GROUNDWORK ENGINEERING LIMITED

24 February, 2022

Michael Kerford

Flatt Point Development Prince Edward County – Wetland Compensation Plan

Dear Michael,

Pursuant to your request, Groundwork Engineering Limited (GEL) completed a review of the lands on and adjacent to an existing unopened road allowance. It is understood that this land may be used to create a new access road to the proposed 16 lot development on Part of Lot A, Concession of South Prince Edward Bay, Township of South Marysburgh, County of Prince Edward.

The purpose for the review was to determine existing elevations along the proposed alignment, complete a geotechnical investigation to understand subgrade conditions for construction of the road, identify possible drainage concerns and determine the potential wetland areas that would be filled in during construction of the proposed road. This will be used to determine the volume and area of wetland to be compensated. The Wetland Compensation Plan has been prepared to describe the measures proposed to offset the residual loss of wetland ecological functions associated with the Project.

The field investigation was completed 20 December 2021. This consisted of a topographic survey along the proposed alignment and excavation of 11 test pits. The test pits averaged 1.2m in depth and were completed with a tracked excavator. Test pits were backfilled with native material when the investigation was complete. The substrata typically consisted of 150mm to 250mm of topsoil over wet stiff silty clay some sand.

Two locations were identified for potential culvert placement. These are recommended to ensure wetland areas on either side of the proposed road will be maintained. Detail design of these water crossings will be completed at a later date. The crossings will be designed to allow for passage of wetland aquatic and terrestrial species.

The existing and proposed finished road profile are indicated on the drawings attached. The proposed road standard section consists of a two lane 6m wide travelled way with 0.5m wide shoulders and a 3H:1V slope to the bottom of ditch or existing grade. The minimum elevation of the road shoulder through the wetland and its approaches will be 76.15 metres. This is based on an assumed 100-year flood elevation of 75.85 metres plus 0.3m of freeboard. The lowest recorded elevation measured along the alignment through the wetland was 75.20 metres. The length of new road through the wetland is

240 metres. The area of new road through the wetland is 2,462 m^2. The volume of infill required through the wetland was determined to be 1,952 m^3.

This investigation and report are completed in conjunction with a report completed by Ecological Services titled Wetland Compensation for road route to Half moon Bay Development dated August 9th, 2021 and a letter completed by Ecological Services titled Wetland Compensation Addendum for road route to Half Moon Bay Development dated February 24th, 2022.

In the initial report Ecological Services identified the wetland extents, completed an ecological land classification of the area and identified conditions of the wetland along the proposed route. The addendum provided a discussion of the wetland compensation for the proposed road route that will be adjacent to the unopened road allowance.

We have identified two areas that are considered suitable for expansion of the existing wetland adjacent to the new road. Area 1 has an area of 0.68 hectares and Area 2 has an area of 0.15 hectares (Drawing C-101). This would provide an approximate 3:1 ratio of wetland compensation to wetland lost.

Toronto and Region Conservation Authority (TRCA) provide three typical wetland ecosystem restoration guides. These include forested wetland, marsh wetland and shrub wetland. Guidance on features to include in design, breakdown of ratios of aquatic to terrestrial habitat and suggested plant species are provided in the attached document. A combination of marsh and forested wetland features while maximizing aquatic habitat with deep vernal pockets is recommended for this site in order to meet the required cut volume of 1,952 m^3. Water depth is to vary in the shallow pockets from 0 to 50cm and in the deep vernal pockets from 50cm to 150cm. Habitat structures are recommended consisting of basking logs, log perches and nest boxes. Drawing C-105 provides a suggested plan for Wetland Compensation Areas 1 and 2. Where possible, plant material and seed stock from the impacted areas of the existing wetland will be transplanted to the compensation wetland area.

Detailed drawings and specifications for construction will be included in the Contract Documents including: topsoil removal; organic soil management; excavation and grading; and, invasive species management, etc.

Soil compaction within the area of the compensation wetland shall be minimized to the greatest extent possible. This can be accomplished by reducing passes across the site with heavy machinery and by using wide-track equipment to complete the required earthwork. The substrate associated with the interior of the compensated wetland may need to be scarified or ripped following construction. Compacted areas should be loosened to a minimum depth of 450 mm.

Development of the road to Flatt Point adjacent to the unopened road allowance will result in an unavoidable loss of wetland function within approximately 0.25 hectares (2,462 m2) of existing wetland area. The Compensation Plan details the proposed wetland mitigation and protection activities to conform with the Quinte Conservation Authority watershed development policies. We have identified an approximate area that could be used for wetland compensation. We recommend on site coordination with Quinte Conservation Authority to determine the best areas. Compensation is proposed at a total of 0.73 hectares (approximately a 3:1 ratio) accounting for the removal of approximately 0.25 hectares (2,462 m2) of degraded wetland area located to the east of the proposed road and adjacent to the existing wetland. Using the TRCA Ecosystems Restoration guide for wetlands we recommend a combination of marsh and forested wetland with larger aquatic habitat to balance the fill volume of the proposed road, 1,952 m^3, through the affected wetland with the excavation of deep vernal and shallow water pockets.

Provided the recommendations in this Wetland Compensation and Protection Plan are followed, the proposed environmental protection/mitigation measures are anticipated to maintain the existing hydrological functions, and enhance the ecological structure, habitat function and long-term resilience of the wetland features found within the project area. We trust this is satisfactory for your purposes at this time.

