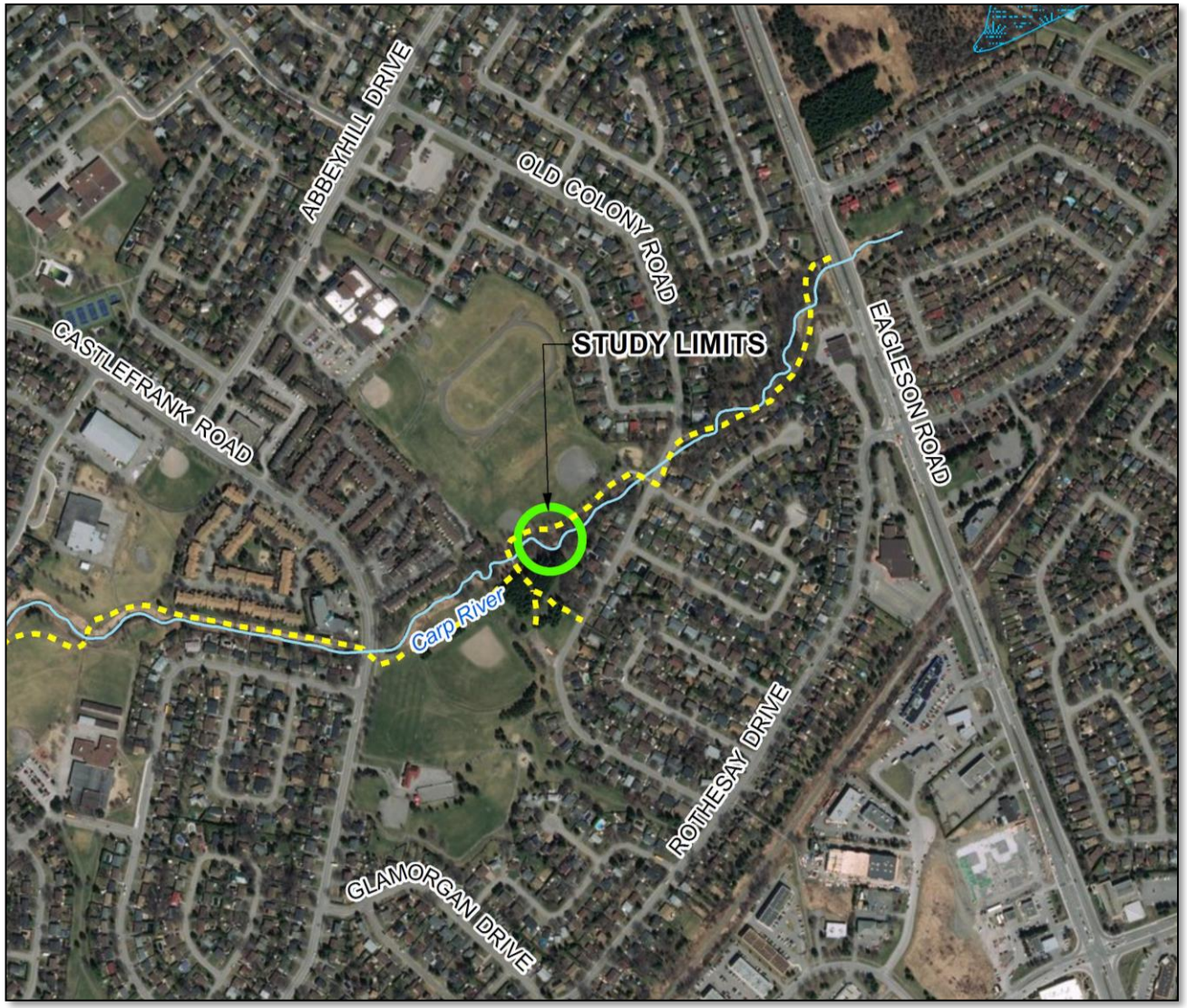
CARP CREEK EMBANKMENT RESTORATION
CONSERVATION ONTARIO CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC INFORMATION CENTRE
JANUARY 2021

CARP CREEK STUDY AREA

The Carp Creek Embankment Restoration study area is located along the Carp Creek within Glen Cairn community, between Terry Fox Drive and Eagleson Road. The portion of creek under investigation runs perpendicular between Castlefrank Road, and Old Colony Road, and is adjacent to the Hope Cloutier Park and A.Y. Jackson High School, within the City of Ottawa.

This Class EA is solely to remediate the severe erosion occurring within the study area limits and will not address and/or deal with recent flooding issues along the Carp Creek/River.



