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EROSION AND SEDIMENT CONTROL PLAN

AT

ELEPHANT LAKE COTTAGES
HARCOURT, DYSART ET AL, ONTARIO

PREPARED FOR:

2463756 Ontario Inc.

December 19, 2024

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1. Executive Summary

King EPCM was retained by 95 Developments (Client) for geotechnical and environmental engineering services, including the creation of an Erosion and Sediment Control Plan (ESC), as part of cottage permit submissions. The property is located along the shoreline of Elephant Lake and Benoir Lake within parts or whole of Lots 32 and 33, Concession 12, Lots 27-31, Concession 11, Lots 27-31, Concession 10, Lots 27-33, Concession 9, and Lots 27-31, Concession 8, Harcourt Township, County of Haliburton, Municipality of Dysart et al. (Site). It is understood that the Erosion and Sediment Control Plan is for the sole purpose of the application and construction of new cottages. The ESC is to be submitted to the County of Haliburton, and Municipality of Dysart et al.

The Site property is approximately 2000 acres in size and is divided into two different Blocks for the purpose of development considerations. One of them is located east of Benoir Lake, behind the Benoir Lake Road (Block A); and the other is located north of the Elephant Lake (Block B), near the shoreline. It consists of several vacant lots abutting existing residential lots along the shore of Benoir Lake, and undeveloped lands along the shore of Elephant Lake. The study area is bound on the west by existing residential properties along Benoir Lake Road and Benoir Lake itself, on the south by Elephant Lake, on the east by vacant undeveloped lots, and on the north by Elephant Lake Road. The Site area consists of 63 proposed road-accessible lots and each lot will have a dwelling and a garage plus one public community boat launch area will develop. Presently the Site is forested with minimal development. See Appendix I for more details on the proposed development.

Appendix I also illustrates the proposed dwellings, garages, and access roads within the site property. Each dwelling was assumed to have a footprint of 164 m^2, consisting of a 114 m^2 dwelling and a 50 m^2 garage, with supporting structures such as asphalt driveway, swales, septic system, and landscaping structures. They were locally elevated on the south (Block B) and west (Block A) sides of a rolling sandy hill with more than 70 mm/hour permeability, and drains into the Elephant and Benoir Lakes, respectively. The site was located in a rural area surrounded by lakes, wetlands, and forest fields and it generally drains into lakes as shown in Figure 2.

The dwellings are proposed to blend into the lots with grading activities limited to the driveway, the building footprint, the garage, and any necessary stormwater management features such as drainage swales, detention basins, or infiltration galleries required for water quantity and quality treatment.

Based on ten (10) boreholes data, the shallow soil stratigraphy of Phase 1 shows topsoil 0 – 0.3m, gravelly sand, coarse gravel and dry at the top, fine wet sands at the bottom 0.3 – 4.6m, and Groundwater between 1.0 ~ 2.0m below grade, depending on local elevation. For Phase 2, topsoil was 0 – 0.15m, red sand 0.15 – 0.5m, gray, yellow sand 0.5-1.5m, and groundwater between 1.0 ~ 2.0m below grade, depending on local elevation. Presence of large boulders & rocks in upland areas

Both topsoil layers are categorized as having a low potential for erodibility, although the proposed significant cut & fill plan still requires careful management of all soil erosion to prevent excess soil from migrating into the wetlands, lakes, and road ditches. The soil layers conditions at the site are described in part 6 of this report.

During construction, the primary erosion and sediment control method is the use of silt fences, specifically around the construction area boundary for each individual lot. A clear-stone mud clean-out area is also required at the main site entrance (See Appendix IV for more details). Inspection and maintenance would be under the responsibility of the site General Contractor, which generally includes checking the silt fences for integrity and repairs. The site owner is responsible for record-keeping for all activities related to the ESC.

A row of perimeter silt fencing will be placed around each individual lot work area to eliminate the migration of sediment during construction. In addition, the drainage swales near access roads will require sediment fencing around the boundary of their construction. Additional controls may be necessary during construction to prevent the discharge of sediment-laden runoff from the Site. These additional controls may include but not be limited to, additional silt fence, coir log (coconut fibre) check dams, rip-rap channel linings and culverts inputs and outputs, geotextile erosion control matting, straw bale check dams, temporary vegetation, and filter media.

In summary, erosion potential is low for the site property, but careful management of soil handling practices is required for the cut & fill portion of the project.

2. Project Description

King EPCM (the Engineer) was retained by 95 Development (the Client) for geotechnical and environmental engineering services, including the creation of an Erosion and Sediment Control Plan (ESC). The property is located along the shoreline of Elephant Lake and Benoir Lake in the County of Haliburton, Municipality of Dysart et al. (Site). It is understood that the ESC is for the sole purpose of the application and construction of new cottages. This report may be submitted to the County of Haliburton and Municipality of Dysart et al.

