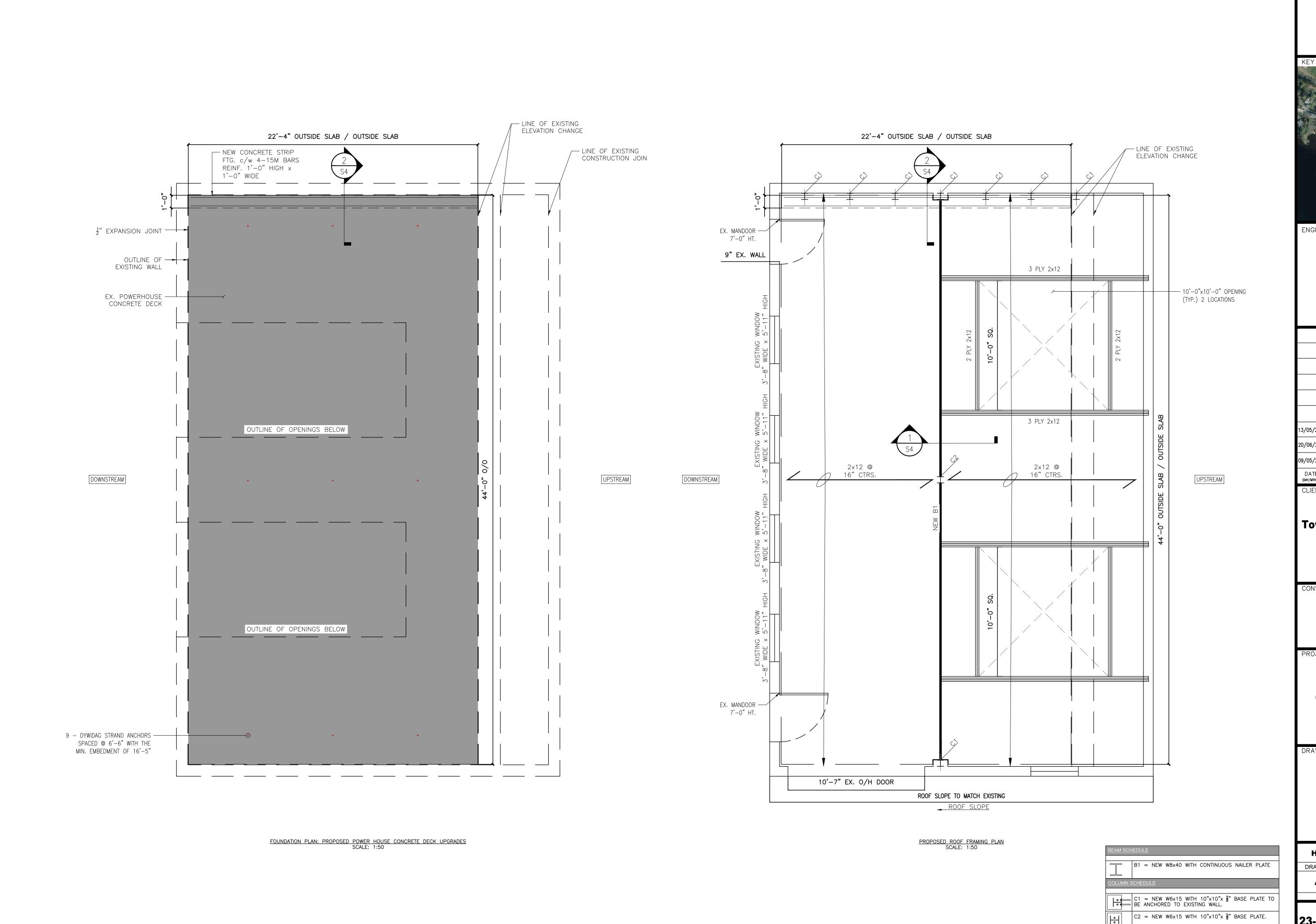
Township of Muskoka Lakes 1 Bailey Street, P.O. Box 129 **Port Carling, Ontario**

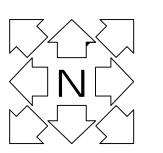
LITTLE BURGESS **GENERATING STATION**

RETAINING WALL SECTIONS

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DRAWING





KEY PLAN



ENGINEER'S SEAL:



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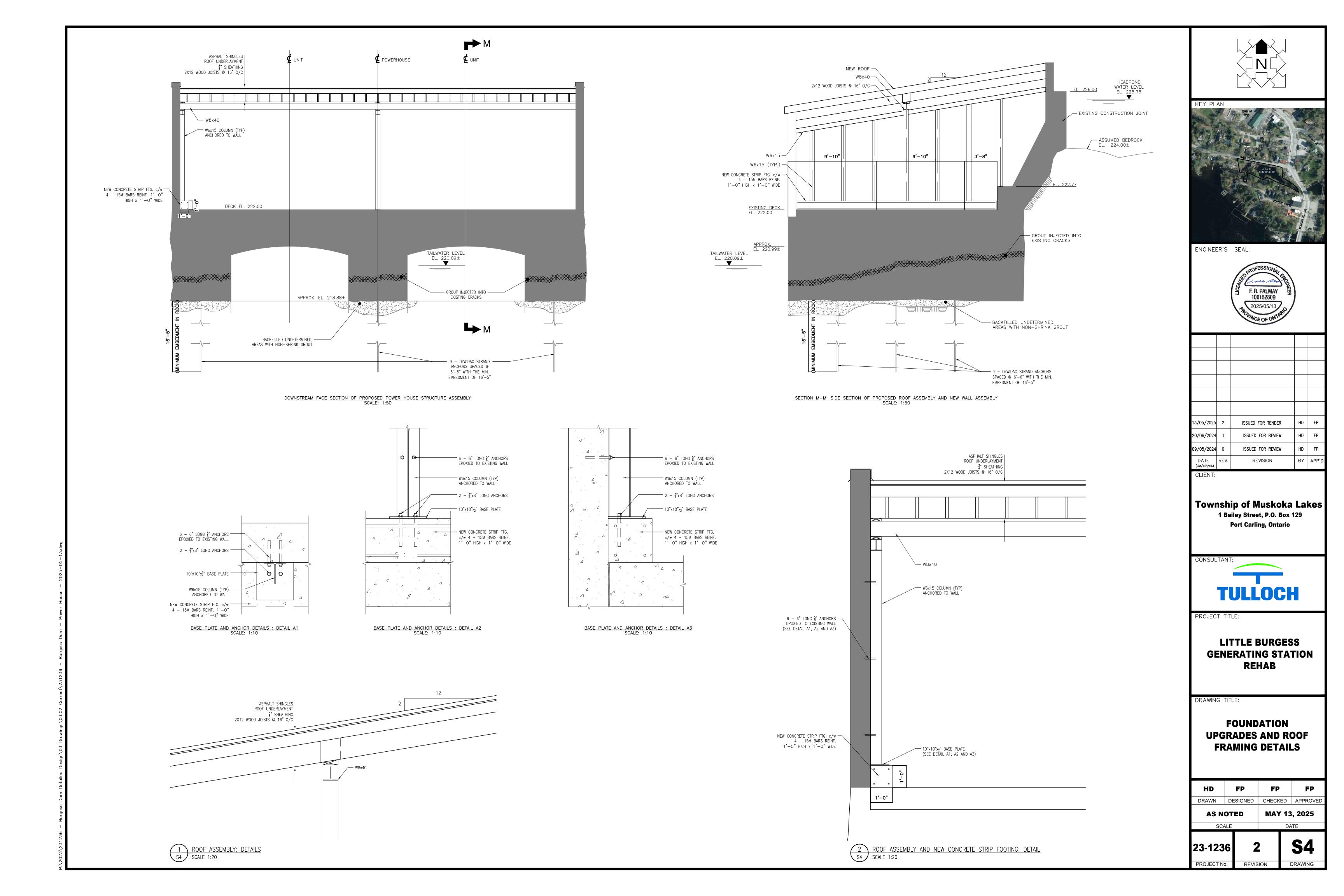
LITTLE BURGESS GENERATING STATION REHAB

DRAWING TITLE:

FOUNDATION UPGRADES & ROOF FRAMING PLANS

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SCALE		DATE	

S3 23-1236 PROJECT No. DRAWING REVISION



<u>PHOTO 1</u> DOWNSTREAM SIDE WEST ELEVATION LOOKING EAST

REMOVE ALL EX. WOOD JOISTS AND DECK PLANKING.



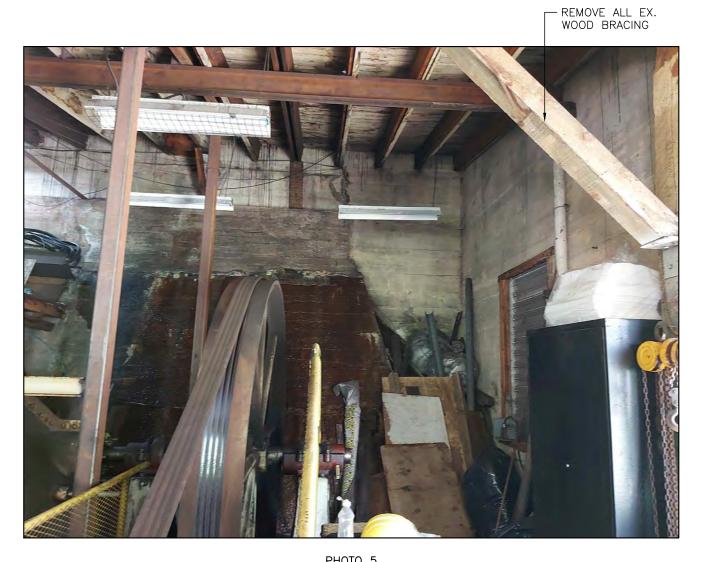
<u>PHOTO 2</u> EXISTING BEAM AND ROOF STRUCTURE REMOVE EX. WOOD — COLUMN AND BRACING



PHOTO 3 EXISTING BEAM AND ROOF STRUCTURE



<u>PHOTO 4</u> EXISTING BEAM AND ROOF STRUCTURE



<u>PHOTO 5</u> EXISTING BEAM AND ROOF STRUCTURE

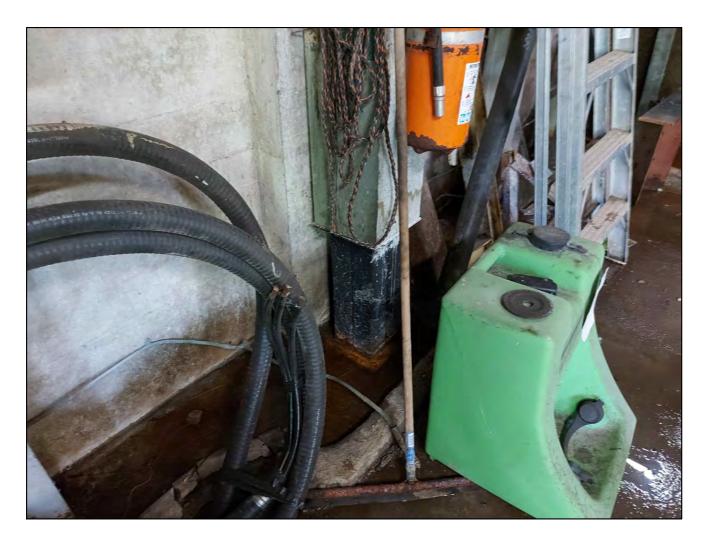
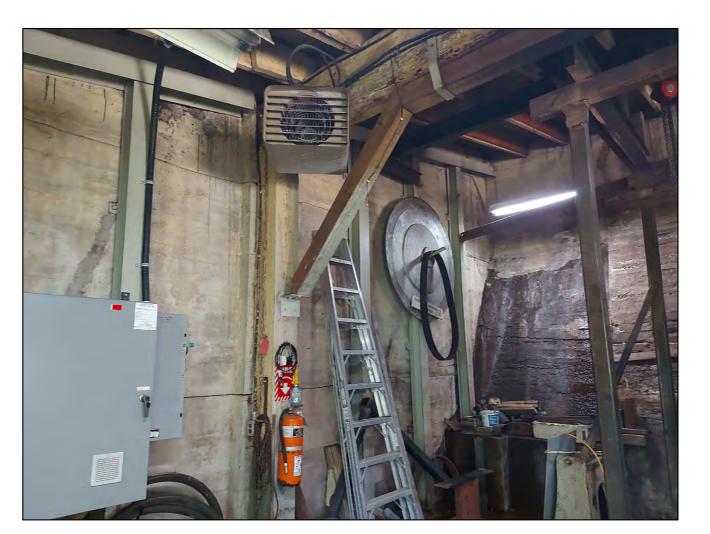


PHOTO 6 EXISTING STEEL COLUMN BASE — NORTH WALL



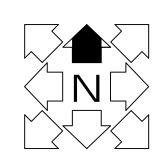
<u>PHOTO 7</u> EXISTING STEELWORK — NORTH WALL



<u>PHOTO 8</u> EXISTING STEELWORK — NORTH WALL

REMOVAL NOTES

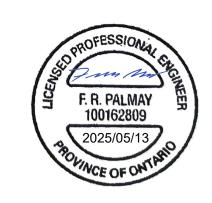
- REMOVE EXISTING WOOD FRAMED ROOF STRUCTURE AND REPLACE WITH NEW.
- REMOVE EXISTING WOOD TIMBER CENTRE BEAM AND EX. WOOD COLUMNS AND REPLACE WITH NEW STEEL.
- 3. REMOVE ALL EXISTING STEEL COLUMNS ON NORTH WALL AND REPLACE WITH NEW.