PROJECT BACKGROUND

2011-2013

The City of Ottawa retained the services of JTB Environmental Systems Inc. to assess the existing conditions along the Carp Creek from upstream of the Castlefrank crossing through to Eagleson Road. The Assessment Report identify an area of potential concern east of Castlefrank Road and upstream of the pedestrian bridge crossing.

2017-2018

McIntosh Perry was retained by MVCA to complete a Conservation Ontario Class Environmental Assessment (Class EA), preliminary and detailed design and prepare tender documents for the Carp Creek embankment restoration within the specified study area.

Fall 2019

In fall 2019, McIntosh Perry met with MVCA and City of Ottawa to discuss the selected Technically Preferred Alternative (TPA) for the Carp Creek embankment restoration. At that time, MVCA and the City requested that an additional alternative solution be considered and tendering of the TPA be put on hold.

Winter 2019/Spring 2020

McIntosh Perry further investigated the additional alternative solution which included re-grading the eroded embankment within the study area (south bank) to provide more floodplain storage and dissipate energy. In Spring 2020, MVCA and City of Ottawa decided to undertake a Class EA Addendum to re-evaluate and confirm the TPA.

CONSERVATION ONTARIO CLASS ENVIRONMENTAL ASSESSMENT

Class EA Process

The Carp Creek Embankment Restoration project is following the process outlined in the Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects.

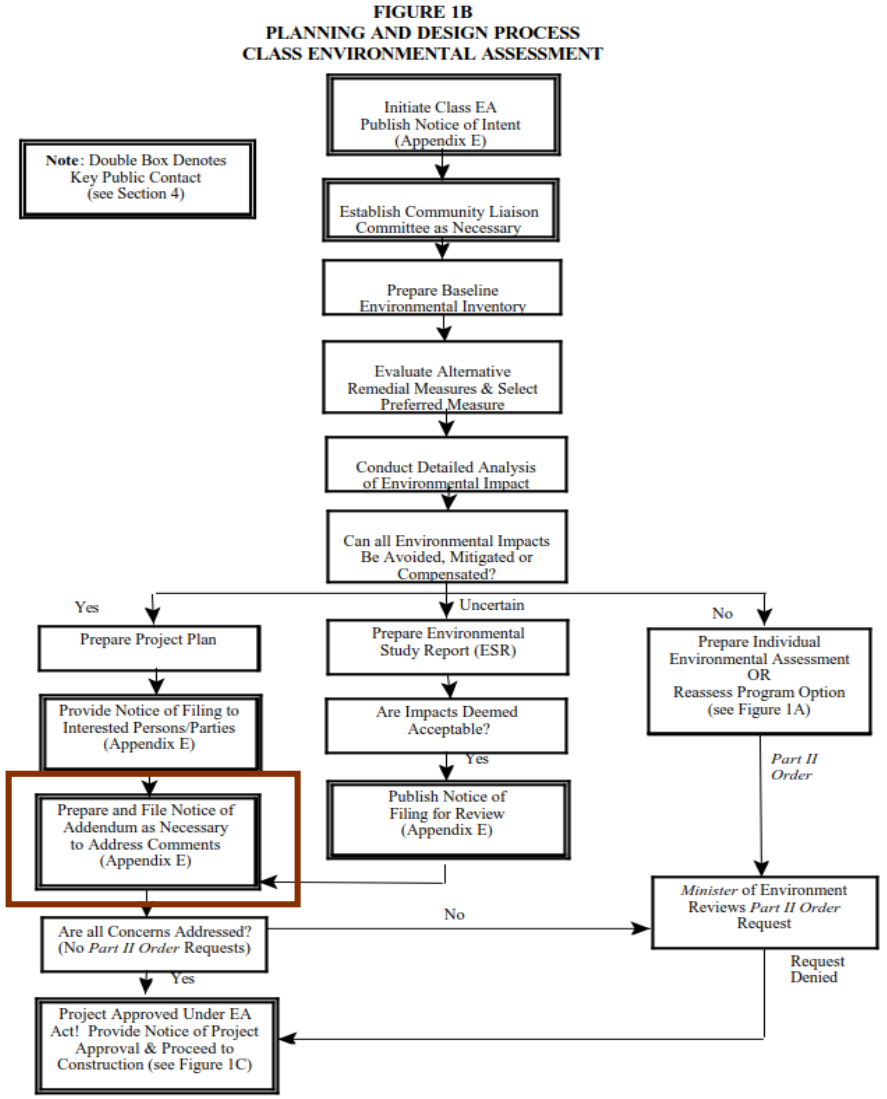
The process provides a project planning and design framework for proponents (conservation authorities like Mississippi Valley Conservation Authority) to ensure they meet the requirements of the Provincial Environmental Assessment Act.