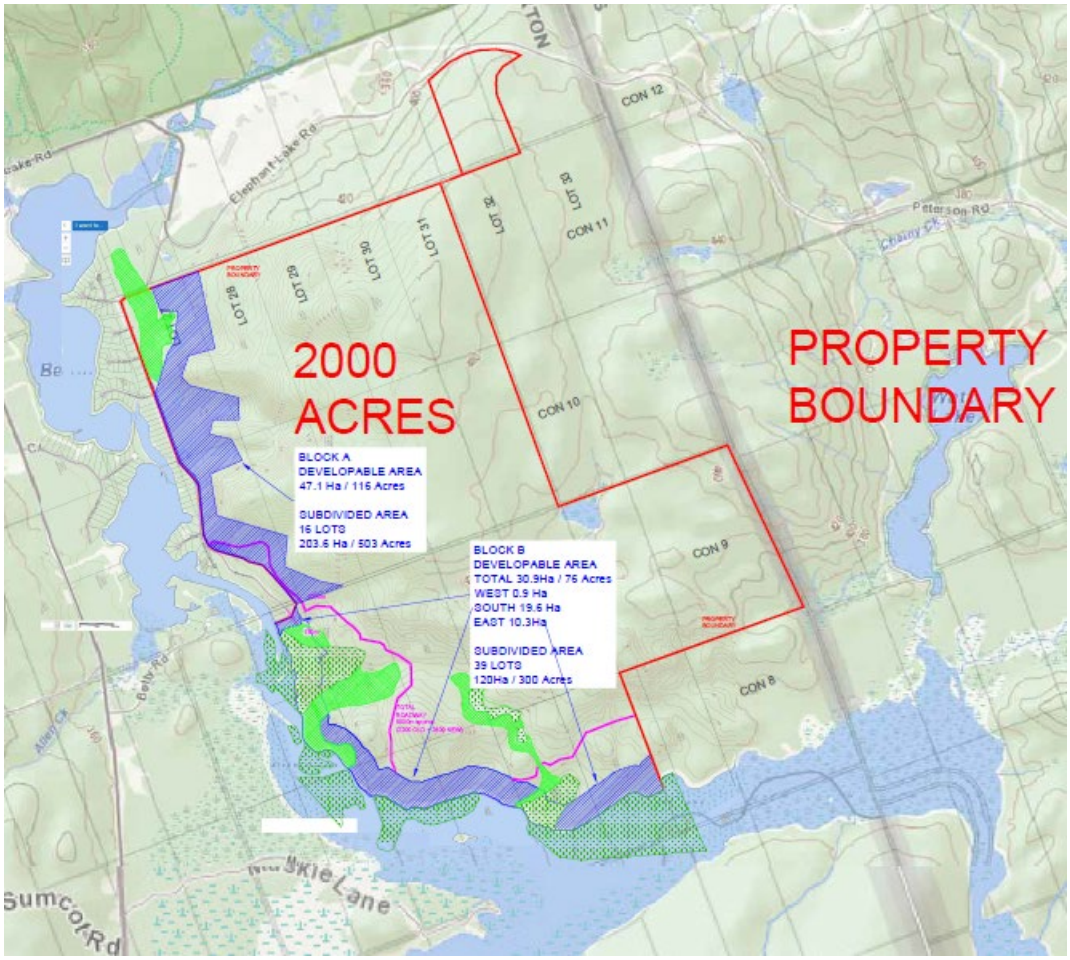


Figure 1 – Topographic map of site area, Haliburton, ON (Ontario MNRF)

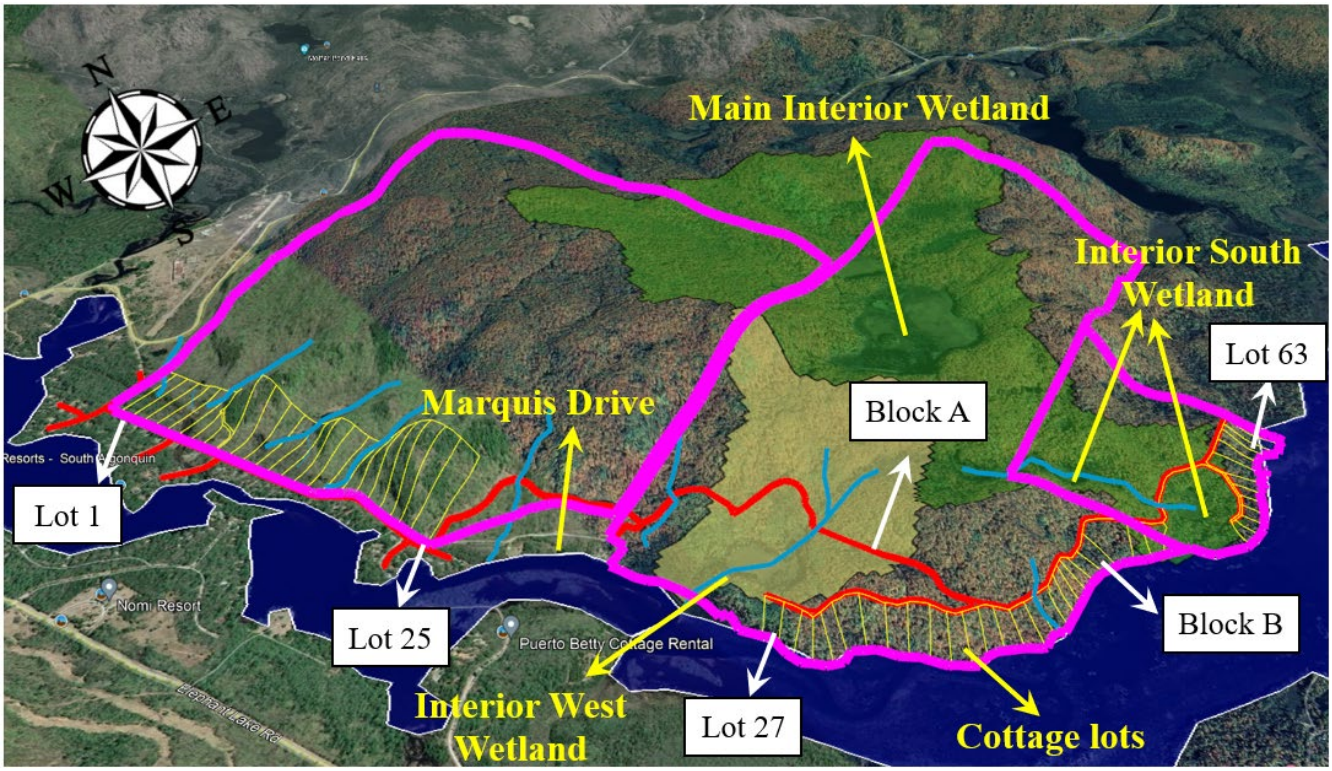


Figure 2 – Overview of interior watersheds, wetlands, roadways, and cottage lots

The proposed project is to construct new cottages along the shoreline (Phase 2, Lot 26 - 63) and behind Benoir Lake Road (Phase 1, Lot 1 - 25). Most of the existing site condition covered by dense forest remains unchanged and just a small area of each lot will be demolished including cutting down trees and covering the land with new cottages, garage, driveway, and access road, with site property post-development Total Impervious Surface Area (TIMP) = 4.1 Ha / 0.5%, which is negligible on reducing infiltration or increasing runoff.

Contact info of the property owner and applicant is:

Mr. David Sun, project manager

David.s@95development.com

Tel: 416-666-7747

3. Condition of Existing Site

The existing site is located on the west and south side of a rolling hill which considered as graded west and south between 2 – 10% (The slope of the section under development is about 2-5% towards the lakes and the slope of the other lot parts towards the hill is up to 10% steeper), with a total area of 2000 Acres. The subject property consists of several vacant lots abutting existing residential lots along the shore of Benoir Lake, and undeveloped lands along the shore of Elephant Lake.

The project site can be considered as two separate blocks: the western sloped section along Benoir Lake Rd. (Phase 1 with 25 lots), and southern waterfront section along the shore of Elephant Lake (Phase 2 with 38 lots). The Phase 1 generally drains from east to west into Benoir Lake, but Phase 2 drains from north to south into Elephant Lake. Both lakes were created by the Ontario Department of Public Works and the Ontario Hydro Electric Power Commission in 1931 at the effluence of the York River from Baptiste Lake. These lakes are located northwest of Bancroft and are part of a three-lake chain that includes Baptiste Lake. The York River flows from the southern extension of Algonquin Provincial Park to the Madawaska River. It spans out into Elephant, Benoir, and Baptiste Lakes and passes through Bancroft. Benoir Lake and Elephant Lake have surface areas of 92.3 and 884.6 hectares, respectively. The current pre-development condition indicates that there is no impermeable surface on the site.