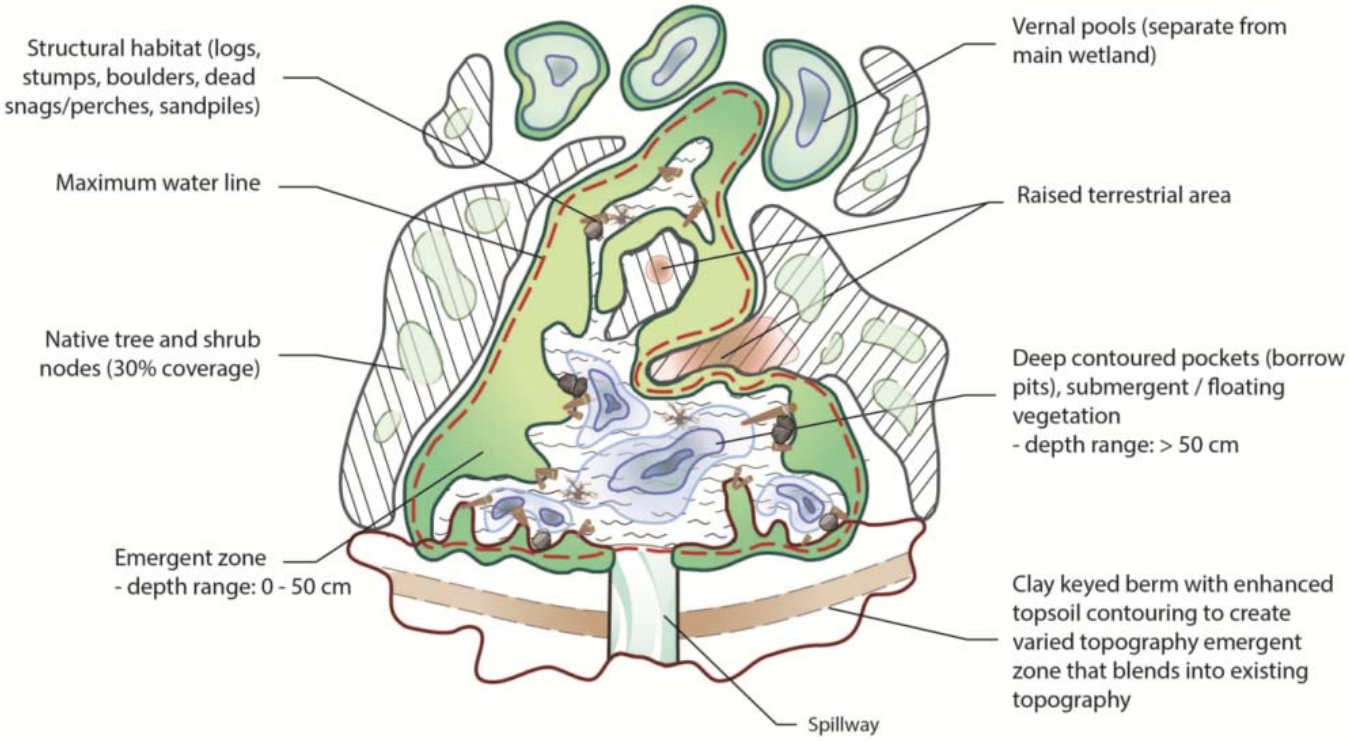
Sincerely,

MBurger

Martin Burger
M.Eng., P.Eng.

Attachments: 2

Marsh Wetland



WETLAND TYPICAL: TOP VIEW

Suggested plant species:

Plant native early successional riparian tree and shrub species and wet tolerant conifer species. Based on specific site conditions and existing vegetation, species might include: red osier dogwood, nanny berry, cottonwood, birch, balsam poplar, tamarack, and E. white cedar.

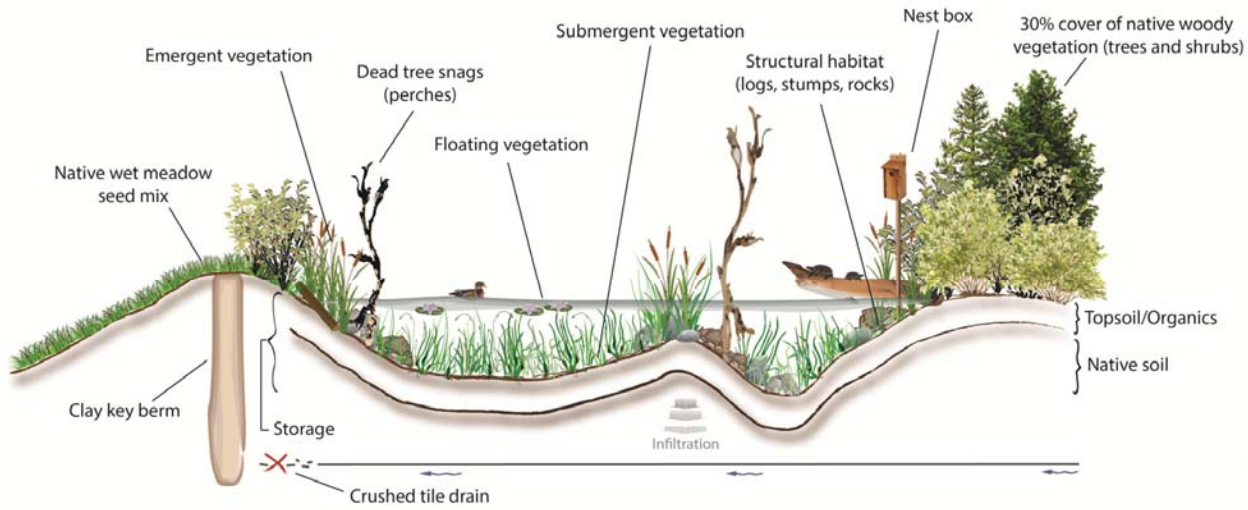
Project Goals:

- Restore ecosystem form and function
- Restore soil and soil processes
- Restore natural hydrologic processes
- Enhance and restore natural cover and critical habitat

Area Details:

Project planning and development (permits, survey, detailed design and project mgmt.), site preparation (sediment & erosion control etc.), berm construction, wetland topography contouring and grading, habitat structure installation, planting and seed application.

- 0.7 ha aquatic (50% of wetland footprint planted with aquatic plugs (2250 plugs)
  - 0.28 ha open water/submergent plantings (10% or 225 plugs),
  - 0.42 ha emergent vegetation plantings (40% or 2025 plugs),
- 0.3 ha terrestrial (100% planted with trees & shrubs (1000 pots))