As part of the process, consultation is required with all stakeholders including the public and agency partners at all stages.

An addendum should be undertaken should a “change in an environmental setting, or other unforeseen circumstances may necessitate a change to the proposed undertaking”.

A Notice of Filing of Addendum should be circulated, and a 15-day review period be provided for public and agency to review the addendum.

We are here



RATIONALE FOR ADDENDUM

Project Objectives

In 2019, MVCA and the City of Ottawa re-evaluated the project and identified the following objectives for this assignment:

- Stabilize the Carp Creek embankment within the study area and prevent any further erosion;
- TPA to be in compliance with the City' draft Official Plan Policy, Section 4.9.2 states "Natural watercourses shall be kept in their natural condition. Where an alteration is assessed as being environmentally appropriate and consistent with a Council-approved study, watercourse alterations shall follow natural channel design". To restore the embankment back to a natural and functional feature of the watercourse.”; and
- To the extent possible, provide more floodplain storage and energy dissipation within study area, while minimizing impacts to the natural environment.

Addendum Process

In accordance with the guidance document for Conservation Ontario Class Environmental Assessment, January 2002, as amended June 2013, Section 3.8, an addendum should be undertaken should a “change in an environmental setting, or other unforeseen circumstances may necessitate a change to the proposed undertaking”. The addendum shall describe the circumstances necessitating the change, the environmental implications of the change and what mitigation methods will be employed to mitigate the negative environmental effects of the change.

PROBLEM STATEMENT/ PURPOSE OF THE UNDERTAKING

The Carp Creek embankment has become unstable due to flooding and severe erosion. The severe erosion is primarily along the southeast embankment. If erosion of the embankment is to continue, it will deposit high levels of sediment into the watercourse, as well as extending into the green space (i.e. forest, parkland, manicured lawns, etc.) along the Carp Creek which is immediately adjacent to residential dwellings. Therefore, the purpose of this undertaking is to identify and deliver an innovative design that will mitigate the erosion of the Carp Creek embankment within the above noted study area.

BASELINE ENVIRONMENTAL INVENTORY

Study Area Description

- Carp Creek is part of the headwater area of the Carp River watershed.
- The creek is located within a forested valley and surrounded by the Glen Cairn community, A.Y. Jackson Secondary School, Hope Cloutier Park, and the Frank MacDonald Ball Park.
- Top of the slope is vegetated with mature trees. A few trees were observed fallen into the creek once undermined by erosion.
- Area beyond mature trees consists of manicured lawns, residential dwellings, a walking trail and recreational fields.

Natural Science

- Carp Creek is known to have a warm water thermal regime and include a wide range of fish communities.
- The forested habitat within the study area would provide habitat for breeding migratory birds and various wildlife species.
- During the 2017 and 2020 field investigations, no Species at Risk (SAR) were observed within the study area.
- Potential SAR within the general vicinity of the study area, as well as their status and habitat protection are stated in below table. Potential impacts to the surrounding natural environment will be considered during the evaluation of alternative solutions, and potential mitigation measures will be identified.

Species at Risk			
Common Name	**Scientific Name**	**Provincial Status**	**Federal Status**
Blanding's Turtle	*Emydoidea blandingii*	Threatened	Threatened
Eastern Musk Turtle	*Sternotherus odoratus*	Special Concern	Threatened
Common Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern
Canada Warbler	*Cardellina canadensis*	Threatened	Threatened
Eastern Wood-pewee	*Contopus virens*	No Status	Special Concern
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Threatened	Threatened

BASELINE ENVIRONMENTAL INVENTORY

Geotechnical

- The site stratigraphy consists of topsoil, clay/silty clay layer, followed by a till layer.
- It was also observed that there is an alluvial deposit (a mix of variable portions of gravel, sand, silt, and clay) of variable thickness that is interbedded with a clay/silty clay layer.
- The clay/silty clay layer was observed to be desiccated above the groundwater table and very soft below the water table.
- A slope stability analyses was performed to evaluate the current slope condition, to determine a suitable backslope gradient and to estimate the factor of safety (FOS) against failure.
- Three slope cut ratios were investigated (2H:1V, 2.5H:1V and 3H:1V).
- A slope cut of 2.5H:1V ratio was recommended, steeper slopes are not recommended from a surface erosion perspective.