KEY PLAN

ENGINEER'S SEAL:

- REMOVE EX. WOOD BEAM



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09/05/2024	0	ISSUED FOR REVIEW	HD	FP
DATE (day/mth/yr.)	REV.	REVISION	BY	APP'D

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PROJECT TITLE:

LITTLE BURGESS GENERATING STATION REHAB

DRAWING TITLE:

REMOVAL PHOTOS

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PROJECT No. REVISION

<u>GENERAL NOTES (CIVIL):</u>

- DO NOT SCALE DRAWINGS.
- ALL STANDARDS ARE TO BE IN ACCORDANCE WITH CURRENT ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD), ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) AND ONTARIO BUILDING CODE (LATEST EDITION), UNLESS OTHERWISE NOTED.
- NOTIFY ALL UTILITIES AND MUNICIPAL AUTHORITIES 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION. UTILITY PERSONNEL TO BE ON SITE WHEN EXCAVATING ADJACENT TO UNDERGROUND UTILITIES. SUPPORT UTILITIES IN ACCORDANCE WITH THE DIRECTIONS AND GUIDELINES OF THE IMPACTED UTILITY.
- THE LOCATION OF UTILITIES AND SERVICES SHOWN ON DRAWINGS IS APPROXIMATE AND MAY BE INCOMPLETE. CONFIRM EXACT LOCATION OF UTILITIES WITH MINISTRY, MUNICIPALITY OR UTILITIES. THE CONTRACTOR I RESPONSIBLE TO DETERMINE LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION AND WILL BE RESPONSIBLE FOR PROTECTING AGAINST DAMAGE. THE CONTRACTOR ASSUMES ALL LIABILITY FOR DAMAGE TO UTILITY AND
- COMPLY WITH THE REQUIREMENTS OF THE DISTRICT MUNICIPALITY OF MUSKOKA IN REGARD TO TRAFFIC FLOW ON MUNICIPAL STREETS. ALL NECESSARY TRAFFIC CONTROL AND SIGNAGE IS TO BE IN ACCORDANCE WITH MTO BOOK
- DESIGN DRAWINGS ARE TO BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.
- ALL DIMENSIONS ARE IN METERS, EXCEPT PIPE DIAMETERS, WHICH ARE IN MILLIMETERS, UNLESS SPECIFIED
- THE CONTRACTOR IS RESPONSIBLE FOR ALL DETAILED LAYOUT WORK
- ALL SILTATION AND EROSION CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREAS ARE REINSTALLED TO THE EXISTING CONDITION IS BETTER.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL DE-WATERING AND WATER MANAGEMENT DURING CONSTRUCTION.
- LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION AND ALL DISCREPANCIES REPORTED TO THE
- TYPICAL DESIGN DETAILS SHOWN ON THE DRAWINGS SHALL GOVERN THE WORK. IF DETAILS ON OTHER DRAWINGS CONFLICT THE MOST STRINGENT SHALL GOVERN.
- ALL INSTALLATIONS AND CONSTRUCTION TO BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND THE TOWNSHIP OF MUSKOKA LAKES IN ACCORDANCE WITH THE CONTRACT DOCUMETNS
- COMPLETE ALL EXCAVATIONS AND FOUNDATION WORK IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH & SAFETY ACT (LATEST EDITION).
- RESTORATION OF ALL DISTURBED AREAS SHALL BE 75mm TOPSOIL AND SEED MIX UNLESS NOTED OTHERWISE
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, DETAILS, AND ELEVATIONS OF THE EXISTING STRUCTURE THAT ARE RELEVANT TO THE WORK SHOWN ON THE DRAWING PRIOR TO THE COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONTRACT ADMINISTRATOR AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED TO MATCH THE EXISTING STRUCTURE SHALL BE SUBMITTED FOR APPROVAL.
- 7. CONTRACTOR ASSUMES ALL RESPONSIBILITY OF DESIGN, ERECTION AND REMOVAL OF TEMPORARY WORKS.
- 8. FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CSA A23.1.
- DESIGN OF FORMWORK IS THE CONTRACTOR'S RESPONSIBILITY.
- O. CONTRACTOR TO PROVIDE TEMPORARY BRACING, SUPPORTS AND/OR OTHER INSTALLATIONS NECESSARY TO MAINTAIN PLUMBNESS, TRUE, ALIGNMENT AND STABILITY OF THE STRUCTURE AND ALL OF ITS PARTS
- IT IS THE ULTIMATE RESPONSIBILITY OF THE CONTRACTOR/OWNER TO ENSURE THAT ALL REQUIRED PERMITS AND APPROVALS ARE OBTAINED & POSTED PRIOR TO PROCEEDING WITH CONSTRUCTION. THESE PERMITS/APPROVALS MAY INCLUDE (BUT ARE NOT NECESSARILY LIMITED TO):
 - MUNICIPAL BUILDING DEPARTMENT PERMIT TO CONSTRUCT (MULTIPLE PERMITS MAY BE REQUIRED)
 - GOVERNMENTAL REGULATORS (CDA/MNRF)
 - ELECTRICAL SAFETY AUTHORITY (ESA) PERMIT

FOUNDATION PREPARATION:

THIS SPECIFICATION COVERS WORK ITEMS REQUIRED FOR CLEARING/ GRUBBING, STRIPPING, EXCAVATION AND FOUNDATION PREPARATION PRIOR TO PLACEMENT OF EMBANKMENT FILL MATERIALS AND CONSTRUCTION OF THE RELATED APPURTENANT STRUCTURES INCLUDING SPILLWAY, ACCESS ROADS, LAYDOWN AREA AND TEMPORARY

NATER MANAGEMENT THE EXISTING DAM CAN BE THE UPSTREAM COFFERDAM DURING REHABILITATION CONSTRUCTION. THE FOUNDATION

- PREPARATION FOR THE DOWNSTREAM WORK AREA WILL RESULT IN SOME SEEPAGE FROM UPSTREAM (THE EXISTING DAM FOUNDATION). THE SEEPAGE RATE IS CONSIDERED TO BE MANAGEABLE BY SUMPS AND PUMPS DURING CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY FOR WATER MANAGEMENT DURING CONSTRUCTION.
- SOME SEEPAGE AND /OR RUN-OFF WATER MAYBE ENCOUNTERED FROM SURROUND AREAS AT THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROL OF RUN-OFF STORM EVENT DURING CONSTRUCTION.
- 3. THE CONTRACTOR'S PROPOSED WATER MANAGEMENT PLAN SHALL BE SUBMITTED TO THE CLIENT'S APPROVAL.

FOUNDATION PREPARATION: CLEARING AND GRUBBING

- THE WORK TO BE DONE UNDER THIS ITEM COMPRISES THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR CLEARING AND GRUBBING THE CONSTRUCTION AREA. AS SHOWN
- CLEARING AND GRUBBING SHALL CONSIST OF CUTTING AND DISPOSING OF ALL TREES, HEDGES, SHRUBS ALIVE OR DEAD, DEBRIS AND ALL OTHER PERISHABLE MATERIALS, INCLUDING FALLEN TREES AND LOGS WHICH MAY BE VISIBLE ON THE SURFACE OF THE GROUND WITHIN THE CONSTRUCTION AREA. ALL TREES, HEDGES, AND SHRUE SHALL BE CUT OFF AT THE NATURAL GROUND SURFACE IN ALL AREAS OF THE CONSTRUCTION AS SHOWN ON THE
- THE CONTRACTOR SHALL GIVE THE CLIENT OR ITS REPRESENTATIVE AT LEAST THREE (3) DAYS NOTICE OF INTENT TO CLEAR AREAS. THE LIMITS OF CLEARING AS APPROVED BY THE CLIENT OR ITS REPRÉSENTATIVE AND AS SPECIFIED HEREIN SHALL BE STRICTLY ADHERED TO.
- . REMOVE ALL CLEARED MATERIAL FROM THE SITE AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE CLIENT OR
- THE WORK SHALL BE CARRIED OUT STRICTLY IN ACCORDANCE WITH THE ENVIRONMENTAL ASSESSMENT PERMIT ISSUED FOR THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND COMPLYING WITH ANY AND ALL PERMITS ASSOCIATE WITH CLEARING, GRUBBING AND PERMANENT DISPOSAL OF MATERIALS.
- 5. CLEARING, GRUBBING AND STRIPPING SHALL BE COMPLETED PRIOR TO THE START OF EARTHWORKS AND SHALL BE AT A MINIMUM DISTANCE OF FIVE (5) METERS FROM FILL PLACEMENT. CONTRACTOR CAN ONLY PROCEED WITH FILL PLACEMENT AFTER RECEIVING WRITTEN APPROVAL FROM THE CLIENT OR ITS REPRESENTATIVE.
- STRIPPING, EXCAVATION AND STOCKPILING:
- THE WORK SHALL COMPRISE THE SUPPLY OF ALL LABOUR AND PLANT, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR THE STRIPPING, EXCAVATION AND STOCKPILING FOR SUBSEQUENT REUSE OR DISPOSING OF STRIPPED AND EXCAVATED MATERIALS FROM THE CONSTRUCTION AREA OF THE DAM, ACCESS ROAD AND LAYDOWN
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE CLIENT FOR CLEARANCE OF ANY BURIED UTILITIES, EXITING GROUND GRID AND INSTRUMENTATION AT THE DAM SITE. BURIED UTILITIES, GROUNDING GRID AND INSTRUMENTATION SHALL BE PROTECTED OR REMOVED WITHOUT DAMAGE BEFORE STRIPPING AND EXCAVATION ACTIVITY. NO STRIPPING OF ANY AREA SHALL START WITHOUT PRIOR WRITTEN APPROVAL FROM THE CLIENT OR ITS
- REPRESENTATIVE. . THE STRIPPING AND EXCAVATED MATERIALS AT THE EXISTING DAM SITE SHALL NOT BE REUSED FOR ENGINEERED DAM FILL MATERIALS. THE MATERIAL MAY NEED TO BE DISCARDED AT THE CLIENT OR ITS REPRESENTATIVE'S
- DISCRETION. THE STRIPPED MATERIAL NOT SUITABLE FOR RE-USE SHALL BE DISPOSED OF BY THE CONTRACTOR OFF SITE AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE CLIENT OR ITS REPRESENTATIVE. THE EXCAVATED MATERIALS FROM THE EXISTING DAM SITE AS PER DESIGN SHALL BE TEMPORARILY STOCKPILED AT THE DAM SITE APPROVED BY THE CLIENT OR ITS REPRESENTATIVE. STOCKPILES SHALL BE SLOPED SUFFICIENTLY

FOR STABILITY. STOCKPILED MATERIALS SHALL BE PROTECTED WITHOUT CONTAMINATION AND EROSION.

GRANULAR FILL PLACEMENT AND COMPACTION:

1. THIS SPECIFICATION DESCRIBES THE REQUIREMENTS FOR PLACEMENT AND COMPACTION OF GRANULAR FILL MATERIALS INCLUDING ROCKFILL/RIP RAP FOR EMBANKMENT DAM BUTTRESS, SPILLWAY, AND CREEK BANK EROSION PROTECTION CONSTRUCTION AS PER DESIGN DRAWINGS.

MATERIAL CODES AND TEST STANDARDS:

2. THE GRANULAR FILL MATERIALS SHALL FOLLOW THE ASTM STANDARDS INCLUDING:

<u>ASTM</u> <u>DESCRIPTION</u> ASTM D75 METHODS FOR SAMPLING AGGREGATES

SOIL-AGGREGATE MIXTURES

WEIGHT) OF SOIL SPECIMENS

- METHOD FOR PARTICLE SIZE ANALYSIS TEST METHOD FOR MOISTURE-DENSITY RELATIONS OF SOILS AND SOIL AGGREGATE MIXTURES USING 4.4LB. (2.5 KG) RAMMER AND 305mm (12") DROP
- ASTM D854 TEST METHOD FOR SPECIFIC GRAVITY OF SOILS
- TEST METHOD FOR AMOUNT OF MATERIALS IN SOILS FINER THAN THE NO. 200 SIEVE ASTM D2216 METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) OF SOIL, ROCK AND
- ASTM D2922 TEST METHODS FOR DENSITY OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR
- ASTM D3017 TEST METHODS FOR MOISTURE CONTENT OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTH)
- STANDARD TEST METHOD FOR PARTICLE SIZE ANALYSIS OF NATURAL AND MAN-MADE RIP RAP MATERIALS ASTM D7263 STANDARD TEST METHODS FOR LABORATORY DETERMINATION OF DENSITY (UNIT

- DIMENSIONS SHALL NOT BE LESS THAN THOSE SPECIFIED AND FINAL SLOPES SHALL NOT BE STEEPER THAN THOSE INDICATED ON THE DESIGN DRAWINGS. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, THE ACCEPTABLE DIMENSIONAL TOLERANCES FOR THE FILL PLACEMENT SHALL BE THE FOLLOWING:
- LEVEL TOLERANCE: +/- 0.1m HORIZONTAL TOLERANCE +/- 0.3m
- SHOULD ANY ERRORS IN SETTING OUT THE WORKS OCCUR, SUCH ERRORS SHALL BE CORRECTED AND ANY NECESSARY ADJUSTMENT TO PREVIOUSLY PLACED FILL MATERIALS RESULTING FROM SUCH ERRORS SHALL BE MADE GOOD TO THE SATISFACTION OF THE ENGINEER AT THE SITE PRIOR TO FURTHER PLACEMENT OF FILL MATERIALS AT NO COST TO THE CLIENT.

1. THE GRANULAR FILL MATERIALS FOR THE WORK AS PER DESIGN DRAWING SHALL BE:

SIEVE SIZES

(US STANDARD SIZE)

1-1/2"

• MAXIMUM SIZE (D_{MAX}): 750 mm (±50mm)

GRANULAR FILL PLACEMENT AND COMPACTION:

MATERIALS, AS SHOWN ON THE DESIGN DRAWINGS.

REQUIRED BY THE ENGINEER BASED ON SPECIFIC SITE CONDITIONS.

• MINIMUM SIZE (D_{MIN}): 180 mm (±50mm)

CONTINUING SATISFACTORY PERFORMANCE.

THE REQUIREMENT OF THE SPECIFICATION.

AS ACCEPTED BY THE ENGINEER.

OCCURS.

MEDIAN SIZE (D₅₀): 370 mm

SPILLWAY RIP RAP

- FREE DRAINING GRANULAR FILL AS NOTED ON DESIGN DRAWINGS
- 2. THE GRANULAR FILL MATERIALS SHALL CONSIST OF NATURALLY OCCURRING (AS SPECIFIED HERE), OR CRUSHED, CLEAN, SOUND, MINERAL PARTICLES, NON-PLASTIC, FREE FROM ROOTS AND TOPSOIL OR OTHER DEBRIS MATERIALS CONTAINING QUANTITIES OF ORGANIC MATTER, FLAT OR ELONGATED PARTICLES, DELETERIOUS MATERIAL SHALL NOT BE USED FOR GRANULAR FILL MATERIALS.
- MATERIAL PLACED WHICH DOES NOT MEET THE SPECIFIED GRADATION REQUIREMENTS SHALL BE REMOVED, BLENDED OR OTHERWISE REWORKED TO PRODUCE A MATERIAL WHICH DOES.
- OVERSIZED PARTICLES SHALL BE REMOVED, EITHER AT THE SOURCE OR DURING PLACEMENT OR BOTH. WHERE REDUCED LIFT THICKNESSES ARE REQUIRED, PARTICLES LARGER THAN 2/3 OF THE REDUCED LIFT THICKNESS

RIP RAP MATERIAL FOR EMBANKMENT AND SPILLWAY EROSION PROTECTION SHALL BE WELL GRADED SIZES OF

CUBIC IN SHAPE WITH THE LARGEST DIMENSION NOT MORE THAN TWICE THE SMALLEST. THE RIP RAP SHALL MEET

HARD STRONG DURABLE, DENSE, AND HIGH-QUALITY ROCK FRAGMENTS. THE FRAGMENTS SHALL BE GENERALL

1. THE WORK TO BE DONE SHALL COMPRISE THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL, AND THE

ERFORMANCE OF ALL WORK NECESSARY FOR SUPPLYING, PLACING AND COMPACTING GRANULAR FILL

2. GRANULAR FILL MATERIALS SHALL BE PLACED TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS

3. PLACING AND SPREADING OF GRANULAR FILL MATERIAL IN ACCORDANCE WITH THESE SPECIFICATIONS SHALL BE PERFORMED IN SUCH A MANNER AS TO AVOID SEGREGATION OF SIZES AND TO OBTAIN A HOMOGENEOUS MASS.

THE SELECTION OF COMPACTION EQUIPMENT SHALL BE SUBJECT TO THE APPROVAL OF ENGINEER AND TO

NATIVE MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY

GRANULAR MATERIAL USED FOR BACKFILL AND EMBEDMENT SHALL BE PLACED IN LAYERS 200mm IN DEPTH

MAXIMUM AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY UNLESS OTHERWISE NOTED.

LOCATIONS, PROVIDED THAT CONTRACTOR EXERCISES EVERY PRECAUTION NECESSARY AND BEST PRACTICES TO

GRANULAR FILL MATERIAL SHALL NOT BE CONTAMINATED BY MIXING WITH OTHER MATERIALS. FILL MATERIALS

11. THE CONTRACTOR MAY USE AN ALTERNATIVE TYPE OF ROLLER OR EQUIPMENT FOR COMPACTION PROVIDED THAT

THE PERFORMANCE OF SUCH EQUIPMENT IS DEMONSTRATED TO PRODUCE THE COMPACTION SPECIFIED TO MEET

GRANULAR FILL MATERIALS SHALL BE PLACED, SPREAD AND COMPACTED IN A DIRECTION PARALLEL TO THE AXIS

WHICH HAVE BECOME CONTAMINATED SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE

OF THE DAM EXCEPT AS OTHERWISE PERMITTED BY ENGINEER BASED ON THE SPECIFIC SITE CONDITION.

12. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE QUALITY OF WORK IN ACCORDANCE WITH THESE SPECIFICATIONS. ENGINEER WILL CARRY OUT QUALITY CONTROL TESTING OF CONTRACTOR'S OPERATIONS, AND

. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER THE SOURCE OF ALL THE REQUIRED GRANULAR FILL

THE WORK TO DEMONSTRATE CONFORMANCE TO THE SPECIFIED GRADATIONS.

CONDITIONS WHICH MAY BE ENCOUNTERED DURING COMPACTION OF THE FILL

AND SHALL BE COMPACTED WITH HAND COMPACTORS TO 98% SPMDD.

SPECIFIED ROCK SIZES AND GRADING APPLY TO RIP RAP IN-PLACE.

MATERIALS SPECIFIED IN THE DESIGN DRAWING AND ASSOCIATE TESTING DATA RESULTS WITHIN 7 DAYS OF AWARD OF CONTRACT. ADDITIONAL TESTING OF THE MATERIAL MAY BE REQUIRED BY THE ENGINEER DURING

1. EACH LAYER OF ROCKFILL MATERIAL SHALL BE COMPACTED BY NOT LESS THAN FOUR COMPLETE PASSES OF THE VIBRATORY ROLLER EQUIPMENT. VIBRATORY ROLLER SHALL HAVE A SMOOTH STEEL DRUM, EQUIPPED WITH

CLEANING DEVICES, EITHER PULLED OR SELF-PROPELLED. COMPACTOR SHALL HAVE A STATIC WEIGHT OF 1

TONNES ON THE AXIS OF THE DRUM. THE VIBRATION FREQUENCY OF THE VIBRATORY ROLLER DURING OPERATION

SHALL BE BETWEEN 20HZ AND 35HZ AND THE COMPACTION (CENTRIFUGAL) FORCE DEVELOPED BY THE ROLLER

AT 30 HZ SHALL NOT BE LESS THAN 19 T. THE POWER OF THE ENGINE DRIVING THE VIBRATORY ROLLER SHALL BE SUFFICIENT TO MAINTAIN THE SPECIFIED FREQUENCY AND CENTRIFUGAL FORCE UNDER THE MOST ADVERSE

2. THE VIBRATORY ROLLER SHALL MAINTAIN A MINIMUM DISTANCE OF 1.5m FROM THE EXISTING CONCRETE DAM FOR COMPACTION. ROCKFILL MATERIAL AROUND THE EXISTING CONCRETE DAM SHALL BE LAID IN 300mm LAYERS

3. ROCKFILL MATERIAL UNDER WATER SHALL BE PLACED WITH MECHANICAL EQUIPMENT AND COMPACTED UNDER WATER WITH THE BACK OF EXCAVATOR BUCKET SO THAT NO DEFORMATION CAN BE OBSERVED. EACH LAYER OF ROCKFILL MATERIAL UNDER WATER SHALL NOT BE MORE THAN 250mm THICK BEFORE COMPACTION.

1. RIP RAP SHALL BE PLACED BY SUITABLE MECHANICAL EQUIPMENT SO THAT INTERMIXING OF ADJOINING ROCKFILL

FRAGMENTS ARE UNIFORMLY DISTRIBUTED AND SMALLER ROCK FRAGMENTS FILL VOIDS BETWEEN LARGER PIECES. HAND PLACING SHALL BE REQUIRED TO THE EXTENT NECESSARY TO SECURE RESULTS SPECIFIED ABOVE. THE

AND RIP RAP DOES NOT OCCUR DURING PLACING AND SO THAT MINIMUM BREAKAGE OF ROCK FRAGMENTS

2. RIP RAP NEED NOT BE COMPACTED BUT PLACED CAREFULLY IN SUCH A MANNER THAT LARGER ROCK

FROM THE MINIMUM FOUR COMPLETE PASSES SPECIFIED, IN ORDER TO ACHIEVE THE SPECIFIED DENSITY.

AND TIMES AS REQUIRED BY THE ENGINEER. THE CONTRACTOR SHALL VARY THE METHOD OF PLACING AND

COMPACTION IN ORDER TO MEET THE REQUIREMENTS OF THESE SPECIFICATIONS AS DETERMINED BY TESTING AND

WHERE NECESSARY TO ACHIEVE THE SPECIFIED COMPACTION, WATER SHALL BE APPLIED BY CONTROLLED

PREVENT SEGREGATION OF PARTICLE SIZES. THE STOCKPILED MATERIAL SHALL MEET THE GRADATION

SPRINKLING TO THE GRANULAR FILL MATERIALS IN AMOUNTS AS APPROVED BY THE ENGINEER.

- SHALL BE REMOVED PRIOR TO COMPACTION. 5. THE GRANULAR FILL MATERIALS SHOULD BE NON-METAL LEACHING AND ARD POTENTIAL MATERIALS.
- ROCKFILL

ROCKFILL MATERIAL FOR EMBANKMENT FILL SHALL BE FROM CRUSHED ROCK SPALLS IN ACCORDANCE WITH THE GEOTEXTILE: FOLLOWING GRADATIONS:

GRAIN SIZE (mm)

% PASSING

CONCRETE CAST-IN-PLACE AND REPAIR:

REFERENCES AND STANDARDS:

CONCRETE REMOVAL:

CONCRETE CAST-IN-PLACE:

PROCESSING.

STANDARD PRACTICES FOR CONCRETE.

THE CONCRETE CAST-IN-PLACE AND REPAIR WORK FOR THIS PROJECT MAINLY CONSISTS OF:

AND IN THIS SPECIFICATION INCLUDING VIBRATING, FINISHING, AND CURING.

5. THE QUALITY CONTROL (QC) TESTING OF ALL CONCRETE MIX MATERIALS.

2. CAN/CSA A3001, CEMENTITIOUS MATERIALS FOR USE IN CONCRETE.

5. CAN/CSA G30.18, BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT.

EXPENSE. TO THE SATISFACTION OF THE ENGINEER.

6. ACI 117, STANDARD TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS.

ROAD, AND EARTH RETAINING STRUCTURE, INTENDED TO REMAIN IN PLACE.

1. CONCRETE MIX DESIGN SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

• MINIMUM 28-DAY COMPRESSIVE STRENGTH - 30 MPA, CLASS F1.

• SLUMP: 75mm +- 25mm (BEFORE ADDITION OF SUPERPLASTICIZER).

• CEMENTITIOUS MATERIAL: TYPE GU WITH UP TO 30% FLY ASH.

• MAXIMUM WATER/CEMENT RATIO BY WEIGHT: 0.45

EXECUTION ACCORDING TO CSA A23.1, LATEST EDITION.

• CURING ACCORDING TO CSA A23.1, LATEST EDITION.

AGGREGATE: 20mm MAX. NOMINAL SIZE.

AIR CONTENT AS PER CSA A23.1

HAS ACHIEVED DESIGN STRENGTH.

7. REINFORCING STEEL INSTITUTE OF CANADA, (RSIC), MANUAL OF STANDARD PRACTICE.

1. REMOVING THE CONCRETE STRUCTURE AS SHOWN AND DESCRIBED ON THE DRAWINGS AND IN THIS SPECIFICATION.

ABRASIVE CLEANING, CLEANING OF EXISTING REINFORCEMENT, AND APPLYING BONDING AGENT TO THE SURFACE.

3. SUPPLYING MATERIALS AND THE MIXING AND PLACING OF CONCRETE AS SHOWN AND DESCRIBED ON THE DRAWINGS

4. SUPPLYING, FABRICATING, CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY WORKS, INCLUDING FALSEWORK

1. CSA A23.1/A23.2, CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION/METHODS OF TEST AND

3. INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI) TECHNICAL GUIDELINE NO. 310.1R, GUIDE FOR SURFACE.

8. GUIDE TO CONCRETE REPAIR (2ND EDITION). U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION.

1. ALL AREAS OF THE EXISTING CONCRETE TO BE REMOVED WILL BE MARKED BY THE CONTRACTOR AS SHOWN ON

DRAWINGS. THE CONCRETE REMOVAL AREAS SHALL BE CONFIRMED AND APPROVED BY THE ENGINEER BEFORE

2. THE CONTRACTOR SHALL REMOVE THE EXISTING CONCRETE AS THE DIMENSIONS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER. ANY DAMAGE CAUSED BY THE CONTRACTOR TO ANY PORTION OF THE STRUCTURE

3. THE CONTRACTOR SHALL EXERCISE CAUTION AND TAKE CARE NOT TO DAMAGE ANY EXISTING DAM. POWERHOUSE.

NOT INTENDED FOR THE REMOVAL SHALL BE REPAIRED/RECOVERED BY THE CONTRACTOR, AT THE CONTRACTOR'S

4. PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION.

2. PREPARING THE SURFACE FOR THE CONCRETE CAST-IN-PLACE AS SHOWN ON THE DRAWINGS, INCLUDING

• PROVIDE EROSION CONTROL FOR OVERFLOW ROCKFILL/RIP RAP FILL OF DOWNSTREAM SPILLWAY CHANNEL AND/OR THE AREA SUBJECT TO FLOW/RUN OFF EROSION AND OR SCOUR DURING DAM OPERATION. • INTERFACE BETWEEN THE ROCKFILL/RIP RAP AND EXCAVATED NATIVE SOIL FOR THE CREEK BANK EROSION • SEPARATE AND PREVENT MIXING OF MATERIALS OF DIFFERENT GRADING AS REQUIRED IN THE DESIGN DRAWING

2. ALL CONCRETE SHALL MEET THE REQUIREMENTS OF CSA A23.1 AND A23.2 STANDARDS, LATEST EDITION.

3. AGGREGATES SHALL BE TESTED FOR ALKALI REACTIVITY AS PER CSA A23.1 AND A23.2 AND APPROVED BY THE

4. BACK-FILLING AGAINST CAST-IN-PLACE CONCRETE WALLS SHALL NOT COMMENCE UNTIL CONCRETE IN THE WALL

- APPLICABLE CODES AND STANDARDS: THE FOLLOWING CODES AND STANDARDS APPLY FOR THE USE OF GEOTEXTILES:
- ASTM D 4354 PRACTICE FOR SAMPLING OF GEOSYNTHETICS FOR TESTING
- 2. ASTM D 4355 TEST METHOD FOR DETERIORATION OF GEOTEXTILES FROM EXPOSURE TO ULTRAVIOLET LIGHT AND WATER (XENON-ARC TYPE APPARATUS)
- 3. ASTM D 4491-99A, STANDARD TEST METHODS FOR WATER PERMEABILITY FOR GEOTEXTILES BY PERMITTIVITY
- 4. ASTM D 4595-86 (2001), STANDARD TEST METHOD FOR TENSILE PROPERTIES OF GEOTEXTILES BY THE WIDE-WIDTH STRIP METHOD.
- 5. ASTM D 4632 TEST METHOD FOR GRAB BREAKING LOAD AND ELONGATION OF GEOTEXTILES. 6. ASTM 4716-01, TEST METHOD FOR DETERMINING THE (IN-PLANE) FLOW RATE PER UNIT WIDTH AND HYDRAULIC
- TRANSMISSIVITY OF A GEOSYNTHETIC USING A CONSTANT HEAD. 7. ASTM D 4751-99A, STANDARD TEST METHOD FOR DETERMINING APPARENT OPENING SIZE OF A GEOTEXTILE.
- 8. ASTM D4759, PRACTICE FOR DETERMINING THE SPECIFICATION CONFORMANCE OF GEOSYNTHETICS.
- 9. ASTM D4833, TEST METHOD FOR INDEX PUNCTURE RESISTANCE OF GEOTEXTILES, GEOMEMBRANES AND RELATED
- 10. ASTM D4873, GUIDE FOR IDENTIFICATION, STORAGE, AND HANDLING OF GEOTEXTILES.
- 11. ASTM D4884, STANDARD TEST METHOD FOR STRENGTH OF SEWN OR THERMALLY BONDED SEAMS OF GEOTEXTILES.
- 12. ASTM D5261, TEST METHOD FOR MEASURING MASS PER UNIT AREA OF GEOTEXTILES.
- 13. ASTM D5321, STANDARD TEST METHOD FOR DETERMINING THE COEFFICIENT OF SOIL AND GEOSYNTHETIC OR GEOSYNTHETIC AND GEOSYNTHETIC FRICTION BY THE DIRECT SHEAR METHOD.
- 14. GRI STANDARD GT12(A) (EDITORIAL CHANGES), GEOSYNTHETIC RESEARCH INSTITUTE. DECEMBER 19, 2012. SHIPPING, STORAGE, AND HANDLING:
- 8. THE STOCKPILING OF GRANULAR FILL MATERIAL WILL BE INSPECTED AND APPROVED BY ENGINEER, AT APPROVED 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING, STORAGE, AND HANDLING OF GEOTEXTILE, AS PER THE ASTM, AND AS WELL AS ANY RELATED COSTS, INCIDENTAL OR OTHERWISE, INCLUDED IN THE INSTALLATION
 - 2. THE GEOTEXTILE SHALL ADHERE TO THE LABELLING REQUIREMENTS OF ASTM D 4873 AND SHIPPING, HANDLING AND STORAGE SHALL ADHERE TO ASTM D 4873. MATERIAL TYPE:
 - 1. THE GEOTEXTILE SHALL BE OF NON-WOVEN SYNTHETIC FIBER, SUPPLIED IN ROLLS: MINIMUM WIDTH OF 4.6m;

• MINIMUM LENGTH OF 91m; AND

• COMPOSED OF MINIMUM 85% BY MASS OF POLYPROPYLENE WITH INHIBITORS ADDED TO BASE PLASTIC TO RESIST DETERIORATION BY ULTRA-VIOLET AND HEAT EXPOSURE FOR 60 DAYS.

CONTRACTOR SHALL COOPERATE IN EVERY WAY TO ENSURE THAT TESTS CAN BE PERFORMED AT ALL LOCATIONS 2. PHYSICAL PROPERTIES OF THE GEOTEXTILE SHALL INCLUDE:

PHYSICAL PROPERTY	<u>VALUE</u>	<u>UNIT</u>	<u>ASTM</u>
NOMINAL THICKNESS	4.1	mm	ASTM D 5199
MASS PER UNIT AREA	540	G/m2	ASTM D 5261
TENSILE STRENGTH	1.64	KN	ASTM D 4632
ELONGATION AT BREAK	50%	_	ASTM D 4632
TRAPEZOIDAL TEAR STRENGTH	0.64	KN	ASTM D 4533
PUNCTURE STRENGTH	1.0	KN	ASTM D 4833
MINIMUM MULLEN BURST	5170	KPA	_
UV RESISTANCE	MINIMUM 70%	_	ASTM D4355
APPARENT OPENING SIZE	0.2	mm	ASTM D 4751
MINIMUM WATER FLOW RATE	2,000	L/MIN/m ²	ASTM D 4491
PERMITTIVITY	0.7	S ⁻¹	ASTM D 4491

4. IF REQUIRED BY THE ENGINEER, CONTRACTOR SHALL VARY THE NUMBER OF PASSES OF COMPACTION EQUIPMENT 3. MATERIAL ACCEPTANCE SHALL ADHERE TO ASTM D 4759.

- 1. PLACE GEOTEXTILE ON APPROVED SUBGRADE, FOLLOWING THE REQUIRED EXCAVATION AND STRIPPING. SITE PREPARATION FOR GEOTEXTILE INSTALLATION AND SMOOTH-ROLLING THE PREPARED SUBGRADE SURFACE.
- 2. PLACE GEOTEXTILE SMOOTH AND FREE OF TENSION STRESS, FOLDS, WRINKLES AND CREASES. 3. GEOTEXTILE PLACED ON SLOPES SHALL BE STARTED FROM THE TOE TO THE UPPER EXTENT OF THE SLOPE.
- 4. THE GEOTEXTILE SHALL BE JOINED BY OVERLAPS, THE MINIMUM OVERLAP BEING 500mm.
- 5. ANY DAMAGED GEOTEXTILE SHALL BE PROMPTLY REPAIRED OR REPLACED TO THE APPROVAL OF THE ENGINEER
- 6. PROTECT PLACED GEOTEXTILE FROM DISPLACEMENT, DAMAGE OR DETERIORATION BEFORE, DURING AND AFTER PLACEMENT OF MATERIAL LAYERS.