4. Condition of Existing Receiving Water

Based on hydrological modeling using OFAT (Ontario Flow Assessment Tool), the Site was delineated into two main sub-catchments as shown in Figure 2. Two main creeks were overflowing from the main interior wetland within the Site property. A road is proposed along the eastern edge of the Site, which is intended to provide access to the proposed dwellings. Based on the topography, surface runoff overflows from the interior wetland mostly flows into Elephant Lake. The site is surrounded by Benoir Lake in the west and Elephant Lake in the south and all rainwater runoff is captured through forest cover and gradually enters them.

The existing roadside ditch draining east and west of the site has a surveyed grade of 1.0% or lower and is heavily colonized by sediment and semi-aquatic vegetation such as cattails and reeds. Although all possible action will be taken to prevent suspended solids and stormwater runoff erosion, potential suspended solids and runoff would be immediately captured and filtered by the semi-aquatic vegetation.

5. Adjacent Areas and Features

The site is located in a low-density rural estate area, adjacent to primary water sources with accessible shorelines. Local natural heritage features include wetlands, surficial streams, and forested lots:

- North –Estuary of the York River to Benoir Lake, rolling hills with ecologically significant forest and a closed garbage landfill
- East – ecologically significant forest and vacant undeveloped lots containing small wetlands
- South – Elephant Lake
- West – Benoir Lake Road and Benoir Lake itself contain residential dwellings.

6. Soils

Based on ten geotechnical borehole data performed by the Engineer in November 2021, the shallow soil stratigraphies for Block A and Block B show:

Phase 1: Lots 1 – 25

- 0 – 0.3 topsoil
- 0.3 – 4.6m gravelly sand, coarse gravel and dry at top, fine wet sands at bottom
- Groundwater between 1.0 ~ 2.0m below grade, depending on local elevation

Phase 2: Lots 26 – 63

- 0 – 0.15 topsoil
- 0.15 – 0.5m red sand
- 0.5 – 1.5m gray, yellow sand
- Groundwater between 1.0 ~ 2.0m below grade, depending on local elevation
- Presence of large boulders & rocks in upland areas

The results show that there is sandy soil in the upper layer of both Blocks A and B. Based on Table A1: Hierarchy of Soil Erodibility (GGHA CA, 2006), the top layer of sand is ranked as "low" for soil erodibility. On the other hand, the site property is between 5.0 – 10.0% grade, but most of the construction operations are concentrated at the end of the lots where the ground slopes mildly to less than 1-2% and this is generally considered as shallowly graded and does not contribute to an increase to soil erodibility.

Table A1: Hierarchy of Soil Erodibility

Soil Type	Erodibility Classification	Soil Erodibility Rating
Silt	Most	High
Silt Loam		High
Loam		High
Silty Sand		High
Sandy Loam		Medium
Silty Clay Loam		Medium
Sany Clay Loam		Medium
Silty Clay		Medium
Sandy Clay		Low
Clay		Low
Heavy Clay		Low
Loamy Sand		Low
Sand		Low
Poorly Graded Gravel		Low
Well Graded Gravel	Least	Low

7. Construction Phasing & Scheduling

The project can be separated into four (4) separate phases. The specific scheduling is currently started by road construction within the forest area, as the project is undergoing building permit approval, and the estimated work schedule is in the next months. A general duration for each phase is considered. See Appendix I for the site plan and phase plans.

7.1 Phase 1 – Roadway, Driveway, and Swale Construction and Culvert Installation

Access road construction and widening the old road, implementation of 9 new proposed culverts and swales along the road requires topsoil stripping, as well as the removal of any trees along the way. In this phase, the existing corrugated metal culverts under the access road are to be replaced with new larger double-walled HDPE Culverts (corrugated outside and smooth inside) with three different sizes including 12, 30, and 59-inch diameters. All culverts have a recommended length of 12.0m.

A silt fence shall be installed as per TRCA diagram, generally along both sides of the road construction (see attached site diagrams).

All topsoil shall be stockpiled at the north side of the road, behind the silt fences, to act as a loose permeable filtration mound before the silt fences. Approximate volumes are 3600m^3, with a geometry of 2000m long, and 1.8m tall. Driveway and sideroad swale construction along with check dams shall also be completed in this phase. In this project, the swales have a 2% slope and a check dam height of 0.3m, the distance between check dams should be 15m. Sideroad grass swale will be required to convey runoff from the slope to the southern wetland and towards the lake while check dams will be required for single-sided and double-sided roadside swales to provide the required volume capacity. Swale shall have a minimum of 50mm of topsoil, and then be seeded with lawn grass during May-September, watered weekly until fully rooted, or perferrably hydro-seeded. The new grass swale will capture, infiltrate and carry all the stormwater & turbid runoffs down the slope to the lakes.

The duration of this phase is around 8 - 10 weeks.

7.2 Phase 2 – Concrete Footing & Foundation Construction

Once road construction is completed, pouring the concrete foundation can begin in each lot individually. In this project, no excavation is done and the building is built on concrete footings. Silt fences must be installed prior to the concrete operation, along the bottom of the hill for each side based on the lot map. Mechanized tracks would not heavily impair sandy soil quality, or cause undue erosion, as long as all work area is surrounded by silt fence. After concrete forms are stripped and appropriately cured, the backfill of surrounding voids will be completed by using material from the stockpile. The duration of this phase is expected to be around 10 – 12 weeks for foundation construction.

7.3 Phase 3 – Actual Construction & Septic System

After the foundation is completed, the physical construction may be completed, as well as septic holding tanks are also installed and buried in this phase. Similar to previous phases, silt fences are required prior

to the start of septic construction. Finally, the area around the new dwelling and its driveway should be paved with asphalt.

The equipment used in this phase would be considered small, such as min-excavators, front-end loaders, and other small landscaping equipment. The duration of this phase is expected to be around 10 – 14 weeks.

7.4 Phase 4 – Landscaping, Grassing, and others

After the backfill is completed, landscaping, grassing, and reseeding also are done during this phase. This phase of construction should not introduce significant erosions, other than where small mechanical equipment treads have disrupted native groundcover vegetation.

The equipment used in this phase would be considered small, such as min-excavators, front-end loaders, and other small landscaping equipment. The duration of this phase is expected to be around 8 – 12 weeks.

8. Critical Areas

The area within the development site that has the greatest potential for serious erosion is the access road along the shoreline in Phase 2, which is completely in the direction of the runoff on the slope of the land towards the lake. Thus additional controls may be necessary during construction to prevent the discharge of sediment-laden runoff from the Site. Furthermore, a small amount of soil excavated from the dwelling area for the septic system must be placed for final backfill immediately, and topsoil cover & reseeding must occur immediately after cut & fill operations have been completed.

9. Cut & Fill Details

The excavation part of this development plan is only for septic system implementation. Based on the rural location of the proposed development, there will be no external importation or exportation of soils. Each proposed lot will locally backfill all excavated soils within their own lot.