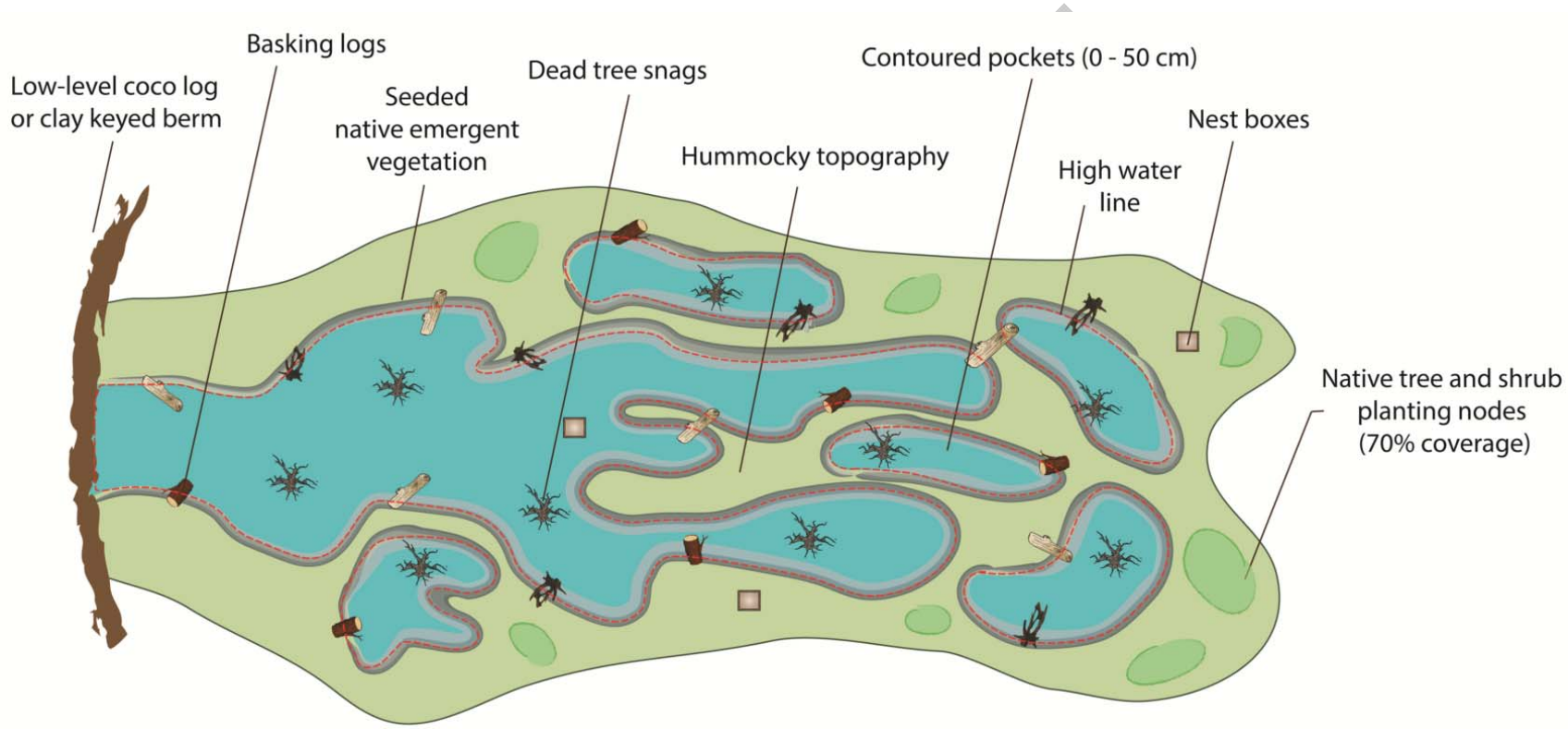


WETLAND TYPICAL: CROSS SECTION

Features to include in Design:

- Reversal of altered hydrology (crushed tile drains, burying straightened ditches)
- Varying topography including shallow water (0-50 cm depth) and open water/deep pockets (50-200 cm depth)
- Proper and stable water level control
- Proper erosion and sediment control methods
- 10-20 Habitat structures (dead trees, snags, basking logs, log perches, sand piles, nest boxes…)
- Site preparation for planting and removal of invasive species
- Native terrestrial, emergent and submergent vegetation
- 100% of terrestrial buffer (10m wide) planted with woody vegetation (1000 pots)
- Terrestrial planting of shrubs in 50 groups of 10 at 1m spacing
- Terrestial planting of trees in 50 groups of 10 at 2.25m spacing
- 50% of aquatic area planted (2250 emergent and submergent plugs at 6 inch spacing)
- Native wetland/ wet meadow seed mix for disturbed soils

Wet Shrub Thicket Wetland



WET SHRUB THICKET TYPICAL: TOP VIEW

Project Goals:

- Restore ecosystem form and function
- Restore soil and soil processes
- Restore natural hydrologic processes
- Enhance and restore natural cover and critical habitat

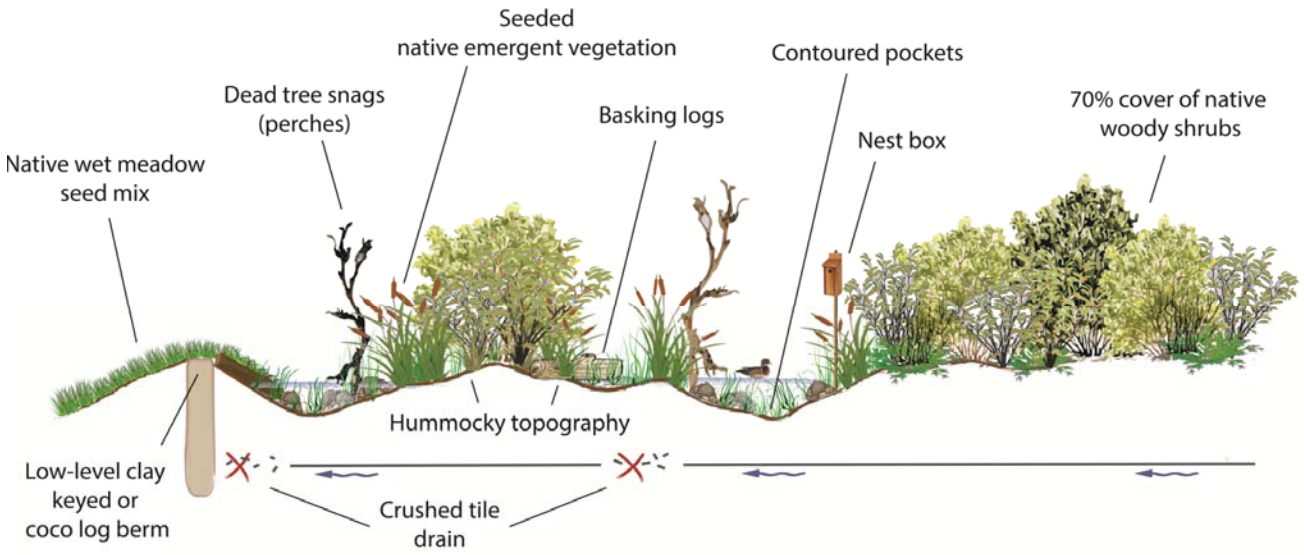
Details:

Project planning and development (permits, survey, detailed design and project mgmt.), site preparation (sediment & erosion control etc.), berm construction, wetland topography contouring and grading, habitat structure installation, planting and seed application.

- 0.3 ha aquatic
- 0.7 ha terrestrial (50% of area planted with shrubs (3500 pots))

Suggested plant species:

Plant native early successional riparian shrub species, such as willow, red berry, high bush cranberry, and button bush.