STRUCTURAL STEEL:

1. STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA-S19.

TIGHT CONDITION AS DEFINED BY CAN/CSA S16.1.

- 2. STRUCTURAL STEEL SHALL BE NEW G40.21 350W MATERIAL UNLESS NOTED OTHERWISE.
- 3. HOLLOW STRUCTURAL SECTIONS SHALL BE ASTM A500 GRADE C OR G40.21 350W MATERIAL UNLESS NOTED OTHERWISE
- 4. ANGLES CHANNELS AND PLATES TO BE G40-.21-300W MATERIAL UNLESS NOTED OTHERWISE.
- 5. WELDING TO CSA W59 WELDED STEEL CONSTRUCTION, LATEST EDITION
- 6. FABRICATOR SHALL BE CERTIFIED ACCORDING TO CSA STANDARD W47.1 DIVISION 1 OR 2, LATEST
- 8. MEMBERS SHALL BE CONNECTED FOR THE FORCES INDICATED. WHERE THESE FORCES ARE NOT SHOWN, COMPRESSION AND TENSION SHOULD BE CONNECTED FOR 50% OF THE EFFECTIVE STRENGTH OF THAT MEMBER AND BEAMS CONNECTED FOR THE FULL UNIFORM CAPACITY FOR
- 9. SPLICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THAT MEMBER AT THE POIN' OF SPLICE. MEMBERS SHALL NOT BE SPLICED AT THE MAXIMUM STRESS POINTS. NO SPLICE IS TO
- BE MADE UNLESS SHOWN ON THE DRAWINGS OR REVIEWED AND APPROVED BY THE CONSULTANT. 10. PROVIDE WELDED STIFFENERS PLATES ON BOTH SIDES OF BEAMS AT POINTS OF CONCENTRATED

LOADS INCLUDING BEAMS SUPPORTING COLUMNS OR RUNNING OVER THE TOP OF COLUMNS.

- 11. ANCHOR BOLTS TO ASTM A307, UNLESS NOTED OTHERWISE.
- 12.GROUT (NON-SHRINK) UNDER BEARING PLATES SHALL BE M-BED BY STERNSON LTD. OR
- 13.NO DRILLING OR CUTTING AFTER FABRICATION OF STRUCTURAL STEEL UNLESS APPROVED BY THE
- 14.ALL FIELD WELDED CONNECTIONS TO BE INSPECTED BY FABRICATION CONTRACTOR.

<u>MATERIAL TESTING AND INSPECTIONS:</u>

15. PROVIDE WEEP HOLES IN ALL HSS STRUCTURAL.

- 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENGAGING THE SERVICES OF A CERTIFIED TESTING AND INSPECTION COMPANY TO COMPLETE:
 - COMPACTION TESTING ON ALL INSTALLED GRANULAR MATERIAL.
 - TESTING OF ALL PLACED CONCRETE/CEMENTITIOUS GROUT
 - IN ACCORDANCE WITH CAN/CSA-A23.2-14
 - ROCK ANCHOR PULL TEST.
 - ALL OTHER QUALITY CONTROL REQUIREMENTS AS OUTLINED IN OPS SPECIFICATIONS.

POSTED TENSIONED ANCHOR DOWEL:

1. THE WORK TO BE DONE SHALL COMPRISE THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL AND THE PERFORMANCE OF ALL WORK NECESSARY FOR SUPPLYING, DRILLING, INSTALLATION, AND GROUTING, POST-TENSIONING TO THE DESIGN LOAD FOR THE ANCHOR DOWELS, AS SHOWN ON

ROCK DOWEL INSTALLATION:

- I. ALL ROCK DOWEL LOCATIONS AND ORIENTATIONS SHALL BE COORDINATED WITH THE ENGINEER PRIOR TO DRILLING. BORE HOLES DRILLED WITHOUT PRIOR APPROVAL FROM THE ENGINEER MAY BE REJECTED AT THE DISCRETION OF THE ENGINEER. REJECTED BORE HOLES SHALL BE FILLED WITH GROUT AND NEW HOLES SHALL BE DRILLED AT THE CONTRACTOR'S EXPENSE.
- 2. THE LOCATES FOR DRILLING SHALL BE CLEAR OF BURIED UTILITIES. IT IS THE CONTRACTOR'S
- 3. UNLESS OTHERWISE SPECIFIED AND APPROVED IN WRITING BY THE ENGINEER. ALL BORE HOLES SHALL BE DRILLED USING A LOW IMPACT ROTARY DRILL TO PREVENT DAMAGE TO THE EXISTING DAM CONCRETE STRUCTURE. AIR POWERED DRILLS ARE NOT ALLOWED TO PREVENT DAMAGE TO THE EXISTING CONCRETE STRUCTURE. ANY DAMAGE SHALL BE REPORTED TO THE ENGINEER FOR CORRECTIVE. CORRECTIVE ACTION AS SPECIFIED BY THE ENGINEER WILL BE COMPLETED AT THE CONTRACTOR'S EXPENSE.
- 4. ALL BORE HOLES SHALL BE CLEANED OUT USING COMPRESSED AIR PRIOR TO INSERTING THE REINFORCING DOWEL. THE ENGINEER RESERVES THE RIGHT TO WITNESS THE CLEANING PROCESS AND INSERTION OF DOWELS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN ADVANCE OF CLEANING AND INSERTION OF DOWELS SO THAT DEPTH AND CLEANLINESS OF THE DRILLED HOLES CAN BE CONFIRMED. DOWELS GROUTED WITHOUT INSPECTION SHALL BE REJECTED AND
- REPLACED AT NO ADDITIONAL COST TO THE CLIENT. 5. ALL ROCK DOWELS SHALL BE GROUTED IN THE PRESENCE OF THE ENGINEER. GROUTING PERFORMED WITHOUT THE ENGINEER PRESENT SHALL BE REJECTED AND THE ROCK DOWELS REPLACED AT THE CONTRACTOR'S EXPENSE.
- 6. ALL ROCK DOWELS SHALL BE CENTERED IN THE DRILLED HOLE USING CENTRALIZERS CONTRACTOR SHALL ADJUST CENTRALIZER SIZE ACCORDING TO DRILLED HOLE DIAMETER IF NECESSARY. ANY ROCK DOWEL NOT CENTERED SHALL BE REJECTED AND REPLACED AT THE CONTRACTOR'S EXPENSE. ANCHORS OR DOWELS SHALL NOT DEVIATE MORE THAN 8% OF TH LED DIAMETER FROM THE CENTER OF THE HOLE. ALL DOWELS SHALL BE APPROVED PRIOR TO INSERTION OF CEMENT GROUT PLUG.
- 7. THE CONTRACTOR SHALL KEEP THE AREA CLEAN DURING GROUTING. ANY SPILLED GROUT SHALL BE CLEANED IMMEDIATELY AT NO ADDITIONAL COST TO THE CLIENT.
- 8. SURFACE GROUT SHALL BE SCULPTED AND STAINED TO MATCH EXISTING SURROUNDING COLOR, TEXTURE, AND SHAPE CONDITIONS.
- 9. ROCK DOWEL MATERIAL, DIAMETER AND EMBEDMENT SHALL BE AS SPECIFIED ON THE DESIGN DRAWING. EMBEDMENT LENGTH SHALL BE THE ACTUAL LENGTH OF BAR SET BENEATH THE EXISTING CONCRETE SURFACE AND ENCASED INTO GROUT. THE CONTRACTOR SHALL ADJUST THE DRILL DEPTH TO MEET THE REQUIRED MINIMUM EMBEDMENT LENGTHS AND ACCOUNT FOR TOP/BOTTOM CLEARANCE AND/OR GROUT PLUG.

CONCRETE NOTES:

1. CONCRETE IS SPECIFIED USING ALTERNATIVE NUMBER OF CSA A23.1 TABLE 2 AS

TABLE 1: PARAMETER EXTERIOR SLAB

EXPOSED CLASS (TABLE 1 AIR CONTENT CATEGORY (TABLE 4) MAX. W/C RATION (TABLE 2) 0.5 CURING TYPE (TABLE 2) MIN. COMPRESSIVE STRENGTH 32MPa

7. ALL BOLTED CONNECTIONS TO BE BEARING TYPE. THE BOLTS SHALL BE BROUGHT TO TO A SNUG 2. AT LEAST TWO (2) WEEKS PRIOR TO THE PLACEMENT OF CONCRETE THE CONTRACTOR SHALL SUBMIT THE FOLLOWING TO THE ENGINEER FOR REVIEW:

- A VALID 'CERTIFICATE OF READY MIXED CONCRETE PRODUCTION FACILITIES' OR VALID 'CERTIFICATE OF MOBILE MIX CONCRETE PRODUCTION FACILITIES' AS ISSUEI BY THE 'READY MIXED CONCRETE ASSOCIATION OF ONTARIO' TO THE PLANT BEIN
 - A COMPLETED 'CONCRETE MIXED DESIGN SUBMISSION FORM'
- A QUALITY PLAN THAT DESIGNATES A SPECIFIED SLUMP OR SOME OTHER MEASURE OF WORKMANSHIP
- TEST RESULTS TO SHOW COMPLIANCE WITH CSA A23.1.
- AIR VOID SYSTEM OF HARDENED CONCRETE.
- STATISTICAL STRENGTH TEST ANALYSIS TO CONFIRM THE STRENGTH LEVEL FOR EACH CLASS OF CONCRETE INCLUDING THE EXPECTED 7/28 DAY STRENGTH RATIO
- 3. FABRICATION AND PLACEMENT OF REINFORCING STEEL TO BE IN ACCORDANCE WITH CSA A23.1 AND THE REINFORCING STEEL INSTITUTE OF CANADA'S 'REINFORCING STEEL MANUAL OF STANDARD PRACTICE'.
- 4. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO CSA G30.18 M92, Fy=400 MPa (GRADE 400)
- 5. CONCRETE SHALL NOT BE POURED UNTIL REBAR HAS BEEN INSPECTED BY THE ENGINEE
- 6. WHERE REBARS JOIN AT CORNERS PROVIDE CORNER BARS FOR LAPS. 7. CONCRETE COVER FOR REINFORCING STEEL AS PER TABLE 17 OF CSA A23.1
- ALL CONCRETE CAST AGAINST EARTH 75mm (3")
- ALL CONCRETE CAST IN FORMS BUT EXPOSED TO EARTH OR WEATHER 50mm (2
- BARS 20M AND SMALLER IN WALLS AND SLABS 32mm (1 1/4")
- CONCRETE NOT EXPOSED TO EARTH AND WEATHER 25mm (1") OR 1.5 NOMINAL BAR DIAMETER

9. CONTINUOUS AND TEMPERATURE REINFORCING BARS SPLICES TO BE LAPPED 40 BAR DIAMETERS OR A MINIMUM OF 300mm (12") AT SPLICES AND CORNERS, UNLESS

- 8. ALL REINFORCING BARS SHALL BE ACCURATELY PLACED AND ADEQUATELY SUPPORTED BY PRECAST CONCRETE, ADDITIONAL BARS, STIRRUPS, TIES OR APPROVED CHAIRS AGAINST DISPLACEMENT.
- OTHERWISE SHOWN ON SECTION OR TYPICAL DETAILS. LAP CONTINUOUS TOP BARS AT ENTRE BETWEEN SUPPORTS AND CONTINUOUS BOTTOM BARS AT SUPPORTS. AS REQUIRED, TERMINATE CONTINUOUS BARS AT NON CONTINUOUS ENDS WITH STANDARD
- 10. CONSTRUCTION JOINTS: SLAB CONSTRUCTION JOINTS MAY BE MADE ONLY AT APPROVE LOCATIONS SHOWN OR AS DIRECTED BY THE ENGINEER.
- 1. ALL CONCRETE ANCHORS TO BE HILTI HAS ROD HOT DIPPED GALVANIZED (DIAMETER A
- 2. ALL CONCRETE ANCHORS TO BE COMPLETE WITH HOT DIPPED GALVANIZED FLAT WASHERS, NUTS, LOCK NUTS, ETC. AS SPECIFIED ON THE DRAWINGS.

1. CEMENTITIOUS GROUT FOR ROCK DOWELS TO BE SIKAGROUT 212.

3. ALL EPOXY ADHESIVE SHALL BE HILTI HIT-HY 200/HIT ICE.

4. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS.

CEMENTITIOUS GROUT:

CONCRETE ANCHORS:

- 2. CEMENTITIOUS GROUT UNDER BASE PLATES TO BE SIKAGROUT 212.
- **ROCK DOWELS:**
- 1. ROCK DOWELS TO BE: 25M - POWER HOUSE STABILIZATION 20M - RETAINING WALL
- ALL DOWELS TO CONFORM TO CSA G30.18 M92, Fy=400 MPa (GRADE 400) 2. ALL DRILLED HOLES FOR ROCK DOWELS SHALL BE 25mm GREATER THAN THE DOWEL

• 15M - SPILLWAY WALL, DAM RAISING, DAN EXTENSION AND RETAINING WALL #2

3/05/2025 6 ISSUED FOR TENDER ISSUED FOR APPROVALS ISSUED FOR FINAL REVIEW 8/05/2024 3 ISSUED FOR CLIENT REVIEW ISSUED FOR CLIENT REVIEW 5/04/2024 2 8/03/2024 ISSUED FOR CLIENT REVIEW 0/09/2022 0 ISSUED FOR CLIENT REVIEW DATE REV. REVISION

1 Bailey Street, P.O. Box 129 Port Carling, Ontario



LITTLE BURGESS **GENERATING STATION REHAB**

PROJECT No.

GENERAL NOTES

DR	EG	EG	EG
DRAWN	DESIGNED	CHECKED	APPROVE
AS SI	HOWN	MAR. 2	7, 2024
SCA	ALE	D	ATE
23-123	6 6	5	G1

REVISION

DRAWING

R-10 RIP RAP -75mm TOPSOIL (400mm THICK MIN.) AND HYDROSEED

RIP RAP DRAINAGE SWALE X-SECTION

SCALE 1:50

ENGINEER'S SEAL:

Township of Muskoka Lakes

APPENDIX B

Natural Heritage Review and Communications with Regulators



1942 Regent Street Unit L Sudbury, ON 3E 5V5 T. 705 671.2295 F. 705 671.9477 TF. 800 810.1937 sudbury@Tulloch.ca

WWW.Tulloch.ca

03 February 2020

Karine Beriault | Management Biologist 7 Bay St, Parry Sound, ON, P2A 1S4 Tel: 705-773-4240

Dear Karine Beriault,

Re: Natural Heritage Background Information Request: A Class Environmental Assessment on Burgess Dam for the Township of Muskoka Lakes, Bala, Ontario, Canada.

Tulloch Environmental, a division of Tulloch Engineering Inc. (Tulloch), has been retained by the Corporation of the Township of Muskoka Lakes to conduct a review of Natural Heritage Background Information available for an existing Dam across the north channel of the outlet from Lake Muskoka into the Moon River in Bala, Ontario. This review is in support of the proposed rehabilitation and/or replacement of the Burgess 1 Dam and Generating Station.

The focus of this review is located at an existing Dam, which can be accessed from River Street and Portage Street in the Village of Bala, ON. The facility consists of a 59m long concrete dam approximately 3m in height. A 16m long retaining wall connects to the north wall of the powerhouse and runs along River St. UTM Coordinates (NAD83) for the site are: 17T 609163 4985226. A map of the project location is provided in the attachments. The scope of this review includes the site and areas within 1000m.