10. Topsoil Stripping & Stockpile Details

Based on ten boreholes completed by the Engineer, the site property has a 0.15 – 0.5m thick layer of sandy topsoil. Stockpiles of soil during Phase 3 (Septic construction), with an estimated 5100 m^3 of soil will be temporarily stockpiled for backfill purposes, on a flat surface near the septic location. As part of earthworks in Phases 1 and 2 constructions, all stripped topsoil, grasses and roots will be stockpiled near the proposed residential dwelling. The concentrated stockpile of topsoil, grass, and roots would allow for easier watering and flipping, to maintain a constant “composting” effect on grass roots.

11. Design Details of Erosion and Sediment Control Measures

Erosion and sediment control measures are primarily using buried silt fences, along with natural infiltration of surface water into the topsoil while any non-absorbed stormwater diverts to creeks moving to the lake. In this project, partial excavation is done for the septic tank, and surrounding the temporary stockpile should be temporarily enclosed with silt fences. After a septic tank is set, it must be appropriately backfilled and this area will require immediate soil stabilization via topsoil, lawn seeding, & watering until firmly rooted.

Additional proposed controls may include but not be limited to, additional silt fences, coir log (coconut fibre) check dams, rip-rap channel linings and culverts inputs and outputs, geotextile erosion control matting, straw bale check dams, temporary vegetation, and filter media.

Due to the existing site entrance and driveways, to effectively reduce track-out and sediment from leaving a multi-residential construction site, vehicle tracking pads like mud mats can be used as a compact versatile construction entrance (Appendix IV). Any erosion from the topsoil or other runoff would be captured by silt fences and strawbale check dams before entering the road, creek, and/or lake. See Appendix I for the location of ESC measures and Appendices II to IV for appropriate installation instructions.

12. Inspection, Maintenance, and Record-Keeping

The site boundary silt fence, and check dam require inspection on a weekly basis. Repairs would be required where damage has occurred. Sediment deposits should be removed when it reaches no more than one-third the height of the fence or half of the height of the check dam. Care must be taken when clearing the sediment so as not to undermine the structural integrity of the fence. Maintenance would be required if significant water has ponded against the silt fence for more than 24 hours which is rare considering the catchment slope towards the lake and the high infiltration rate of sandy soil. Inspect each bale and replace any that is damaged, decaying, or dislodged immediately. Ensure bales are still tightly bound and secure.

Emergency spill kits for mechanical fluids and Petroleum Hydrocarbons are required to be available at the site at all times.

Inspection and maintenance of the Erosion and Sediment Control Measures (i.e., silt fence, straw bale check dam, and mud mat) fall under the responsibility of the general contractor, or the excavator machine operator. Record keeping of any incidents and this document falls under the responsibility of the property owner, 95 Development, Mr. Robert Guo. In cases of emergency, the contact person is the property owner, Mr. Robert Guo.

13. Reliance & Signature

This report is the intellectual property of King EPCM, and has been prepared for the sole use of 95 Developments (the Client). King EPCM accepts no liability for claims arising from the use of this report, or from actions taken or decisions made as a result of this report, by parties other than the Client. The Client may submit this report to the Harcourt Township, County of Haliburton, and Municipality of Dysart et al. in regards to the Client's residential development project at Elephant Lake, Harcourt, Dysart et al., Ontario.

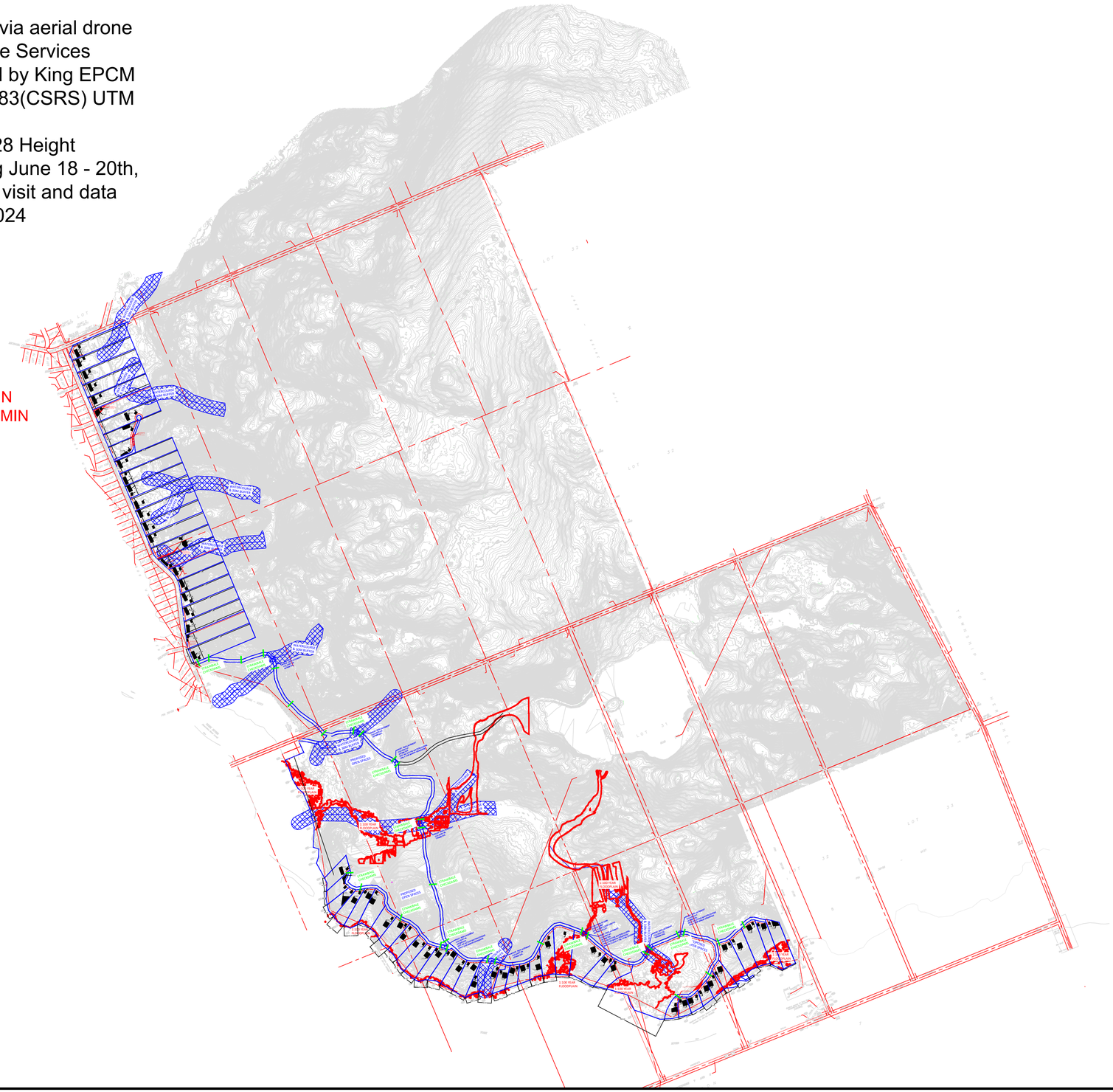
Yu Tao (Tony) Wang, P. Eng
Principal Engineer
King EPCM