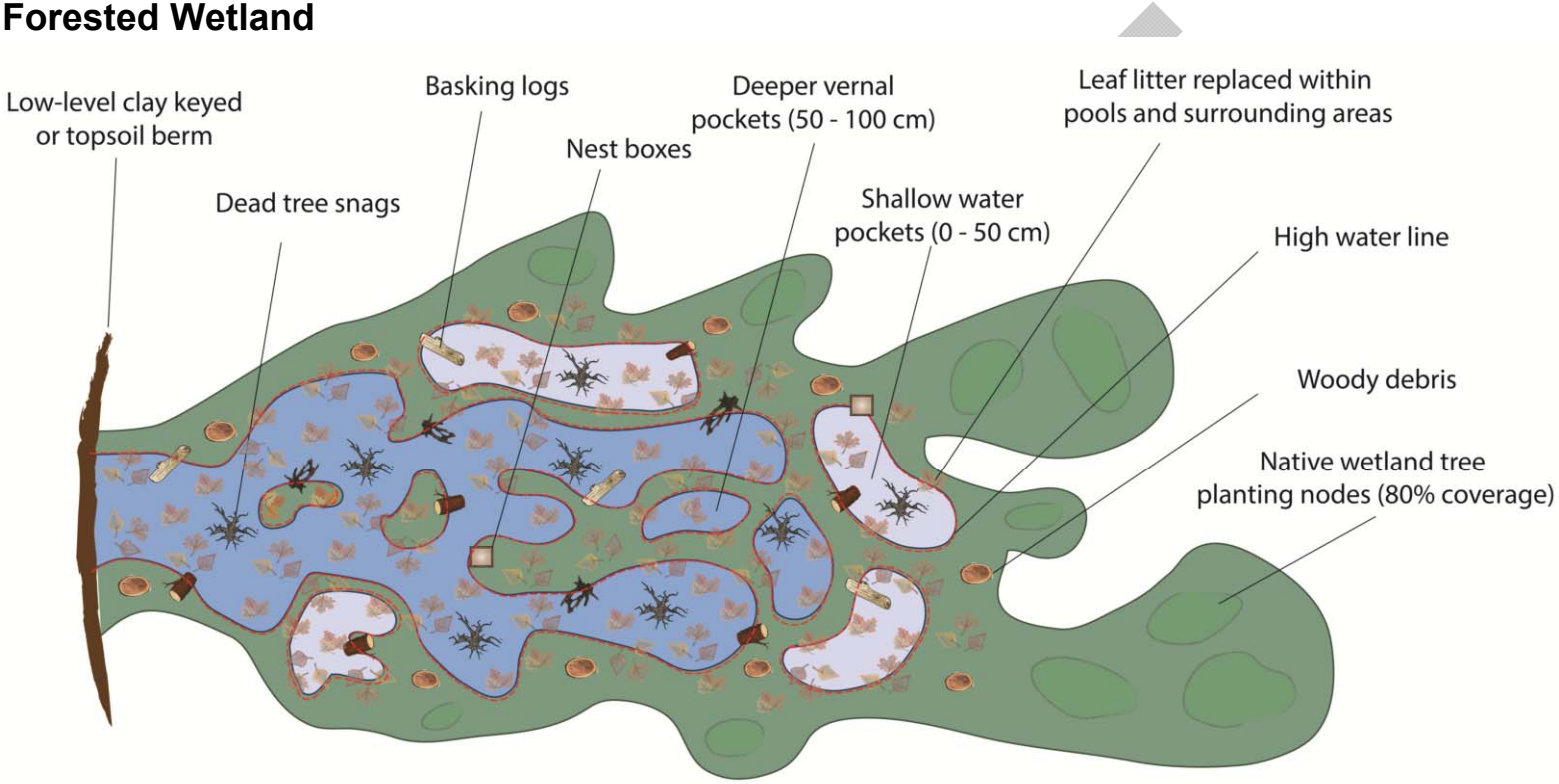


WET SHRUB THICKET TYPICAL: CROSS SECTION

Features to include in Design:

- Reversal of altered hydrology (crushed tile drains, burying straightened ditches)
- Proper and stable water level control
- Proper erosion and sediment control methods
- Varying/hummocky topography including shallow open water (0-50cm depth)
- 20-30 Habitat structures (dead trees, snags, basking logs, log perches, nest boxes,…)
- Site preparation for planting and removal of invasive species
- Native terrestrial and emergent vegetation
- 50% of terrestrial planting area planted with shrubs in 350 groups of 10 at 1m spacing (3500 potted shrubs)
- Native wetland / wet meadow seed mix for disturbed soils

Forested Wetland



FORESTED WETLAND TYPICAL: TOP VIEW

Project Goals:

- Restore ecosystem form and function
- Restore soil and soil processes
- Restore natural hydrologic processes
- Enhance and restore natural cover and critical habitat

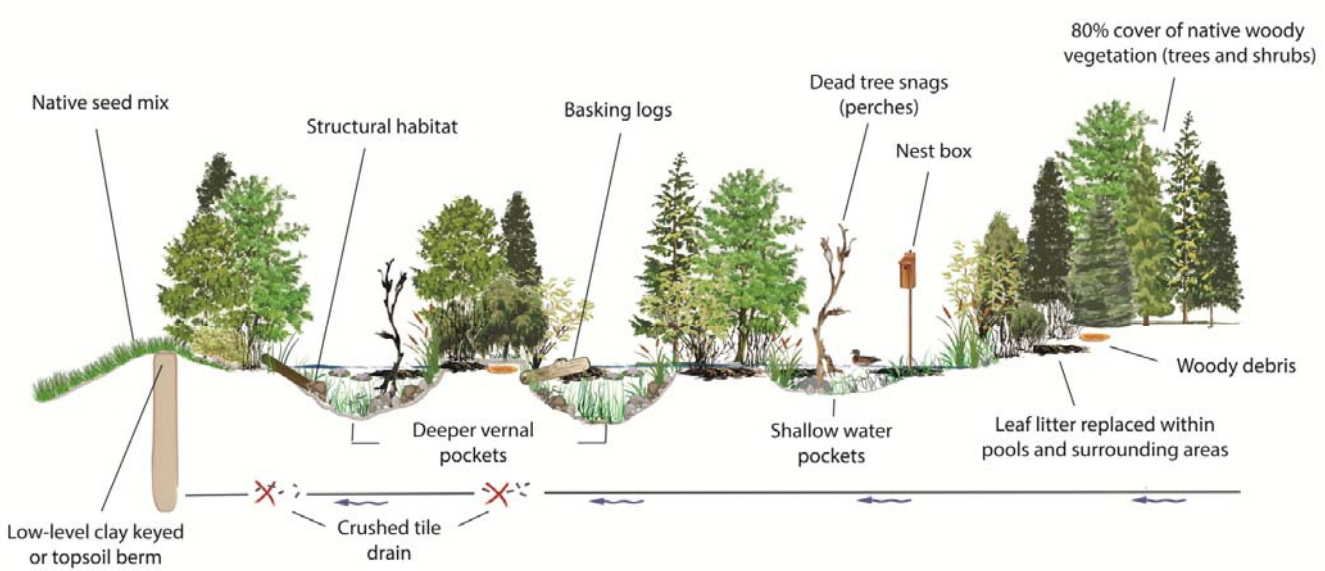
Details:

Project planning and development (permits, survey, detailed design and project mgmt.), site preparation (sediment & erosion control etc.), subtle regrading to create low level control berm, wetland topography contouring and grading, enhanced wildlife habitat and/or bird box installation, seed application.