Tulloch has reviewed information obtained from Land Information Ontario (LIO) regarding land uses and natural heritage features known (or believed) to occur within 1000m of the site. These data included sites of domestic, recreational, commercial and industrial land uses as well as known environmental sensitives (e.g. Significant Wildlife Habitat, nesting sites, fish spawning sites) and areas of enhanced protection (e.g. parks, conservation reserves, ANSI). A series of maps indicating LIO findings are provided in the attachments.

Tulloch has also reviewed natural heritage information provided by the Ministry of Natural Resources and Forestry via the Natural Heritage Information Centre (NHIC) Make-a-map, Crown Land Use Atlas and Fish ON-Line web applications. This information was supplemented with records obtained from authoritative atlases, including; the Atlas of the Breeding Birds of Ontario, Bat Conservation International and the Ontario Reptiles and Amphibians Atlas. A summary of notable information is provided below:

- Four (4) NHIC records of Species at risk were returned within 1000m of the study area.
 - Massasauga Great Lakes / St. Lawrence population (Threatened)
 - Rusty-patched Bumble Bee (Endangered)
 - o Blanding's Turtle (Threatened)
 - Eastern Wood-pewee (Special Concern)



- Five (5) NHIC records of locally rare species were returned within 1000m of the study area
 - o Redtop Panicgrass
 - o Cyrano Darner
 - Giant Lacewing
 - Ridged Yellow Flax
 - Sand Panicgrass
- Records of restricted species were returned within 1000m of the study area.
- Ten (10) ABBO records of species at Risk were returned within 1000m of the study area.
 - o Barn Swallow (OBBA 1985 & 2005)
 - o Bobolink (OBBA 1985)
 - o Canada Warbler (OBBA 1985 & 2005)
 - o Chimney Swift (OBBA 1985 & 2005)
 - o Common Nighthawk (OBBA 1985 & 2005)
 - o Eastern Meadowlark (OBBA 1985)
 - o Eastern Wood-pewee (OBBA 1985 & 2005)
 - o Golden-winged Warbler (OBBA 1985)
 - o Olive-sided Flycatcher (OBBA 1985 & 2005)
 - o Wood Thrush (OBBA 1985 & 2005)
- One Natural Area, BALA was identified from NHIC records
- Environment and Climate Change Canada considers the General Nesting Periods for this area (Nesting Zone C3) to be 8 April to 28 August for Forests, 12 April to 28 August for open habitats and 8 April to 16 August for Wetlands.
- Lake Muskoka outlets to the Moon River through the Burgess Dam. The Moon River outlets to Georgian Bay approximately 40km downstream.
 - Lake Muskoka is 120.4 ha with a mean depth of 15m and a max depth of 66m. The
 thermal regime is unknown but is assumed to be cool-cold. Lake Trout stocking has
 occurred every year since 2013, and once in 2010. Known fish species in the lake
 include:
 - Black Crappie
 - Brown Bullhead
 - Burbot
 - Cisco
 - Lake Trout
 - Lake Whitefish
 - Largemouth Bass
 - Northern Pike
 - Pumpkinseed
 - Rainbow Smelt
 - Rock Bass

Burgess Dam 2



- Smallmouth Bass
- Walleye
- White Sucker
- Yellow Perch
- Moon River thermal regime is cool-water. Fishing is restricted at Freeman Twp. Lots 33, 34, 35, 36 in Concessions VIII, IX, and X. No fishing from Apr 1 Fri before the 3rd sat in May. Fish species are unknown; however, online fishing atlases suggest Muskie, Pike, Walleye and Bass are all present in the River.

Tulloch is requesting the following information and guidance from the OMNRF:

- A SAR list for the district.
- The identification of the Restricted Species (proof of medium sensitivity data training can be provided).
- Terrestrial data pertaining to the site and areas within 1000m, such as:
 - o Records of provincially tracked species associate with the planning areas.
 - Known Significant Wildlife Habitat and other areas of critical habitat associate with the planning areas.
 - The General Nesting Periods for the area (if different from that recommended by Environment and Climate Change Canada, above)
 - o Other terrestrial timing windows and restrictions
- Fishery data for water bodies adjacent to the project area including:
 - o Known fish community species
 - o Thermal regimes (if different than above)
 - Areas of known critical habitat (spawning, etc.)
 - o Aquatic species at risk (records, local knowledge)
 - o Barriers to passage
- OMNRF fishery management information:
 - o In-water work timing window
 - Areas of concern (e.g. known sources of sediment and erosion, sources of pollution)
 - o Fishery management objectives (e.g. rehabilitation or protection goals, etc.)
 - o Known commercial fishing licenses (i.e. commercial baitfish licenses) in the area
- Adjacent areas of protection not listed above (ANSI, Parks, Conservation Reserves, etc.)

Burgess Dam 3



If you have any questions or require additional information, please do not hesitate to contact the undersigned at (705) 522-6303.

Thank you for your time and assistance.

Sincerely,

Emelia Myles-Gonzalez

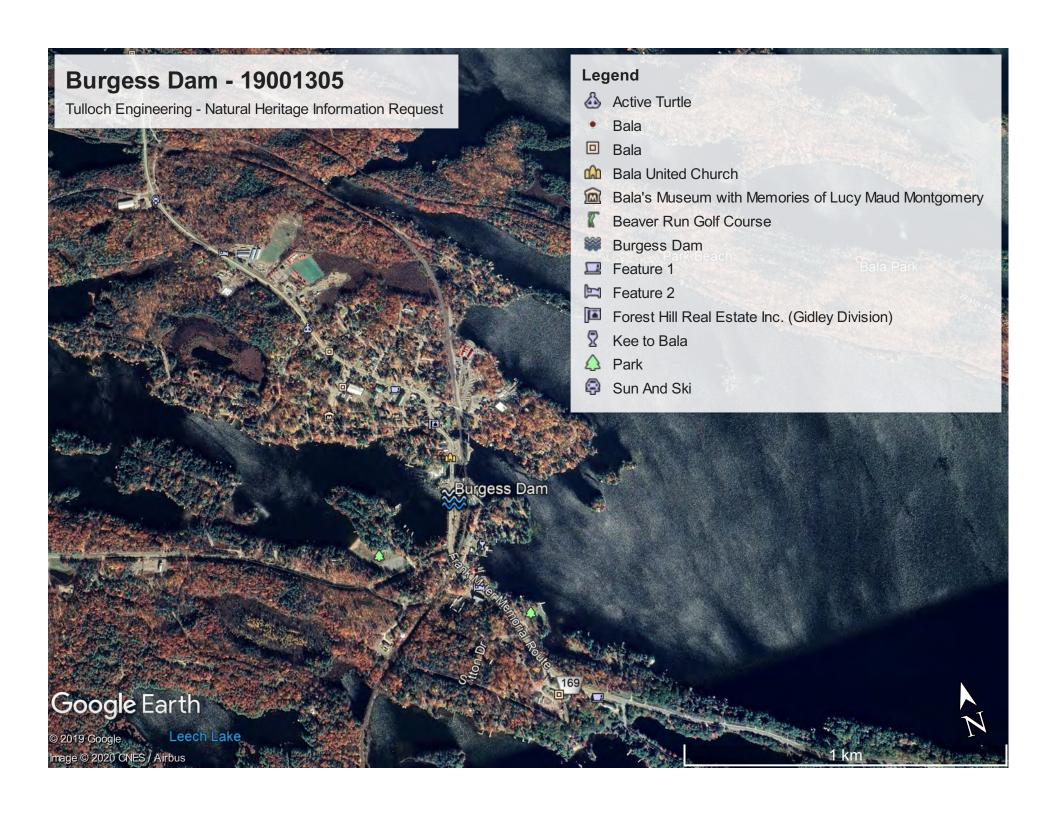
Aquatic Ecologist

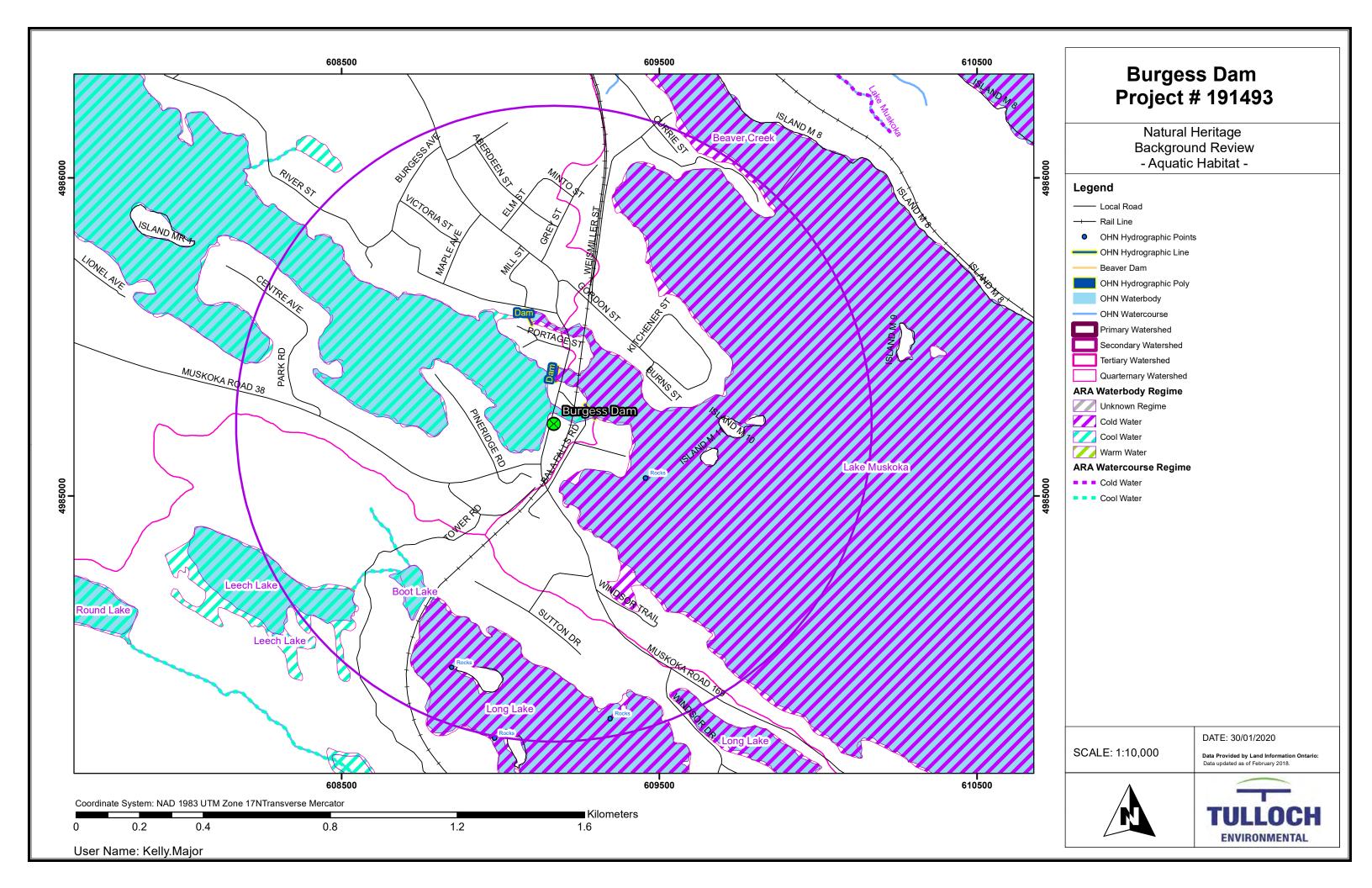
Tulloch Environmental, a division of Tulloch Engineering emelia.myles-gonzalez@tulloch.ca

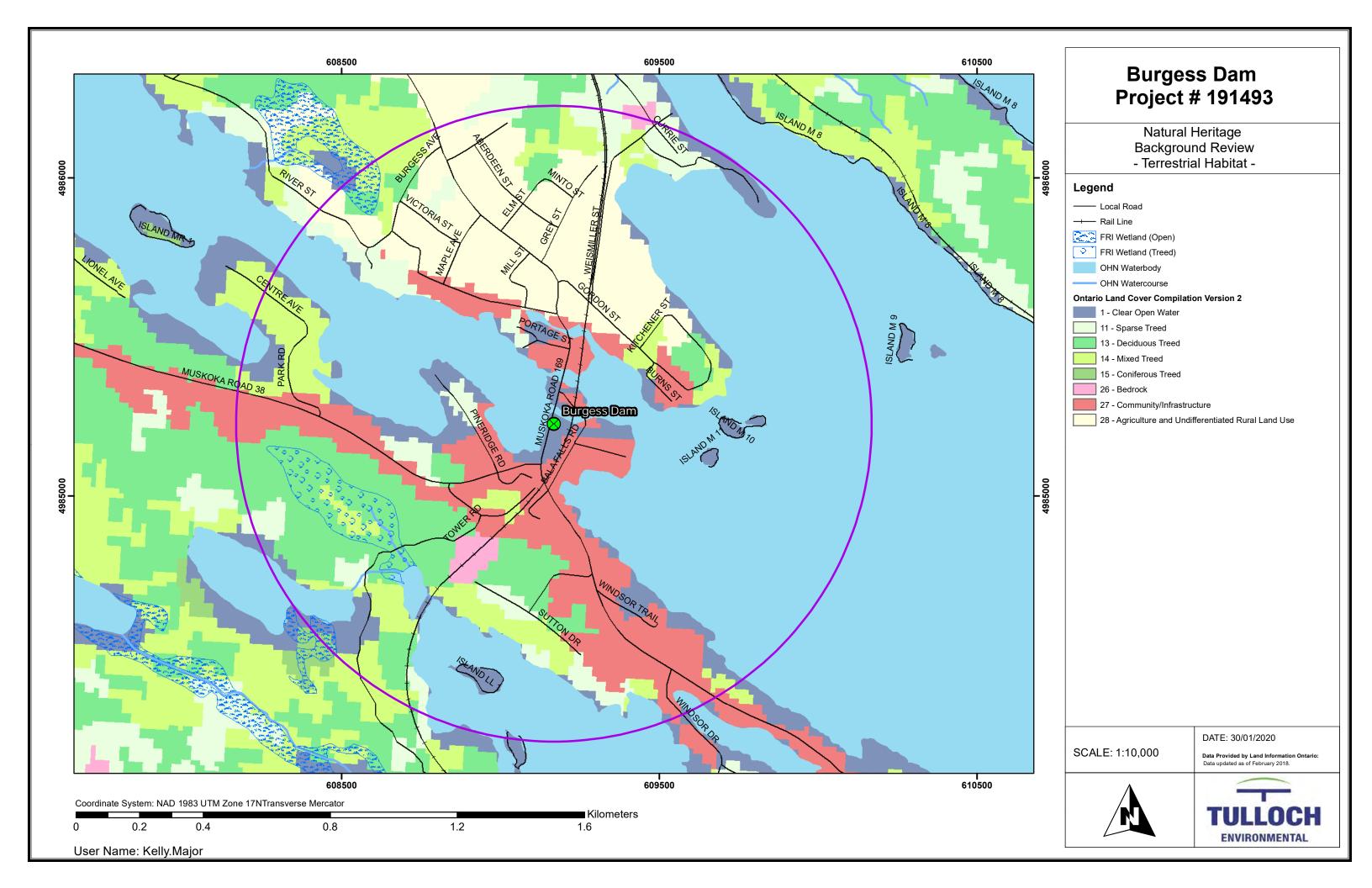
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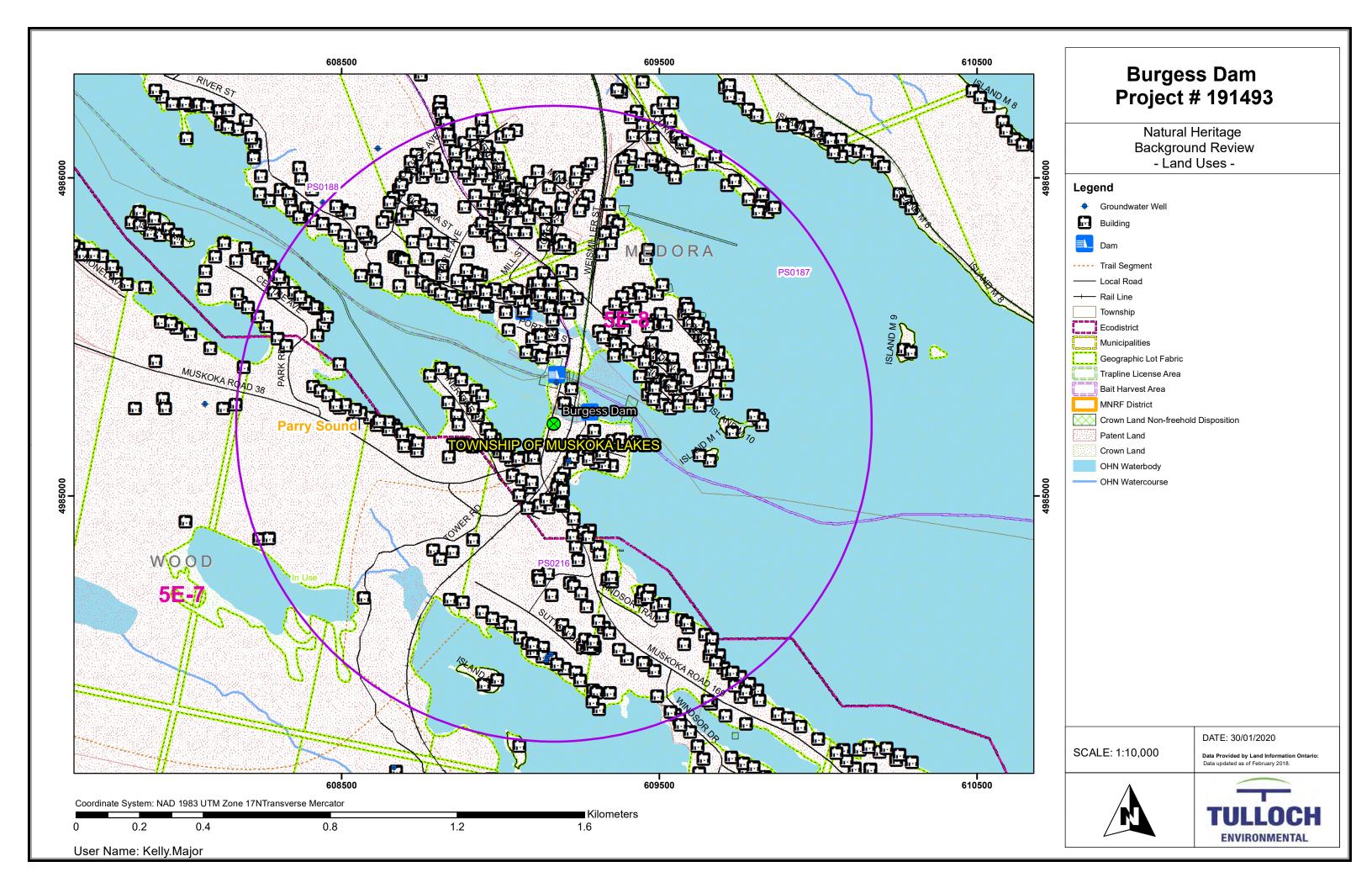
Burgess Dam 4