Appendix I – General Site Plan & Construction Phases

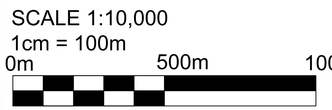
GENERAL NOTES:

- Topographic LiDAR survey via aerial drone was sub-contracted to Drone Services Canada Inc. and supervised by King EPCM
- Horizontal Projection - NAD83(CSRS) UTM Zone 17N
- Vertical Projection - CGVD28 Height
- Field work completed during June 18 - 20th, 2024, with King EPCM field visit and data verification on June 19th, 2024

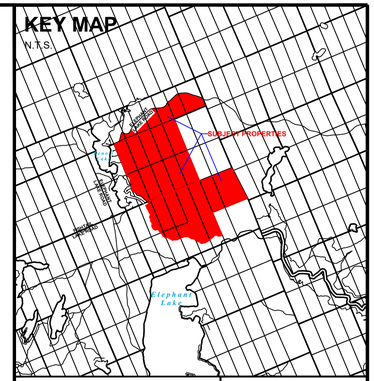
PROPOSED ZONING
WATERFRONT RESIDENTIAL 4
FRONT YARD SETBACK = 7.5M MIN.
REAR YARD SETBACK = 7.5M MIN.
SIDEYARD SETBACK, DWELLING = 4.5 MIN
SIDEYARD SETBACK, ACCESSORY = 1.0 MIN



SCALE 1:10,000
1cm = 100m
0m 500m 1000m



KEY MAP
N.T.S.



DRAWN
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DATE
DEC 18, 2024

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CLIENT
95 DEVELOPMENT

PROJECT NAME
ELEPHANT LAKE - NORTH AND SOUTH PHASE

PROJECT LOCATION
ELEPHANT LAKE, HARCOURT, DYSART ET AL

PRINT TITLE
EROSION AND SEDIMENT CONTROL SITE PLAN

FILE No.
EGR-2.2

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V25	ISSUED FOR SUBMISSIONS	DEC 11, 2024	TW	TW

Appendix II – Typical Details of Silt Fence

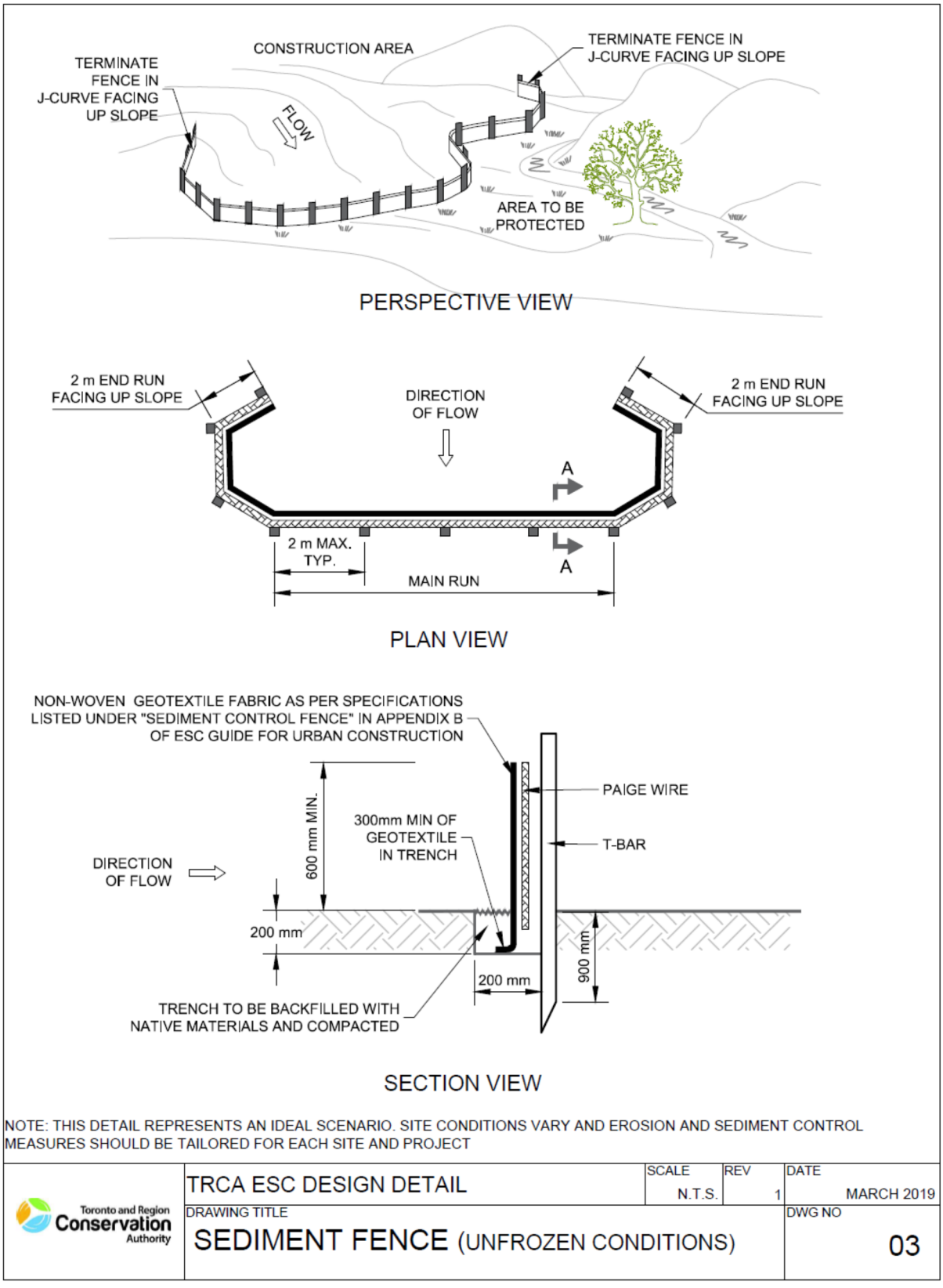


Figure B2-3a: Design detail for sediment control fence (unfrozen conditions).