- 0.2 ha aquatic
- 0.8 ha terrestrial (100% of area planted with trees and shrubs (2440 pots))

Suggested plant species:

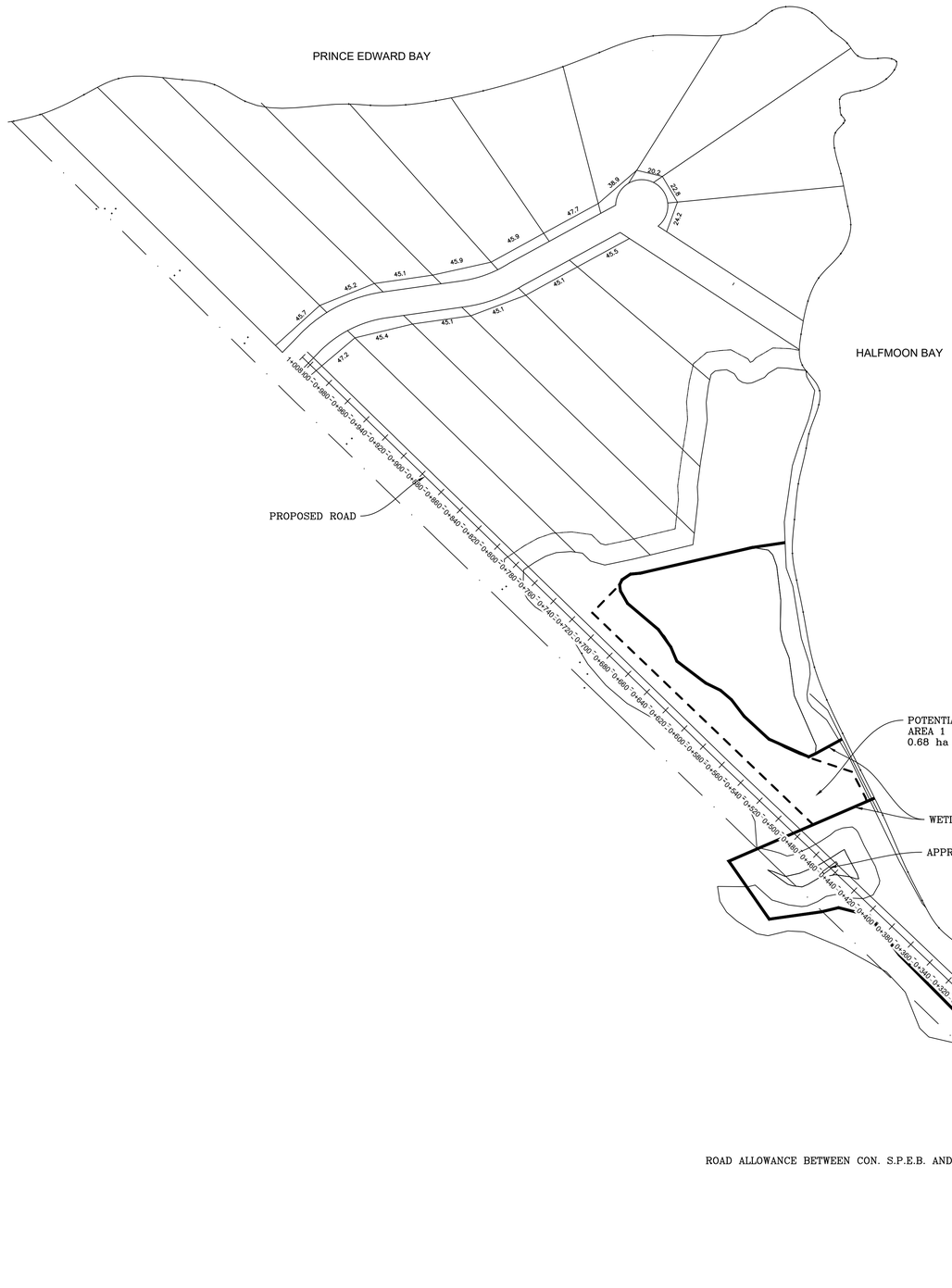
Plant native early successional riparian tree and shrub species and wet tolerant conifers. Based on specific site conditions and existing vegetation, species might include red osier dogwood, alder, silver maple, birch, E. white cedar, tamarack, and white spruce.

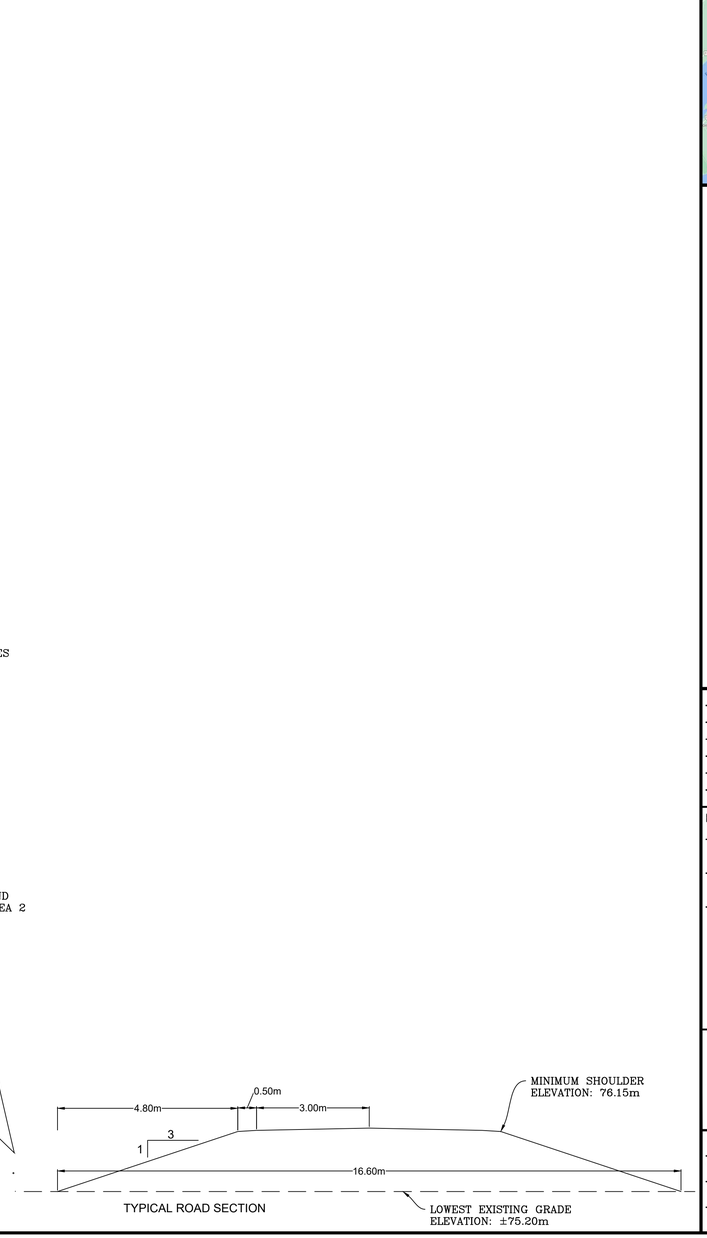


FORESTED WETLAND TYPICAL: CROSS SECTION

Features to include in Design:

- Reversal of altered hydrology (crushed tile drains, burying straightened ditches)
- Proper and stable water level control
- Proper erosion and sediment control methods
- Varying topography including shallow water (0-50cm depth) deeper vernal pockets (50-100 cm depth)
- 20-30 Habitat structures (basking logs, log perches, nest boxes)
- Site preparation for planting and removal of invasive species
- Terrestrial area planted with 80% woody vegetation (native trees and shrub pots)
- Trees planted in groups of 10 at 2.4m spacing
- Shrubs planted in groups of 10 at 1m spacing
- Native wetland/ wet meadow seed mix for