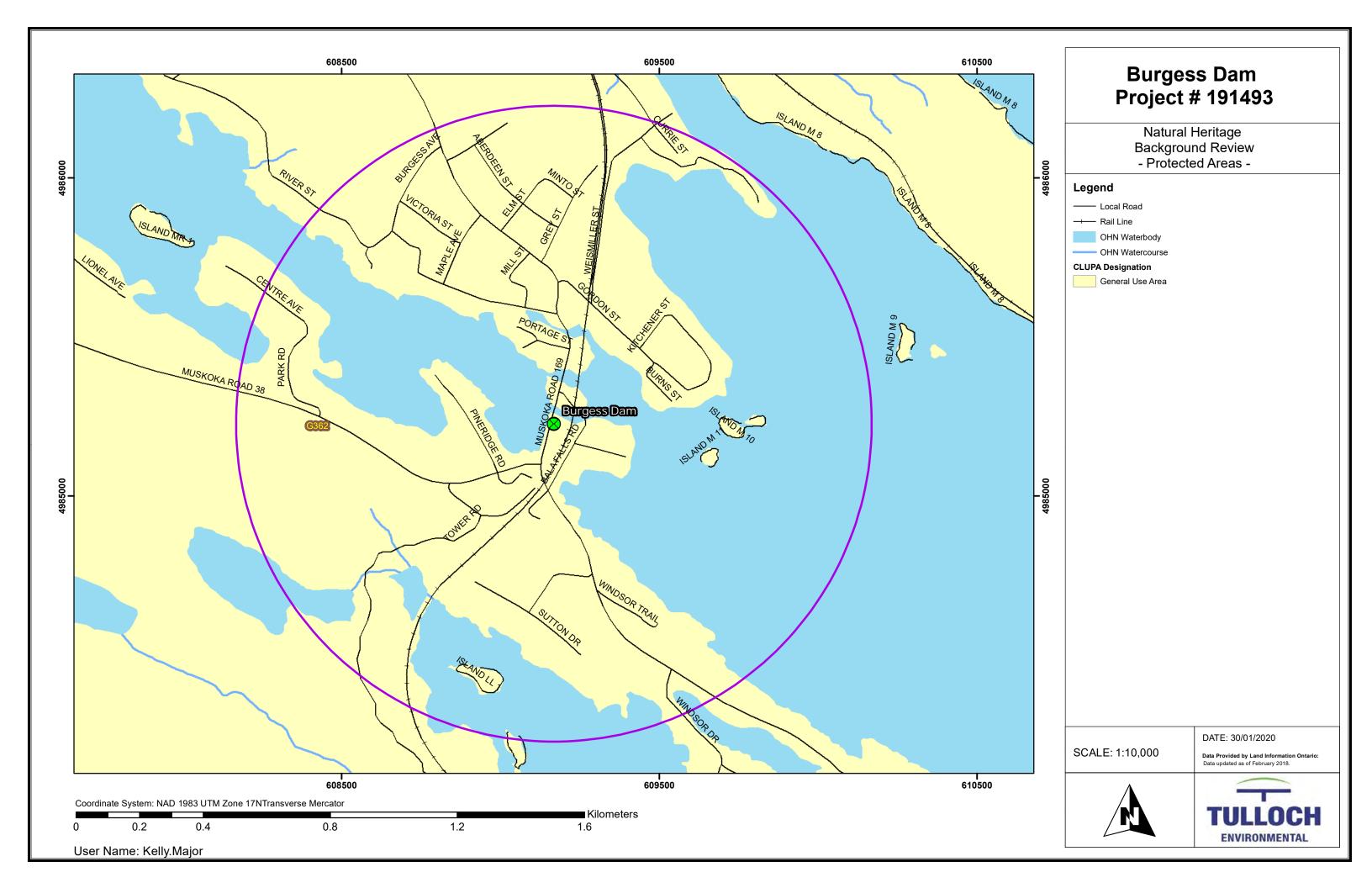


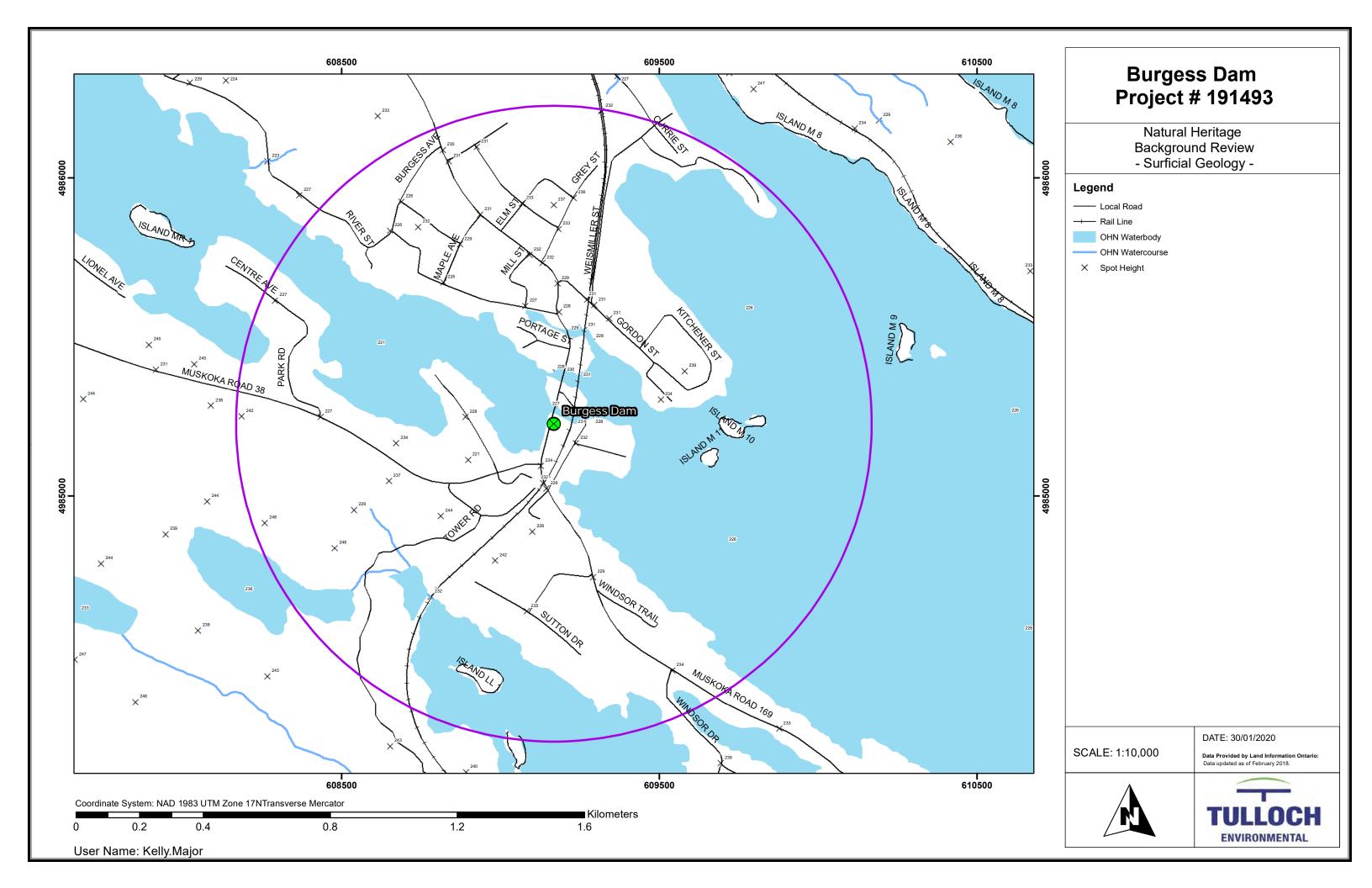












Emelia Myles-Gonzalez

From: Emelia Myles-Gonzalez

Sent: February 12, 2020 9:50 AM

To: NHI ParrySound (MNRF)

Subject: RE: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

Thank you Jake.

I will review your information and let you know if I have any questions.

Regards,

Emelia Myles-Gonzalez

Aquatic Biologist



Tel: 705 522 6303 Cell: 613 985 6961

TULLOCH Engineering Inc 1942 Regent St, Sudbury, ON P3E 5V5

emelia.myles-gonzalez@TULLOCH.ca | TULLOCH.ca

From: NHI ParrySound (MNRF) < NHI.ParrySound@ontario.ca>

Sent: February 12, 2020 9:48 AM

To: Emelia Myles-Gonzalez <emelia.myles-gonzalez@tulloch.ca>

Subject: RE: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

Hi Emelia.

Please see information below:

All SAR information is to be request from MOE.

The location of the Burgess dam is incorrectly marked on the maps.

You seem to be relying on fish online rather than direct LIO data which is more complete.

Lake Muskoka is ~12040 ha not 120.4 and is considered coldwater.

Lake Muskoka fact sheet is attached – is somewhat out of date but may have some useful info.

Bala Reach. Fact sheet attached and data is in LIO (ARA summary), not fish online.

There is a walleye spawning area - mapped as an area that includes the Burgess tailrace all the way over to the main Bala Falls. Other typical species that spawn in that type of habitat can be expected as well, such as smelt and suckers. The Burgess plant has normally run as a run-of river plant and there has not been any flow requirements in the water management plan. Work that requires plant

shutdown (shutting off of flow through the dam/plant) should be scheduled to avoid the spring spawning period (April 1 – June 1). Same recommendation applies for work in water.

There is also a potential spawning area mapped on the upstream, Lake Muskoka, side between Burgess and North Bala dam. It must have been mapped based on habitat as it does not seem to be a great location.

Margined madtom may be present as they do occur in Lake Muskoka and they like that rocky kind of habitat that is in the tailrace.

The EA documents for the Bala Falls project which may have some material of interest are on the Swift River web site (balafalls.ca).

If there are any other questions please give me a call.

Jake Rouse

Jeremy Rouse
Management Biologist
Parry Sound District
Ministry of Natural Resources and Forestry

Office: 705-773-4205



From: Emelia Myles-Gonzalez <emelia.myles-gonzalez@tulloch.ca>

Sent: Monday, February 3, 2020 2:33 PM

To: NHI ParrySound (MNRF) < NHI.ParrySound@ontario.ca >

Subject: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello,

On behalf of Tulloch Environmental, a branch of Tulloch Engineering, I am seeking any Natural Heritage Information you may have for the proposed rehabilitation of the Burgess Dam and Generating Station in Bala, Ontario. All information gathered from online resources is summarized in the attachment, as well as a site map and maps showing Aquatic Features, Terrestrial Features, Protected Areas and Land-use Features.

A list of the requested information is outlined in the letter attached above. We understand that MNRF does not provide information on SAR, but would appreciate any additional information on tracked or locally rare species. A restricted

species was retrieved in our background review. If you require proof of Sensitivity training for this information please let me know.

Thank you for any information you can provide. I look forward to hearing back from you,

Emelia Myles-Gonzalez

Aquatic Biologist



Tel: 705 522 6303 Cell: 613 985 6961

TULLOCH Engineering Inc 1942 Regent St, Sudbury, ON P3E 5V5

emelia.myles-gonzalez@TULLOCH.ca | TULLOCH.ca



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Lake Fact Sheet - Parry Sound District

Lake Muskoka

Location	
Official Name:Lake Muskoka	Local Names:
County/District:Muskoka	Geographic Twp:Muskoka
Municipality:Township of Muskoka Lakes	MNR Admin. Area: Bracebridge
Lat./Long:45.054 N -79.475 W	UTM (NAD83):17 620081 4990037
Topographic Map (1:50,000):31E03	Drainage Basin: Muskoka River

Physical Features		
Surface Area (ha):12,100	Maximum Depth (m):73	Mean Depth (m):18
Elevation (m asl):225	Perimeter (km):269	Island Shoreline (km): 209
Volume (10 ⁴ m ^{3:}):183,000	Watershed (km²):4,600 (excludes area of lake)	Water Clarity:

Land Use and Development		
Crown Land (%):	0 Provincial Parks:	
Shoreline Development:	Intense; urban, shoreline residential, commercial,	
Access:	Public launches: Bracebridge - George Road, Beaumont Drive; Gravenhurst – Muskoka Wharf; Bala; Milford Bay and others; private access through several marinas.	
Water Level Management:	Regulated; water level is controlled by MNR-owned and operated dams at Bala. Flows and levels are governed by the Muskoka River Water Management Plan.	