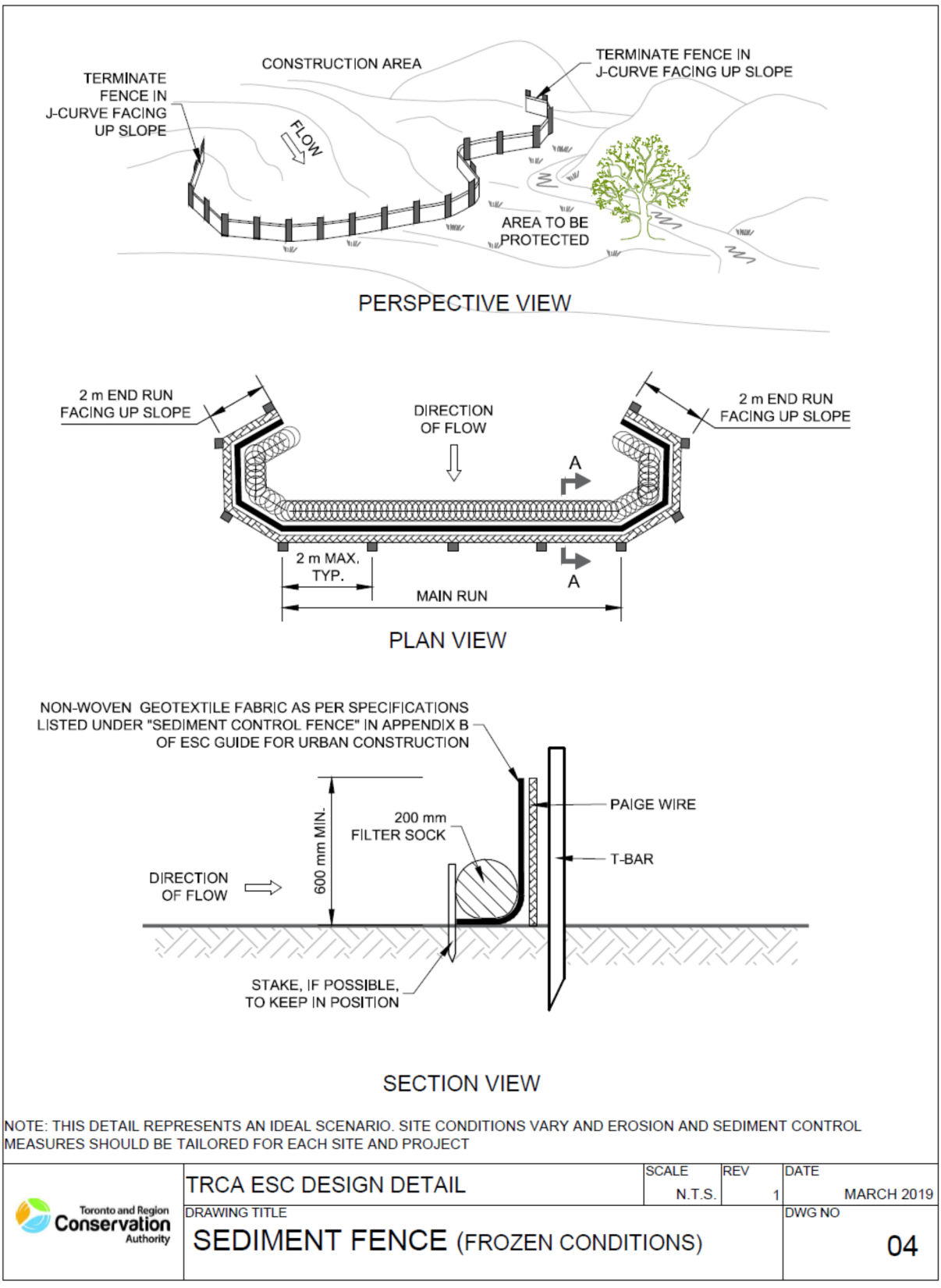
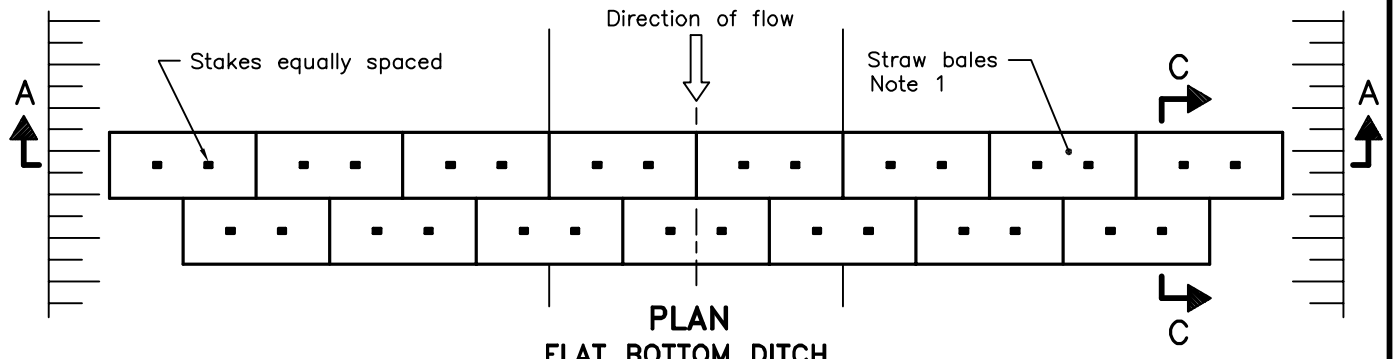
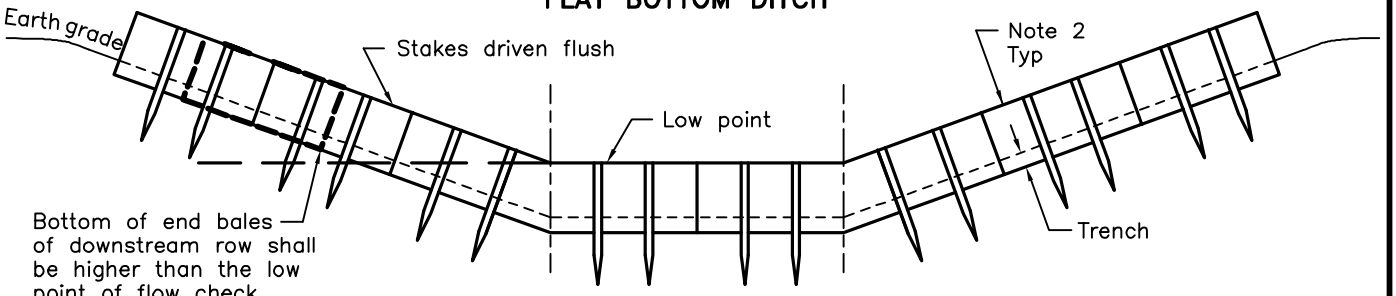


Figure B2-3b: Design detail for sediment control fence (frozen conditions).