TYPICAL ROAD SECTION

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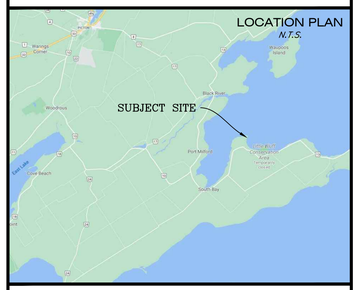

AREA OF ROAD THROUGH WETLAND: 2462m²

VOLUME OF FILL REQUIRED FOR 240m OF ROAD THROUGH WETLAND: 1952m³

REVISIONS

No.	Description	Date
#1	ISSUED FOR WETLAND COMPENSATION	2022/02/24

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

Client / Land Owner:

URSTRONG

Project:

HALFMOON BAY

PRINCE EDWARD COUNTY ONTARIO

Drawing Title:

WETLAND COMPENSATION

Drawn by: DF

Checked By: MB

Scale: 24"x36" 1:2000

Date: FEBRUARY 24, 2022

Project Number: GW-21014

Drawing Number: C-101

SHEET 1 of 5

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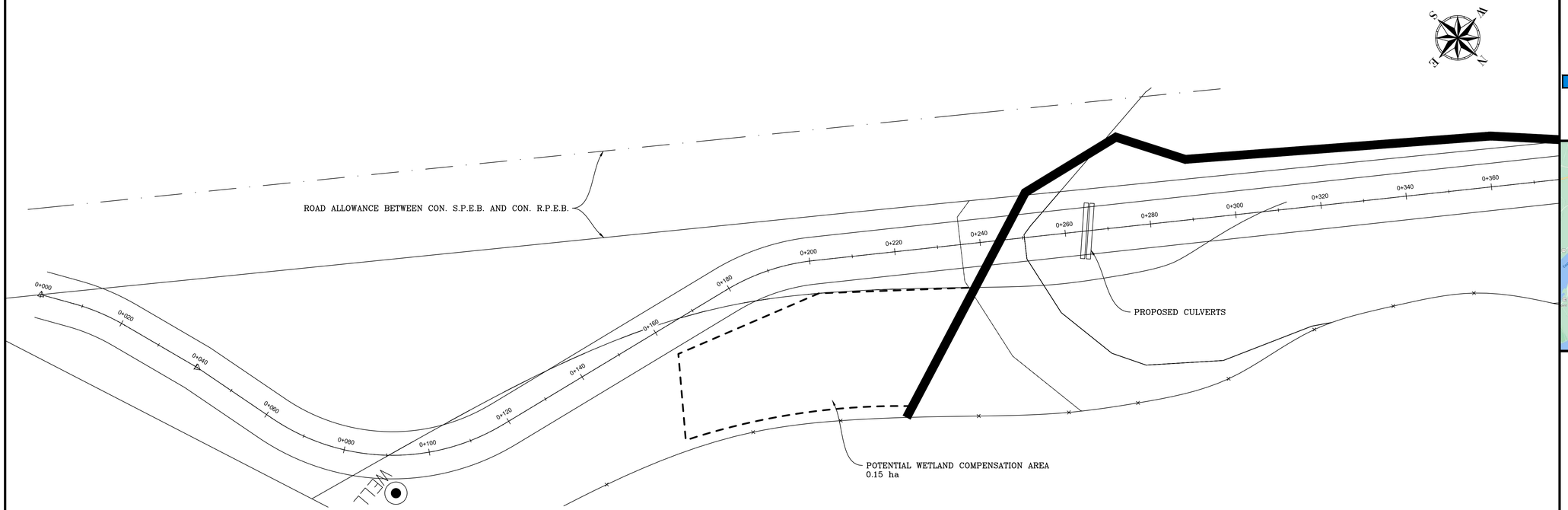

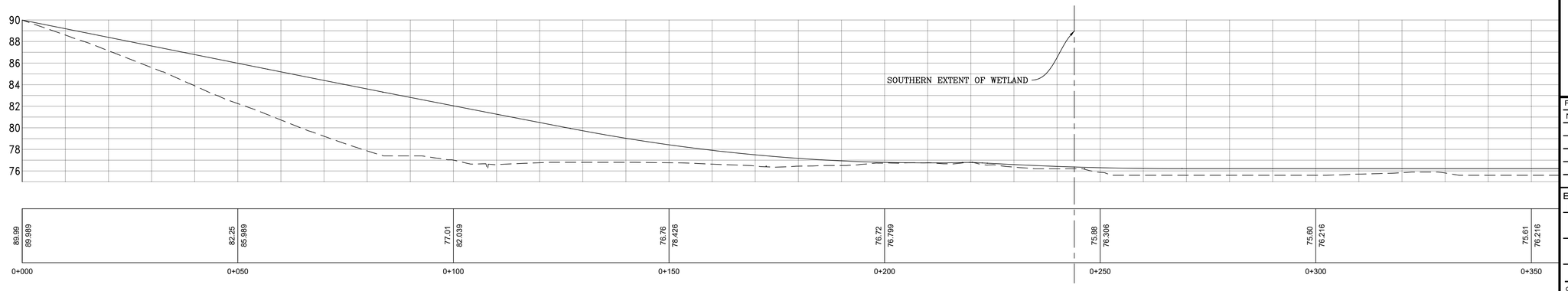

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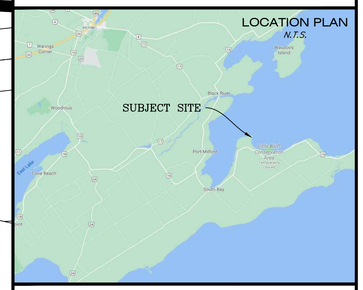
LOCATION PLAN
N.T.S.



REVISIONS

No.	Description	Date
#1	ISSUED FOR WETLAND COMPENSATION	2022/02/24

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

Client / Land Owner:

URSTRONG

Project:

HALFMOON BAY

PRINCE EDWARD COUNTY ONTARIO

Drawing Title:

PLAN & PROFILE

Drawn by: DF

Checked By: MB

Scale: 24"x36" 1:250

Date: FEBRUARY 24, 2022

Project Number: GW-21014

Drawing Number: C-102

SHEET 2 of 5

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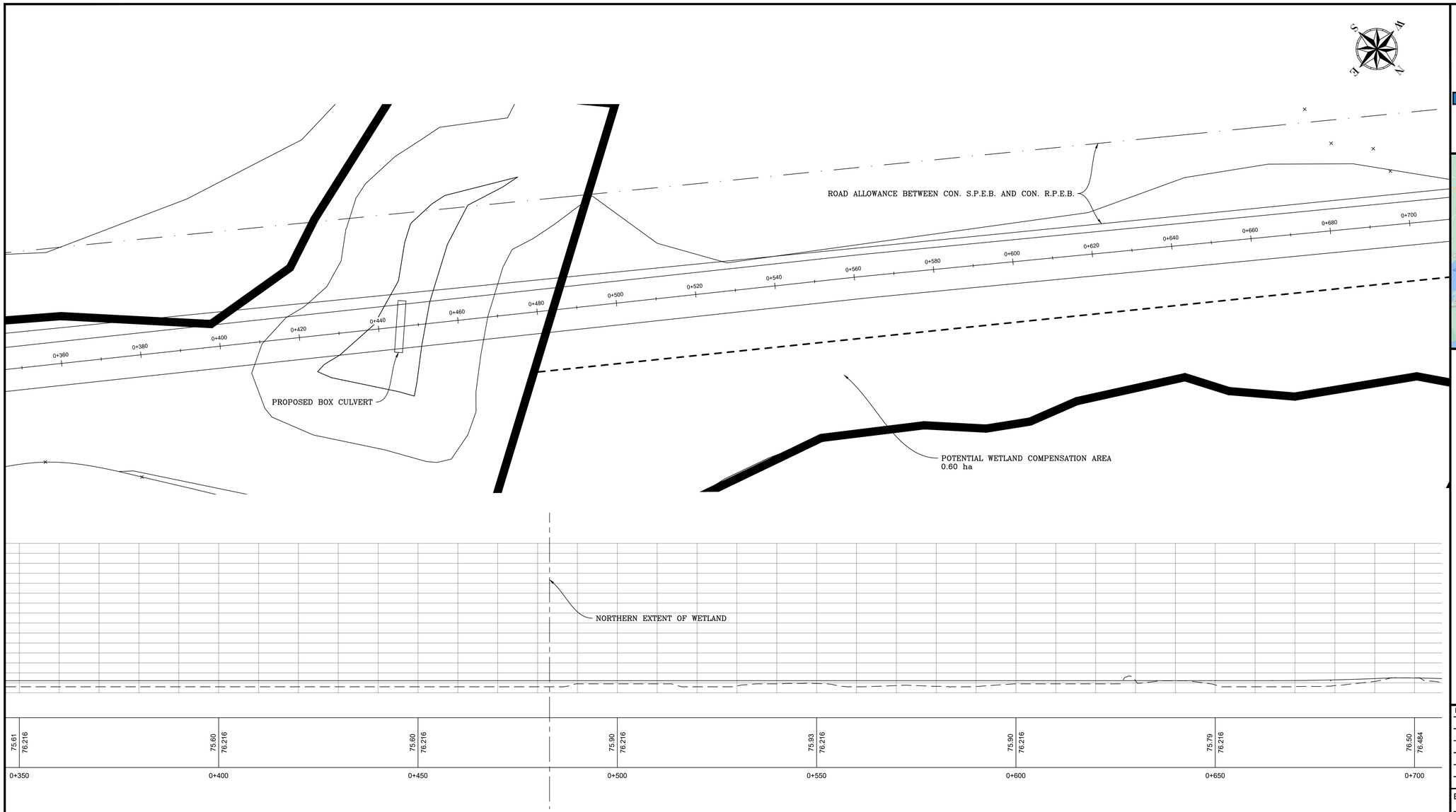

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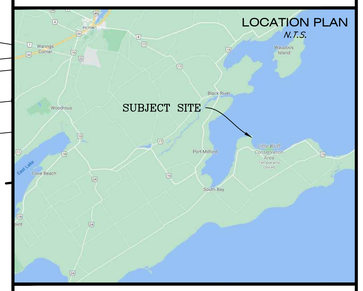
LOCATION PLAN
N.T.S.



REVISIONS

No.	Description	Date
#1	ISSUED FOR WETLAND COMPENSATION	2022/02/24

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

Client / Land Owner:
URSTRONG

Project:
HALFMOON BAY
PRINCE EDWARD COUNTY ONTARIO

Drawing Title:
PLAN & PROFILE

Drawn by: DF
Checked By: MB
Scale: 24"x36" 1:500
Date: FEBRUARY 24, 2022

Project Number: GW-21014
Drawing Number: C-103
SHEET 3 of 5

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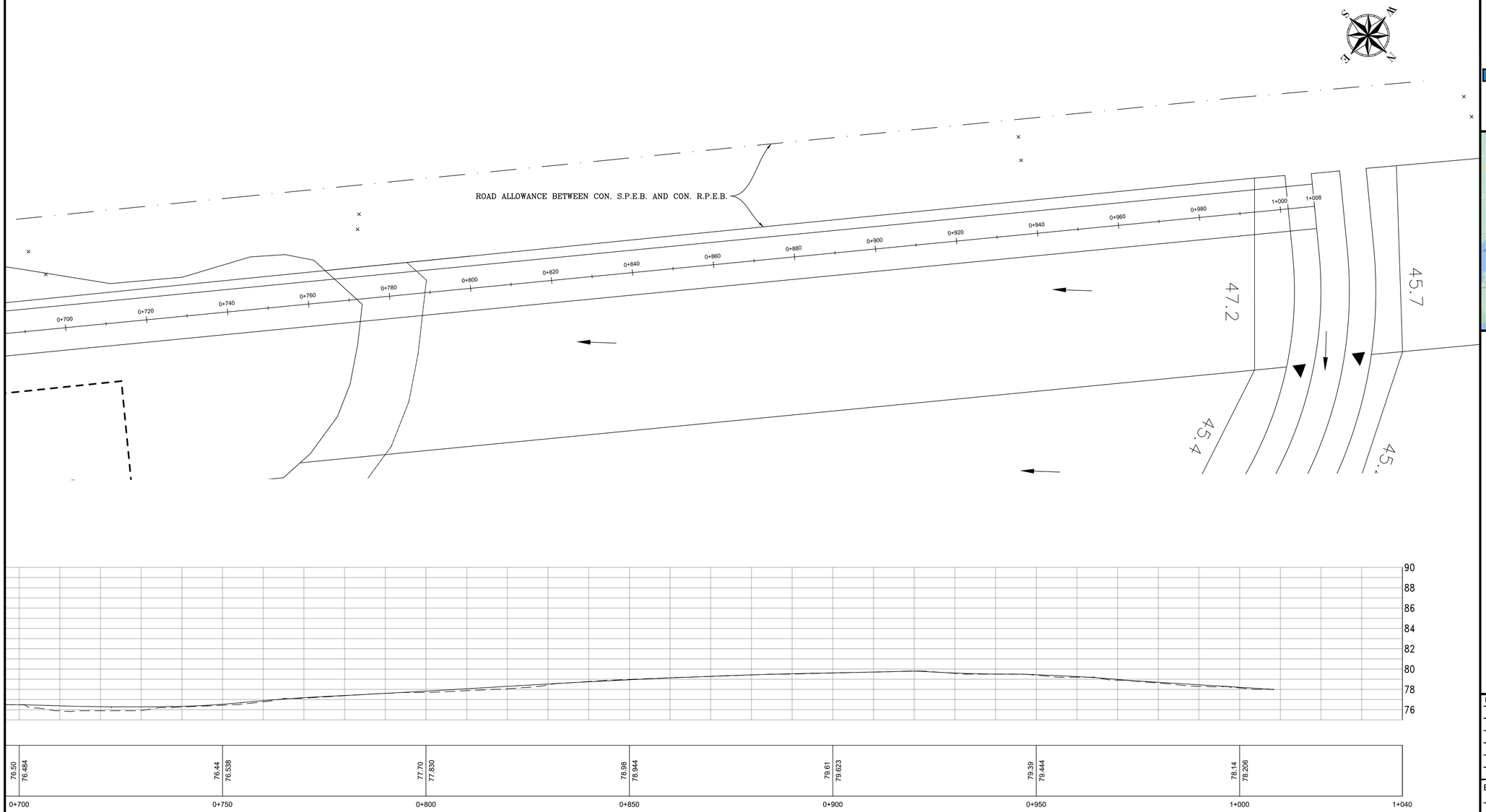