Major Fish Species:	brook trout (E), lake trout (S), lake whitefish (R), Cisco (R), rainbow smelt (I), northern
Major Fior oposios:	
	pike, burbot, smallmouth bass (I?), largemouth bass (I?), walleye (I?),

Other Fish Species: longnose sucker, white sucker, lake chub, golden shiner, common shiner, blacknose

shiner, spottail shiner, spotfin shiner (I), bluntnose minnow, black bullhead (?), brown bullhead, margined madtom (I?), trout-perch, rock bass (I), pumpkinseed, black crappie (I 1989), yellow perch, lowa darter, logperch, cisco, Slimy Sculpin,

Spoonhead Sculpin

Fish Species

Lake Fact Sheet - Parry Sound District

Lake Muskoka

Other Species: spiny water flea (I 1989), freshwater jellyfish (I 2002)

Notes: E: extirpated, I: introduced – intentional or accidental, O: occasional, R: remnant, S: currently stocked, ?: status uncertain, 2009: year of first record or introduction if known, blank: presumed native

Fisheries Management

Designation for Lake Trout Management: designated; natural reproduction; not at development capacity

Fishing Regulation

Exceptions:

No lake-specific exceptions (2009);

Muskoka River; Bracebridge Falls and South Falls to Lake Muskoka: Fish sanctuary -

no fishing from Apr. 1 - June 15 (2009)

Current Stocking: Lake trout – supplemental, some natural reproduction occurs, stocked every year

with yearlings.

Historic Stocking (last year stocked):

brown trout (1933), smallmouth bass (1949), walleye (1989), rainbow trout (1983),

brook trout (1961), splake (1961)

Contaminants: Species tested: lake trout, northern pike, walleye, smallmouth bass, yellow perch,

rock bass, brown bullhead, rainbow smelt

Assessment: Completed Projects:

1988 contaminant sampling

1989 benthic invertebrate sampling

1989-94 zooplankton sampling

1990 critical habitat mapping

1990-91 vegetation mapping 1992-93 winter creel survey

1993 summer creel survey

1993-94 substrate mapping 1993-94 contaminant sampling

1993-95 small fish survey

1995 development mapping

1995 cisco study

1995-96 spring littoral index netting

1998 summer creel survey

1998 lake trout spawning observations

1998 contaminant sampling 1998-99 spring littoral index netting

2001 near shore community index netting

2003 Summer Profundal Index Netting (targets lake trout) (SPIN)

2005 SPIN

2002-06 Fall Walleye Index Netting

2007 Broad-scale Monitoring (BsM)- large mesh (generalized fish community

assessment

2008 BsM – small mesh 2010 BsM – large mesh

2014 Broad-scale Monitoring (large and small mesh netting)

Annual ice hut count

ontario.ca/mnr

Lake Fact Sheet – Parry Sound District Lake Muskoka

ontario.ca/mnr

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Parry Sound Area office: (705) 746-4201 Bracebridge Area office: (705) 645-8747

Lake Fact Sheet – Parry Sound District Lake Muskoka

Synopsis

Lake Muskoka is the largest inland lake in the District of Muskoka and MNR's Parry Sound District. It supports a large diverse sport fishery. The lake is highly developed and has been greatly perturbed by water management, contaminants, shoreline development and species introductions.

Lake trout were the primary native sport fish species. The population went into serious decline in the 1970's at least partly due to reproductive failure from DDT contamination. The population has not fully recovered; supplemental stocking still occurs. Lake whitefish and lake herring (cisco) populations have been severely depressed as well and are currently present in low numbers, but believed to be increasing. The walleye population crashed as well. Rehabilitation efforts including water level control, habitat improvement, harvest regulation and stocking have largely restored the population.

A disjunct population of margined madtom, a small, secretive member of the catfish family, occurs in Lake Muskoka. It is not known if the population is native or introduced. Margined madtoms are rare in Ontario and are listed as Data Deficient by the Committee on the Status of Species Endangered Wildlife in Canada (COSEWIC 2002).

Fish habitat features along the shoreline of Lake Muskoka have been mapped and provided to municipalities for use in municipal planning. Inquiries regarding the application of this information should be directed to the relevant municipality.

Lake Muskoka is a 'fixed' lake for the provincial Broad-scale Monitoring Program. Repeated sampling on a five year cycle is planned to monitor long-term trends in water quality, fish community and sport fish abundance in randomly selected lakes across the province.

2014 Broad-scale Monitoring

Lake Muskoka was sampled in 2014 as a "trend" lake for the Cycle 2 of the provincial Broad-scale monitoring program. Results will be reported through that program. Two species not previously documented were captured; Slimy Sculpin and Spoonhead Sculpin. Both species are thought to be native to the lake.

Updated: 2018

Refer to Lake Fact Sheet Interpretation document for explanation of content.

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Lake Fact Sheet – Parry Sound District

Bala Reach

Location	
Official Name:	Local Names:Bala Reach
County/District:Muskoka	Geographic Twp:Medora, Wood
Municipality:Township of Muskoka Lakes	MNR Admin. Area: Bracebridge
Lat./Long:	UTM (NAD83): 17 607002 4986580
Topographic Map (1:50,000):31E04	Drainage Basin: Moon River, Musquash River

Physical Features		
Surface Area (ha):307	Maximum Depth (m):	Mean Depth (m):
Elevation (m asl):225	Perimeter (km):	Island Shoreline (km):
Volume (10 ⁴ m ^{3:}):	Watershed (km²):4700 (excludes area of lake)	Water Clarity (m):

Land Use and Development	
Crown Land (%):10	Provincial Parks: None
Shoreline Development:	High
Access:	Public; boat launch and public docks in Bala
Water Level Management: . Regulated; Ontario Power Generation owned and operated dams at Swift Rapids Generating	
	Water level is managed in accordance with the Muskoka River Water Management Plan

Fish Species	
Major Fish Species:	Northern Pike, Smallmouth Bass, Largemouth Bass, Black Crappie (I 2004)), Walleye
	Brown Bullhead, Emerald Shiner, Hornyhead Chub (I), Logperch, Longnose DacePumpkinseed, Rock Bass, White Sucker, Yellow Perch, Rainbow Smelt (I 1980)
Other Species:	Spiny Water Flea

Notes: E: extirpated, I: introduced – intentional or accidental, O: occasional, R: remnant, S: currently stocked, ?: status uncertain, 2009: year of first record or introduction if known, blank: presumed native

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Parry Sound District office: (705) 746-4201 Bracebridge Area office: (705) 645-8747

Lake Fact Sheet – Parry Sound District Bala Reach

Fisheries Management		
Fisheries Management Zone:		15
Designation for Lake Trout Management:		ment: not designated
Fishing Regulation Exceptions		
Current Stocking:none		
Historic Stocking (last yea	ar stocked)	
Contaminants (species te	ested):	
Assessment:	Complete	d Projects:
	1980 2004 2017	Fish Community Survey (trap net and gill net) ESTN Trap Net Survey MOE Contaminant Sampling

Synopsis

Bala Reach is a lake-like section of the Moon River located between Bala and Swift Rapids. It has not had a complete inventory conducted but several fish community surveys have been done.

In the early 2000s, efforts were made by the local community, supported by MNRF, to rehabilitate the Walleye population. Like Lake Muskoka, upstream, the Walleye population had collapsed decades previously, probably due to a combination of water level fluctuations, introduced Rainbow Smelt and pesticide use. Habitat enhancement, stocking and possibly downstream movement of fish from the previously rehabilitated Lake Muskoka population resulted in successful re-establishment of a population and fishery.

Updated: 2018

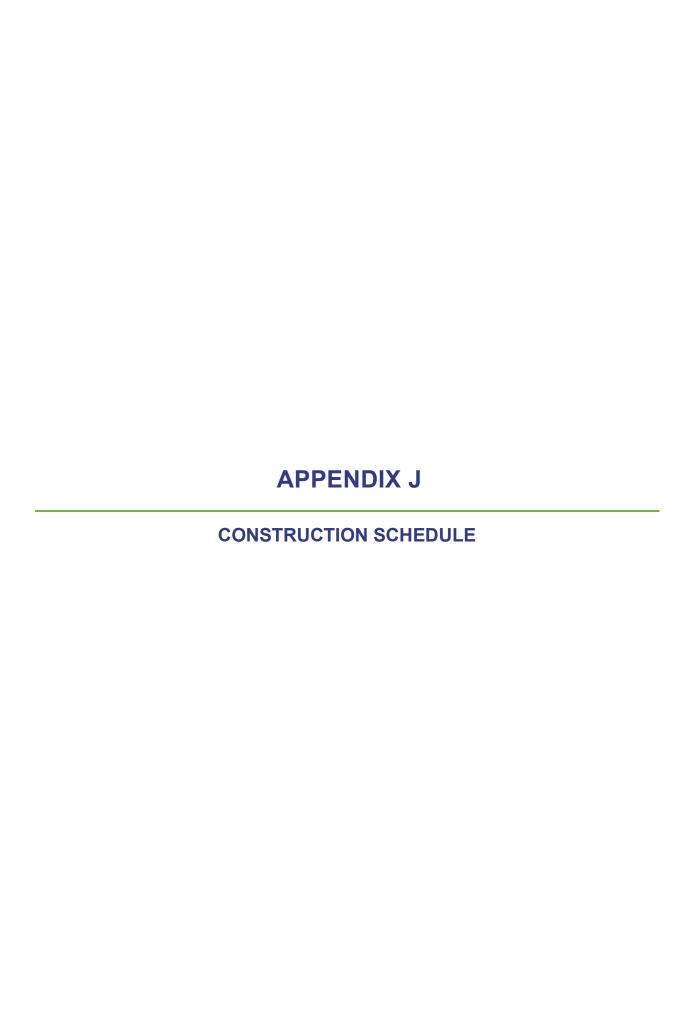
Refer to Lake Fact Background Information document for explanation of content.

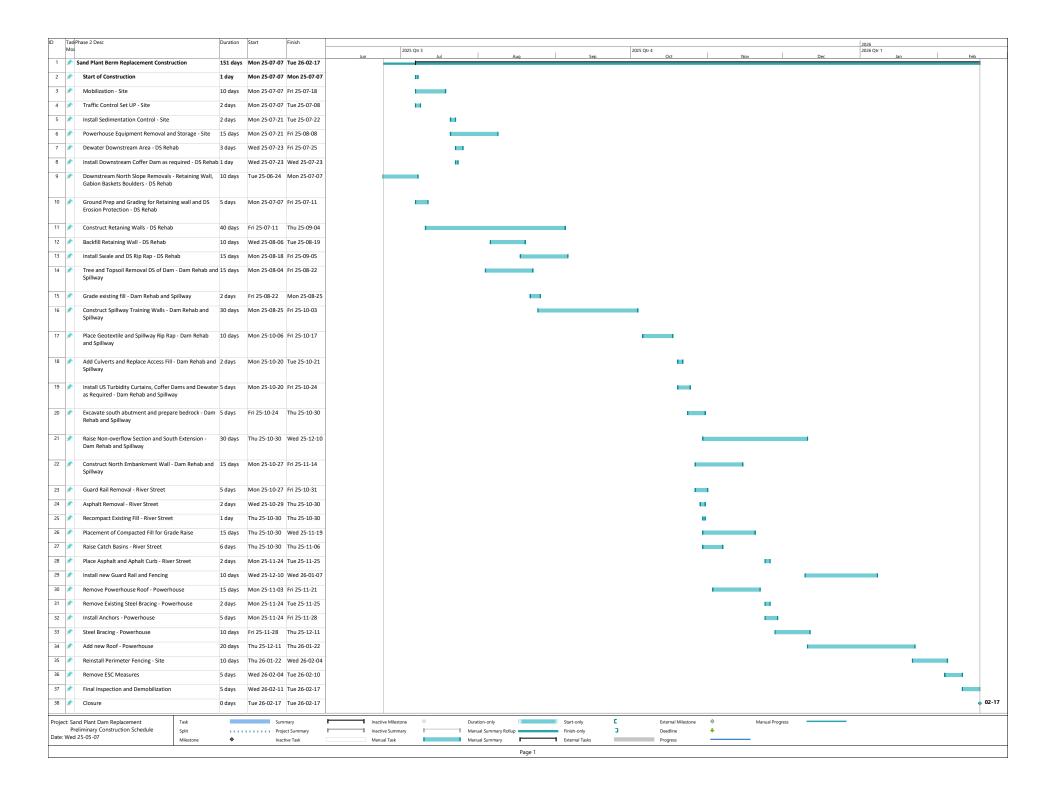
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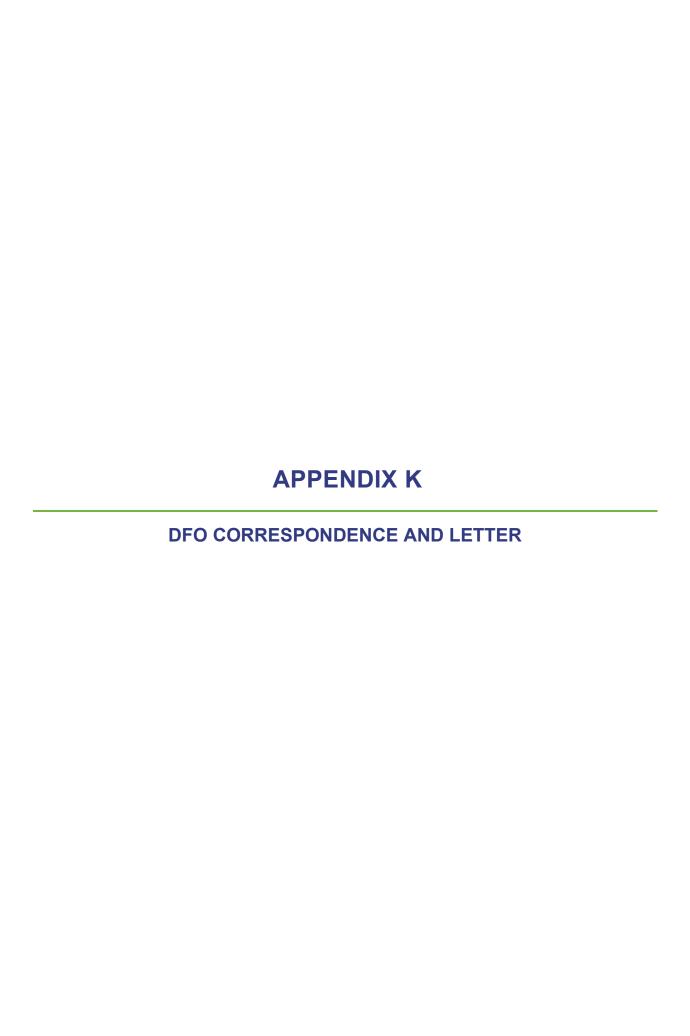
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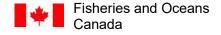












Pêches et Océans Canada

Ontario and Prairie Region Fish and Fish Habitat Protection Program 501 University Crescent Winnipeg, MB R3T 2N6 Région de l'Ontario et des Prairies Programme de protection du du poisson et de son habitat 501 croissant University Winnipeg (Manitoba) R3T 2N6

April 25, 2025

Our file Votre référence 24-HCAA-02352

Township of Muskoka Lakes Attn: Tim Sopkowe 1 Bailey Street PO Box 129 Port Carling, Ontario POB 110

Subject: Dam Repair, Moon River, Lake Muskoka, Township of Muskoka Lakes – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Tim Sopkowe:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on October 9, 2024. We understand that you propose to:

- Raise the existing upstream dam face to 226.50 M.A.S.L. and extend the dam on the upstream south shore.
- Install a concrete spillway lined with rip rap at the top and base of the spillway.
- Place a 43.5m x 0.60m wide embankment wall along the north shoreline.
- Place concrete retaining wall along the left and right banks downstream of the generating station.
- Place bank protection on the right downstream bank.
- Install a cofferdam to isolate the work site.