Appendix III – Typical Details of Strawbale Check Dam

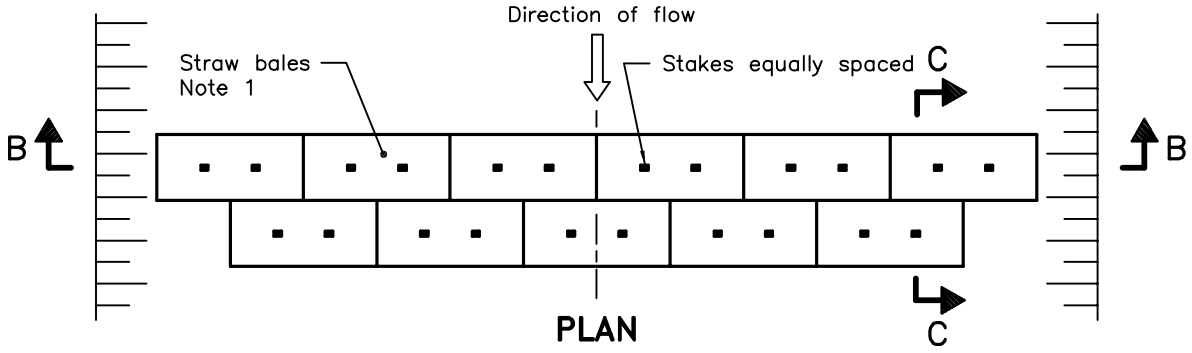


PLAN
FLAT BOTTOM DITCH

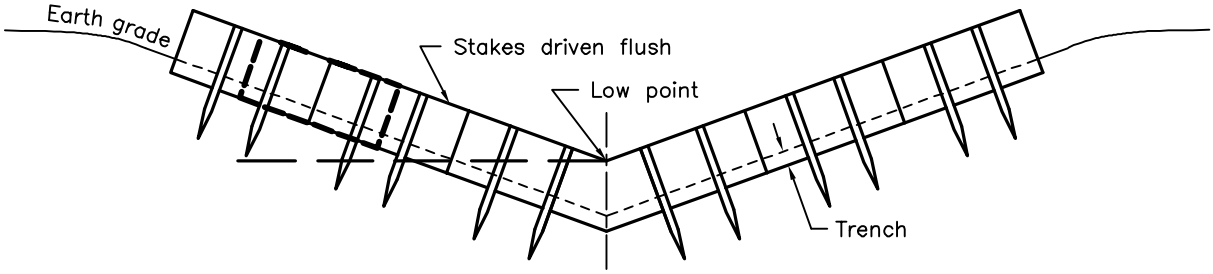


Bottom of end bales of downstream row shall be higher than the low point of flow check. Downstream bale position outlined. Typ

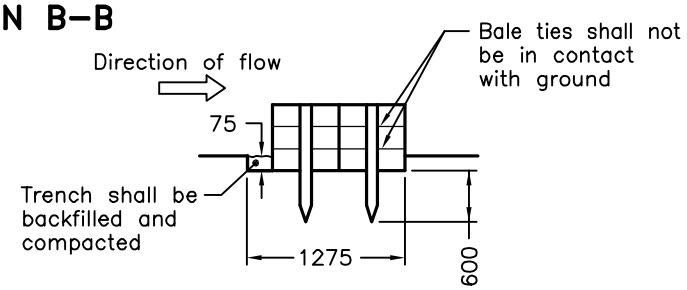
SECTION A–A



PLAN
V–DITCH



SECTION B–B



SECTION C–C

NOTES:

1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2
STRAW BALE FLOW CHECK DAM			
	OPSD 219.180		

NATURAL FIBRE LOGS
(a.k.a. Natural fibre wattles)

Natural fibre logs are a category of sediment control devices encompassing several products that are, like filter socks, applied for sediment removal from sheet flow or concentrated flows in swales. By decreasing flow velocities they promote gravitational settling of suspended sediments and help reduce runoff erosivity. They differ from filter socks in their material composition and the fact that they are pre-fabricated and not typically filled onsite. They are composed of various biodegradable natural fibres and are typically uniform throughout. Lengths and diameters vary according to the product type and manufacturer. Examples of natural fibre logs / wattles commonly used for ESC include:

- **Coir logs** | Coconut fibre encased in a coconut fibre twine netting.
- **Straw logs** | Agricultural straw typically encased in a tubular synthetic netting
- **Wood fibre logs** | Wood excelsior fibre (wood slivers) logs, typically encased in a tubular synthetic netting.

Figure B2-8: Natural fibre logs

Application

Natural fibre logs can be used in a variety of sediment control applications depending on their diameter, length and how they are placed/positioned. Common sediment control applications of logs include:

- As flow interruption on level and sloped areas where they are applied along contours, perpendicular to runoff sheet flows;
- At the base of slopes, at a recommended distance of at least 1.5 m from the based in order to provide adequate space for sediment deposition;
- Along the site perimeter in areas of sheet flow;
- Perpendicular to channelized flow in swales and ditches where they function as check dams;
- Around storm drain inlets receiving sheet flows;
- At the base of topsoil stockpiles;
- Around sediment bags as part of a dewatering treatment train;
- During frozen conditions in place of sediment fence that cannot be trenched in; and
- Any other areas where it is necessary to dissipate flow velocities and pond water to promote sediment settling.

Design and installation

Product specifications

- Biodegradable and non-biodegradable casings are available depending on the product and intended application. Where logs are being used for permanent stabilization, particularly for construction projects in natural water features, biodegradable casing can be a useful option. Confirm casing life span with the product supplier.
- Fibre material should be free of any refuse, weeds, contaminants or other materials toxic to plants, wildlife or humans. It should also be relatively free (<1% by dry weight) of inert or foreign man made materials.

Product performance

- Confirm removal efficiency of any natural fibre log product prior to applying it on the site. It is recommended that products are selected that can demonstrate sediment removal efficiency ≥ 70% based on testing by an independent third party. Where this removal efficiency cannot be verified, the products should only be used in low risk applications, and not applied as the primary barrier protecting an adjacent natural feature.
- Sediment retention testing should be carried out using American Society for Testing and Materials (ASTM) Standard D7351-13, which is the “Standard Test Method for Determination of Sediment Retention Device Effectiveness in Sheet Flow Applications”.

Sheet flow applications

- For optimal performance, upslope area draining to the log should be stabilized, particularly if the application is on a slope.
- Logs applied as sediment control for runoff sheet flow - e.g. at site perimeter, along contours of sloping areas, around storm drain inlets - should be sized such that flows from most storm events will not overtop the logs.
- Consult with supplier for guidance on selecting appropriate log diameter based on slope grades and lengths and the design storm which is meant to be treated. In general, the sizing should be based on the 5 year design storm, however sizing for a larger design storm may be necessary if logs are being applied to protect adjacent natural features.
- Prepare the ground surface prior to log placement to ensure good ground contact. Creating a shallow depression in which to place the log can help to improve ground contact.
- Place logs on level contours to ensure they receive sheet flows rather than concentrated flows.
- Where logs are applied at the base of a slope, a distance of at 1.5 m from the base is recommended in order to provide adequate space for sediment settling.
- Install logs perpendicular to the sheet flow path and install with ends turned upslope to discourage water from flowing around the ends.
- For slopes steeper than 2H:1V, multiple parallel logs may need to be installed on the slope to dissipate runoff energy and reduce the risk of rill erosion.

- Secure logs by staking them into place with long wooden stakes driven into the centre, or alternatively on both sides if tearing of the casing is a concern. Where ground below is paved, secure with heavy concrete blocks or other appropriate means to ensure good ground contact and discourage shifting.
- Stakes should be driven into the ground at least 20 cm and extend above the height of the log.
- Stakes should be placed at regular intervals as needed to secure the log, with intervals varying based on the sock diameter and the slope of the drainage area. Confirm appropriate spacing with supplier.
- Consult with supplier to confirm recommended staking procedures, including staking depths and stake placement.