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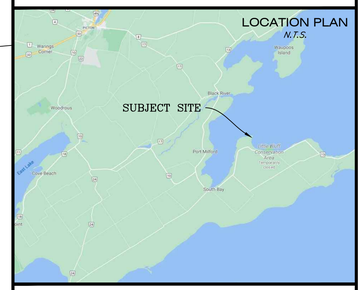

REVISIONS

No.	Description	Date
#1	ISSUED FOR WETLAND COMPENSATION	2022/02/24

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

Client / Land Owner:

URSTRONG

Project:

HALFMOON BAY

PRINCE EDWARD COUNTY ONTARIO

Drawing Title:

PLAN & PROFILE

Drawn by: DF

Checked By: MB

Scale: 24"x36" 1:500

Date: FEBRUARY 24, 2022

Project Number: GW-21014

Drawing Number: C-104

SHEET 4 of 5

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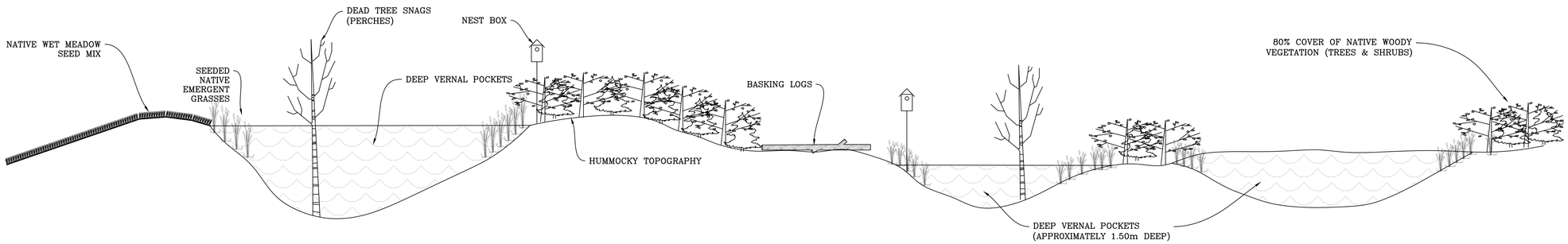
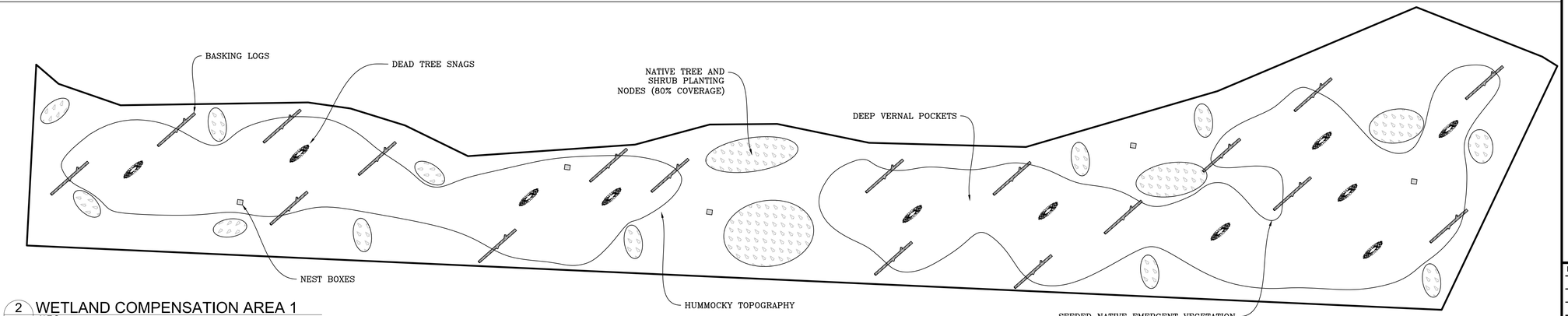


1 C-105 TYPICAL WETLAND SECTION
N.T.S.



2 C-105 WETLAND COMPENSATION AREA 1
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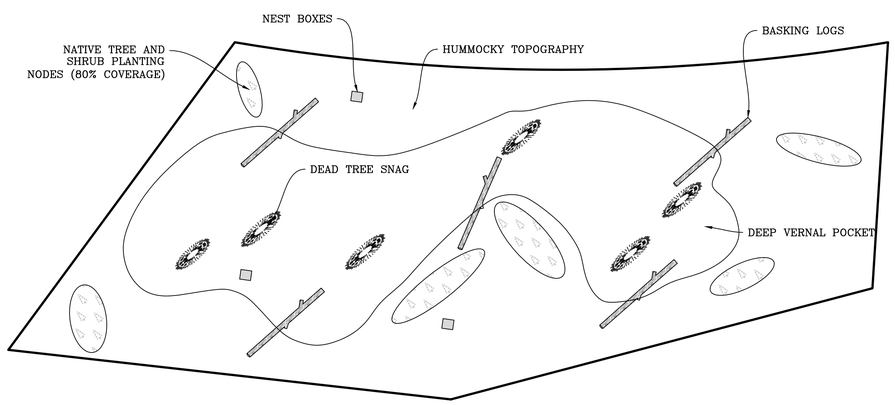

3 C-105 WETLAND COMPENSATION AREA 2
N.T.S.

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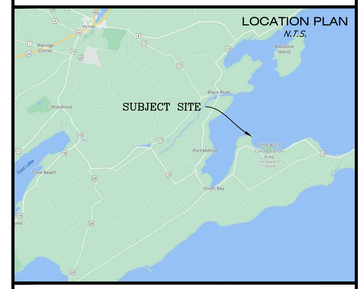
LOCATION PLAN
N.T.S.



WETLAND 1 - 0.68ha
- AQUATIC AREA = 0.32ha
- TERRESTRIAL AREA = 0.36ha

WETLAND 2 - 0.15ha
- AQUATIC AREA = 0.06ha
- TERRESTRIAL AREA = 0.09ha

REVISIONS

No.	Description	Date
#1	ISSUED FOR WETLAND COMPENSATION	2022/02/24

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

Client / Land Owner:
URSTRONG

Project:
HALFMOON BAY
PRINCE EDWARD COUNTY ONTARIO

Drawing Title:
WETLAND DETAILS

Drawn by: DF
Checked By: MB
Scale: 24"x36" NTS
Date: FEBRUARY 24, 2022

Project Number: GW-21014
Drawing Number: C-105
SHEET 5 of 5

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