Our review considered the following information:

Burgess Dam Rehabilitation - DFO RfR - 09Sep24, pdf, 9/9/2024



- Correspondence with Emilia Myles-Gonzales, email, 11/11/2025 to 3/18/2025.
- Meeting with Tulloch engineers, Teams meeting, 2/13/2025.
- Meeting with MNR, Teams meeting, 2/19/2025.
- Correspondence with Erik Giles, email, 2/12/2025 to 3/17/2025.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*; and
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the Species at Risk Act; and
- the introduction of aquatic species into regions or bodies of water frequented by fish where they are not indigenous, which is prohibited under section 10 of the *Aquatic Invasive Species Regulations*.

The aforementioned outcomes are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures listed below:

- Carry out the project in accordance with timing windows.
 - Limit the duration of in-water works undertakings and activities.
- Capture fish trapped within an isolated or enclosed area and relocate them to the same watercourse or water body.
 - o Dewater gradually to reduce the potential for stranding fish.
 - Capture and relocate any fish as per applicable permits.
- Screen intake pipes during all phases of the project.
 - Use interim code of practice: <u>End-of-pipe fish protection screens for</u> small water intakes in freshwater.
- Avoid obstructing or interfering with the movement and migration of fish.
- Maintain hydrological conditions (i.e., flow) for bypass channels during all phases of the project.
- Use existing trails, roads, access points of cut lines.
- Maintain a functioning vegetated riparian zone between the project site and the ordinary high water mark.
 - Limit vegetation removal, pruning and grubbing to the area required for accessing the project site.
 - Limit access to shorelines and banks or areas adjacent to the watercourse or water body.
 - Construct roads, access points and approaches perpendicular to the watercourse or water body.

- Use methods to reduce soil compaction (e.g., swamp mats, pads).
- o Reinstate stream banks and slopes of the affected riparian zone.
- Re-vegetate the affected riparian zone with native species suitable for the project site.
- Ensure that equipment and machinery are clean and free of aquatic invasive species prior to arriving on the project site.
- Limit disturbance of fish habitat features (e.g., aquatic plants, rocks, woody material) to the area required to carry out the project.
 - Operate machinery on land, from barges or on ice during all phases of the project.
 - Limit operation of vehicles and machinery to the area required to carry out the project.
- Maintain base flow and seasonal flow of water during all phases of the project.
- Restore the bed and banks, gradient and contour affected by the project.
- Avoid introducing sediment in the water, like silt, clay and sand.
- Manage sediment laden water flowing onto or through the site during all phases of the project.
 - o Install erosion and sediment controls prior to beginning the project.
 - Pump sediment laden water into a vegetated area or a filtration system (e.g., settling basin).
 - Release water gradually when suspended sediment has settled in the settling basin and water is clear.
 - o Conduct all operations in isolation of open or flowing water.
 - Follow interim in-water site isolation standard.
 - o Install a turbidity curtain.
 - o Install cofferdams, diversion channels, flumes and elevated pipes or pump arounds to work in the dry.
 - Develop and implement an erosion and sediment control plan for all phases of the project.
 - Regularly observe the watercourse or water body for signs of suspended sediment during all phases of the project and take corrective action when and where required.
 - Inspect the erosion and sediment controls regularly during all phases of the project.
 - Repair the sediment controls during all phases of the project.
 - Operate machinery on land in stable areas.
 - Use biodegradable materials for erosion and sediment controls whenever possible.
 - Remove all non-biodegradable erosion and sediment controls once the site has been stabilized.
 - Dispose of, and stabilize, all excavated material above the ordinary high water mark or top of bank of nearby watercourses or water bodies.
 - Use only clean materials.

- Keep the erosion and sediment controls in place until all disturbed ground has been stabilized and suspended sediments have settled.
- Develop a plan to prevent deleterious substances from entering a watercourse or water body.
 - o Maintain all machinery on site in a clean condition and free of fluid leaks.
 - Wash, refuel and service machinery in such a way as to prevent any deleterious substances from entering a watercourse or water body.
 - Store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering a watercourse or water body.
 - Plan activities near water such that materials (e.g., paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals) do not enter a watercourse or water body.
 - Ensure that building material used in a watercourse or water body has been handled and treated in a manner that prevents the release or leaching of deleterious substances into a watercourse or water body.
 - o Dispose of all waste materials on land in a designated area away from the ordinary high water mark of any watercourse or water body.
- Implement a response plan immediately in the event of a spill of a deleterious substance (including sediment).
 - o Stop all works, undertakings and activities.
 - o Report spill immediately when a deleterious substance enters a watercourse or water body.
 - o Contain water with deleterious substances.
 - o Clean-up and dispose of water contaminated with deleterious substances.
 - Use an emergency spill kit.
- Aquatic invasive species are introduced and spread through transporting water, sands and sediments and using contaminated construction equipment. To prevent the spread of aquatic invasive species during construction in aquatic environments:
 - Ensure that equipment and machinery are clean and free of aquatic invasive species prior to arriving on the project site.

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal is not likely to result in the contravention of the above mentioned prohibitions and requirements.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act*, the *Species at Risk Act* and the *Aquatic Invasive Species Regulations*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction

of fish habitat. Such notifications should be directed to (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html).

Please notify this office at least 10 days before starting any in-water works. Send your notification to the assessor (contact information below) and the DFO 10 notification mailbox: DFO.OP.10DayNotification-Notification10Jours.OP.MPO@dfo-mpo.gc.ca. We recommend that a copy of this letter be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

- 5 -

Please note that the advice provided in this letter will remain valid for a period of 1 years from the date of issuance. If you plan to execute your proposal after the expiry of this letter, we recommend that you contact the Program to ensure that the advice remains up-to-date and accurate. Furthermore, the validity of the advice is also subject to there being no change in the relevant aquatic environment, including any legal protection orders or designations, during the 1 year period.

If you have any questions with the content of this letter, please contact Dylan McKenzie at our Winnipeg office at 431-371-1870, or by email at Dylan.McKenzie@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Jeff Moyer Senior Biologist

Cc: Emelia Myles-Gonzalez

Erik Giles

Hol Mayer

Dylan McKenzie

Erik Giles

From: Erik Giles

 Sent:
 April 17, 2025 10:02 AM

 To:
 McKenzie, Dylan (DFO/MPO)

Cc: Emelia Myles-Gonzalez; George Liang

Subject: RE: [EXTERNAL] RE: Burgess Spillway Slide Deck

Attachments: Updated Spillway Calculation - Rip Rap Sizing and Flow Velocities.pdf; Updated Spillway

Drawings.pdf

Hi Dylan,

Please see attached for drawing with additional rip rap at the spillway outlet. Rip rap sizing will be the same throughout the spillway as a function of conservative design as well as to simplify things during construction. Attached you will find Sheet C2 which shows a plan view of the spillway with the added rip rap at the outlet as discussed, Cross-sections of the rip rap are shown in the following sheet C3.

I also have a PDF of updated hydraulic calculations attached as well. At the bottom of the calcs you will see the 2nd to last row that outlines spillway end rip rap chute calculations. Effectively with the rip rap in place the interstitial velocity of the water through the rock will be about 0.14 m/s per our calculations with the added rip rap which Is about a 94% dissipation in velocity form the 2.2 m/s going in at the top of the spillway entrance. As discussed, given the site constraints I think that's not to bad, and probably as good as it is going to get.

I believe this should give you the information you need for completing the permit. If you have any further questions feel free to reach out.

Thanks and have a great weekend,



Erik Giles, P.Eng. General Manager - Engineering Sr. Associate

Phone: 705-789-7851 ext 438 Mobile: 647-968-9894

Huntsville Office | www.TULLOCH.ca



From: McKenzie, Dylan (DFO/MPO) < Dylan.McKenzie@dfo-mpo.gc.ca>

Sent: April 14, 2025 8:55 AM

To: Erik Giles <erik.giles@tulloch.ca>

Subject: RE: [EXTERNAL] RE: Burgess Spillway Slide Deck

Hi Erik,

Sounds good. I appreciate the quick response.

Have a good day.

Dylan McKenzie
Fish Protection Program Biologist
Fisheries and Oceans Canada
Fish and Fish Habitat Protection Program
Dylan.McKenzie@dfo-mpo.gc.ca /Tel: 431 371-1870

Biologist du Programme de Protection des Poissons Pêches et Océans Canada Programme de la protection du poisson et de son habitat Dylan.McKenzie@dfo-mpo.gc.ca /Tel: 431 371-1870

From: Erik Giles < erik.giles@tulloch.ca>
Sent: Friday, April 11, 2025 3:19 PM

To: McKenzie, Dylan (DFO/MPO) < Dylan.McKenzie@dfo-mpo.gc.ca

Cc: Bill Tibble < bill.tibble@tulloch.ca >; George Liang < george.liang@tulloch.ca >; Emelia Myles-Gonzalez < emelia.myles-

gonzalez@tulloch.ca>

Subject: RE: [EXTERNAL] RE: Burgess Spillway Slide Deck

Hi Dylan,

I sent in revisions to our drafer earlier this week (I got a bit sidetracked with our LRIA permit with MNRF....apologies!) I should have an updated sketch for you next week.

Thanks!



Erik Giles, P.Eng. General Manager - Engineering Sr. Associate

Phone: 705-789-7851 ext 438 Mobile: 647-968-9894

Huntsville Office | www.TULLOCH.ca



From: McKenzie, Dylan (DFO/MPO) < Dylan.McKenzie@dfo-mpo.gc.ca>

Sent: April 11, 2025 2:21 PM

To: Erik Giles < erik.giles@tulloch.ca>

Cc: Bill Tibble <bill.tibble@tulloch.ca>; George Liang <george.liang@tulloch.ca>; Emelia Myles-Gonzalez <emelia.myles-

gonzalez@tulloch.ca>

Subject: [EXTERNAL] RE: Burgess Spillway Slide Deck

Hi Erik,

I am curious if you have had time to update the diagram with the additional rip rap and the expected velocities. If not, that's no problem, but I want to make sure we can complete and close the file soon.

Thank you,

Dylan McKenzie
Fish Protection Program Biologist
Fisheries and Oceans Canada
Fish and Fish Habitat Protection Program
Dylan.McKenzie@dfo-mpo.gc.ca /Tel: 431 371-1870

Biologist du Programme de Protection des Poissons Pêches et Océans Canada Programme de la protection du poisson et de son habitat Dylan.McKenzie@dfo-mpo.gc.ca /Tel: 431 371-1870

From: McKenzie, Dylan (DFO/MPO)
Sent: Monday, March 17, 2025 1:43 PM
To: Erik Giles <erik.giles@tulloch.ca>

Cc: Bill Tibble < bill.tibble@tulloch.ca >; George Liang < george.liang@tulloch.ca >; Emelia Myles-Gonzalez < emelia.myles-

gonzalez@tulloch.ca>

Subject: RE: Burgess Spillway Slide Deck

Hi Erik,

I hope you are doing well.

I received an update from senior management about the project. We will issue a Standard Mitigation and Avoidance Letter for the project if you agree to install some rip rap at the spillway's base. We discussed this during our meeting last month as a mitigation measure to lower the discharge velocity into the spawning shoal. Ideally, if you can get the discharge velocity as close to 1 m/s as possible (or lower), that velocity is at the upper limit for the preferred walleye spawning habitat. I believe you said the addition of rip rap wouldn't be a concern, but please let me know if anything has changed.

I will be writing the letter and making some adjustments to the reference material. Could you supply me with a drawing outlining the additional rip rap? It can be added to the attached drawing. It would be helpful if you could indicate the expected velocity as well.

Let me know if you have any questions or concerns. I will make sure I get the letter written and signed as soon as possible.

I appreciate your patience.

Dylan McKenzie
Fish Protection Program Biologist
Fisheries and Oceans Canada
Fish and Fish Habitat Protection Program

Dylan.McKenzie@dfo-mpo.gc.ca /Tel: 431 371-1870

Biologist du Programme de Protection des Poissons Pêches et Océans Canada Programme de la protection du poisson et de son habitat <u>Dylan.McKenzie@dfo-mpo.gc.ca</u> /Tel: 431 371-1870

From: Erik Giles < erik.giles@tulloch.ca>
Sent: Thursday, February 13, 2025 2:57 PM

To: McKenzie, Dylan (DFO/MPO) < Dylan.McKenzie@dfo-mpo.gc.ca>

Cc: Bill Tibble < bill.tibble@tulloch.ca >; George Liang < george.liang@tulloch.ca >; Emelia Myles-Gonzalez < emelia.myles-

gonzalez@tulloch.ca>

Subject: Burgess Spillway Slide Deck

You don't often get email from erik.giles@tulloch.ca. Learn why this is important

Hi Dylan,

Please see attached for slide deck, I also overlaid the approximate spillway alignment over some of the photos taken on site, I think this should give a pretty good idea of where the water will be flowing. In essence the flow will be south of the utility pole and discharge into the already fast moving water.

Let us know if you have any further questions, I'd be happy to walk any other folks on your end or with the MNRF through the rationale for the spillway.

Thanks,

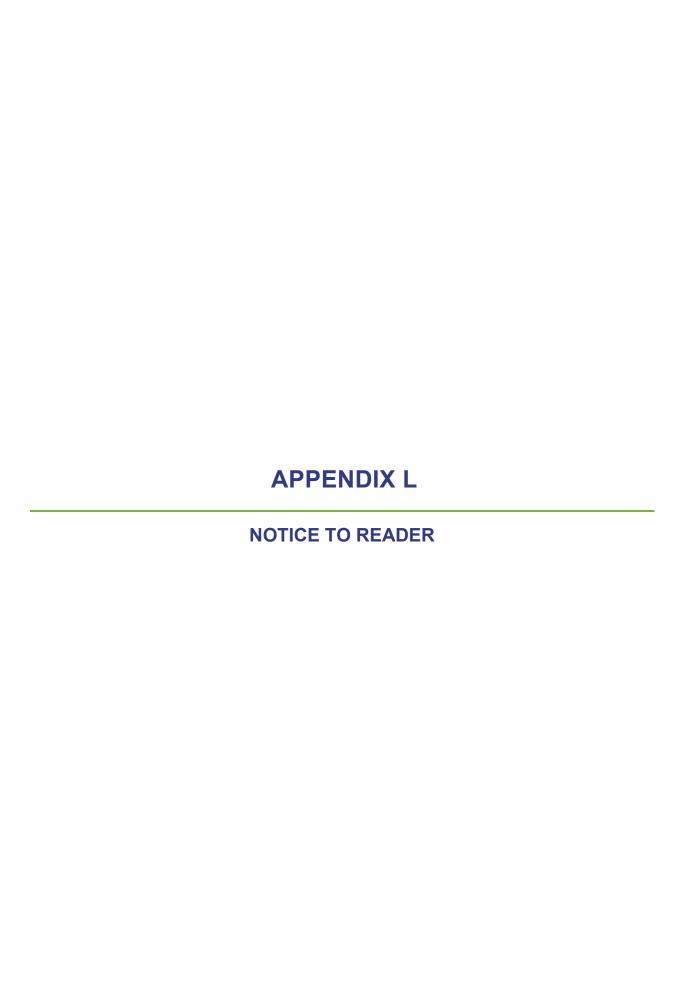


Erik Giles, P.Eng. Geotechnical Engineering Manager Sr. Associate

Phone: 705-789-7851 ext 438 Mobile: 647-968-9894

Huntsville Office | www.TULLOCH.ca





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