Concentrated flow applications:

- Natural fibre logs can be used as sediment control check dam structures to treat concentrated flows in small open construction site channels like interceptor swales.
- For use of logs as check dams, consult with supplier for guidance on selecting appropriate log diameter based on the design storm to be treated. In general, the sizing should be based on the 5 year design storm, however sizing for a larger design storm may be necessary where there is a low tolerance of risk of failure.
- Treatment of larger flow volumes should be addressed by selecting the largest log diameter that is recommended for the swale and reducing the spacing interval between logs. Stacking logs may also help increase capacity but should be decided on based on supplier guidance.
- Spacing of logs in the swale is based on the swale gradient and anticipated flows. Consult with supplier for guidance on optimal spacing along the swale.
- Prepare the ground surface prior to device placement to ensure good ground contact. The log should be pressed in to the ground during installation. Creating a shallow depression in which to place the log can help to improve ground contact.
- The log should be installed in the swale in a U-shape with ends pointed slightly upslope to encourage water to pond and – during large events – overtop the log in the middle rather than around the sides. The log should be long enough to extent to the top of the swale.
- As a minimum, stake into place in the centre and at both ends. To avoid damage to the casing, stakes can instead be placed on either side of the log to create a brace. Stakes should be driven into the ground at least 20 cm and extend above the height of the log.
- For best results, swales in which natural fibre logs are installed should be stabilized.

Inspection and maintenance

- Inspect all logs weekly, and before and after significant rainfall (see definition in Section 10.1.2) or snowmelt events, and keep a record of the inspection.
- Look for any signs of erosion and areas where water is undermining the log and consider how positioning, ground contact or flow rates can be adjusted to prevent continued undermining.
- Inspect positioning and placement of logs to ensure they haven't shifted substantially. Re-position and re-stake as needed.

- Where flows are exceeding the retention capacity of the log (e.g. frequent overtopping, water flowing around check dams), re-consider log diameter used, add additional logs (for swale applications) or stack them to create a higher barrier.
- Where logs continue to fail on an ongoing basis, consider replacing with an alternative sediment retention device. If failure is a result of concentrated flows being directed to logs being applied for sheet flow control, consider re-designing surface water flow paths to reduce volumes being directed to the problem area.
- Sediment and/or debris accumulation behind logs should be removed before it reaches approximately 30% of the log height.
- Any repair or maintenance needs identified should be repaired within 48 hours or sooner if natural receptors are at imminent and foreseeable risk of adverse impact. Higher priority should be assigned to repair of logs installed upgradient of natural features.

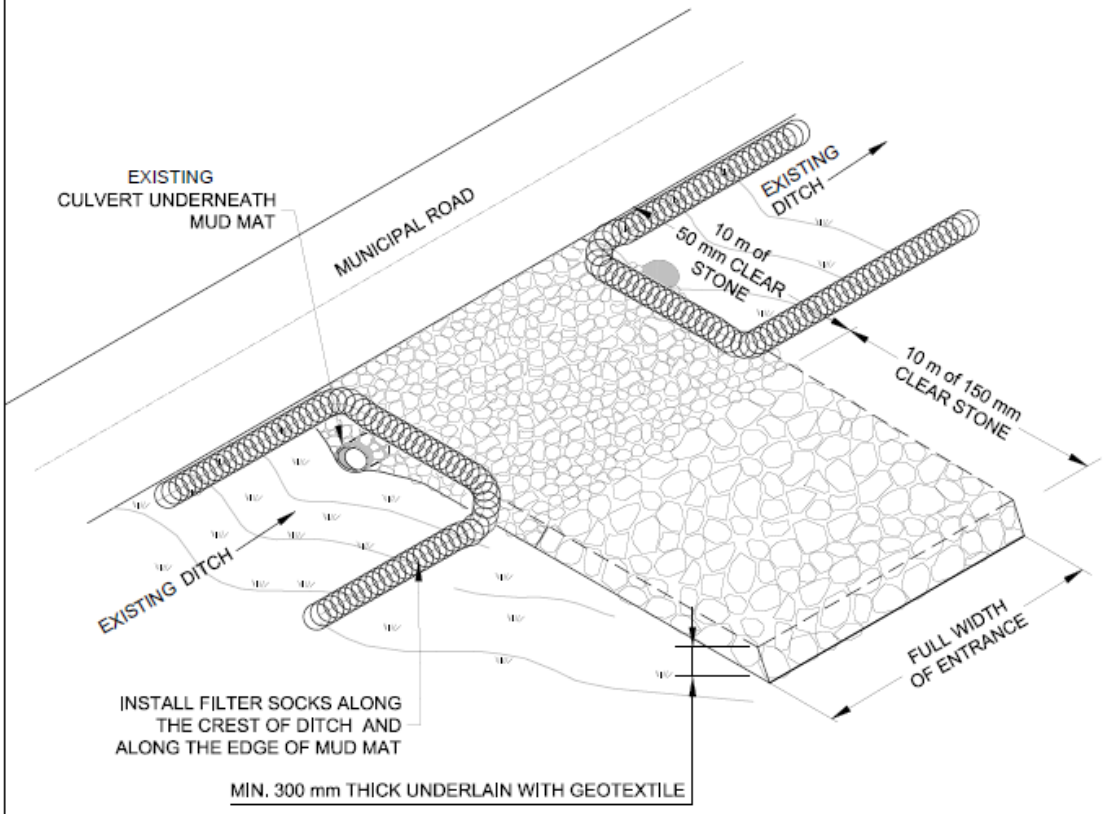
Decommissioning

- Remove and properly dispose of accumulated sediment.
- Where desired, and if fill material is not contaminated, some types of logs may be cut open so that fill can be used onsite as mulch for restoration works.
- Remove and dispose of any non-biodegradable material.

Appendix IV – Typical Details of Vehicle Tracking Pad (Mud Mat)

MUD MAT DETAIL NOTES:

1. MUD MAT TO BE UNDERLAIN WITH A GEOTEXTILE CLOTH
2. SEDIMENT WILL BE CLEANED FROM PUBLIC RIGHT OF WAYS AS REQUIRED
3. STORM INLETS IN CLOSE VICINITY TO MUD MAT TO BE PROTECTED WITH INLET CONTROL MEASURES



NOTE: THIS DETAIL REPRESENTS AN IDEAL SCENARIO. SITE CONDITIONS VARY AND EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE TAILORED FOR EACH SITE AND PROJECT

Toronto and Region Conservation Authority	TRCA ESC DESIGN DETAIL	SCALE N.T.S.	REV 1	DATE MARCH 2019
	DRAWING TITLE MUD MAT			DWG NO 05

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Figure B2-29: Design detail for mud mat for construction site vehicle access