Hydraulic and Fluvial Geomorphology

- The average bankfull widths and depths through this reach are 5.25 m and 0.57 m, respectively.
- Depth of water within the study area average from 15 to 30 cm.
- The 100-year floodwater elevation is approximately 102.23 m throughout the study area with velocities ranging from 2.52 - 3.58 m/s for the 2-year to 100-year return periods.
- The study reach of the Carp Creek is within the Ottawa Valley Clay Plains, which leads to poor infiltration and flooding.

ISSUES RELATED TO EROSION

The eroded area is located at a sharp creek meander which is exposed to excessive erosive forces and high velocities during flood events.

The existing bank is failing due to the creek being out of alignment which is causing toe erosion and mass washout of the existing slopes.

The southeast embankment is relatively steep and remains susceptible to high discharge events that will eventually lead to further erosion.

The sites geotechnical stratigraphy consists of clay material topping till with a low bearing capacity.

Very acute angle of the exiting channel tends to direct flows at the immediately downstream banks causing additional erosion concerns.

OVERVIEW OF 2017/2018 CLASS ENVIRONMENTAL ASSESSMENT

A range of alternative solutions were identified and evaluated to address the problem/opportunity statement prepared for the 2017/2018 Class EA. Six Alternative Solutions were evaluated.

Through consultation with agencies, stakeholders and the public, and the Class EA evaluation process, a Technically Preferred Alternative was selected and carried forward to the detailed design and tendering stage.

Technical Preferred Alternative #4 - partial realignment of the creek with the installation of a live crib wall, as well as plantings and Rip Rap strategically placed to protect the toe of slope and at transition points along the creek.

ALTERNATIVE SOLUTIONS

1. "Do Nothing"
2. Solider Piles and Wood Lagging
3. Mechanically Stabilized Earth
4. Partial Realignment with live bank treatment (i.e. live crib wall, coir fibre logs, planting/Rip-Rap combinations, live stakes, wattle fence, etc.)
5. Partial Realignment with hard bank treatment (i.e. Stacked/Terraced Stone Revetment, gabion basket, rip-rap revetment, etc.),
6. Full Realignment

CLASS EA ADDENDUM ALTERNATIVE SOLUTIONS

Alternatives carried forward from the long list in 2017/2018 Class EA: **Alternative 4** – partial channel realignment with live bank /Bio-Engineered treatment (live crib wall, planting/Rip-Rap combinations and live stakes) and **Alternative 6** – full channel realignment, as well as the new alternative solution:

Alternative 7 - Partial Channel Realignment with Revegetation: partial realignment of the channel and re-grading the eroded embankment within the study area back to a stable slope. The re-graded slope would be stabilized using natural material such as live bank (planting, live stakes, etc) and Rip Rap treatments.

Long List of Alternatives

Alternative 1:	"Do Nothing"
Alternative 2:	Solider Piles and Wood Lagging
Alternative 3:	Mechanically Stabilized Earth
Alternative 4:	Partial Realignment with Live Bank/Bio-Engineering Treatment
Alternative 5:	Partial Realignment with Hard Bank Treatment
Alternative 6:	Full Realignment

Short List of Alternatives

Alternative 4:	Partial Realignment with Live Bank/Bio-Engineering Treatment
Alternative 6:	Full Realignment
Alternative 7:	Partial Creek Realignment with Re-grading of Embankment and Stabilization using Live Bank/Rip Rap Treatments

Alternatives have been evaluated considering four environmental categories and various evaluation criteria specifically relevant to the study area, objectives and stakeholders.

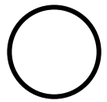
PRELIMINARY EVALUATION OF ALTERNATIVE SOLUTIONS

Evaluation Criteria	Description of Criteria	Criteria Measures	Description of Criteria Measures	Alternative 4 Partial Creek Realignment with Live Crib Wall and Planting/Rip Rap	Alternative 6 Full Creek Realignment	Alternative 7 Partial Creek Realignment with Re-grading of Embankment and Stabilization using Live Bank/Rip Rap Treatments
Function Environment	Criteria to evaluate whether the alternative Solution addresses the problem and opportunities; as well as, evaluate the operational suitability and engineering characteristics of the Solution.	Infrastructure Plans and Policies	Compatibility with MVA and City of Ottawa guidelines, standards and policies (i.e. City of Ottawa Draft Official Plan).	 - Incorporates natural stream features but not to the full extent as Alternative 6 & 7. Does not fully conform to the Draft Official Plan. - Crib walls provides both embankment and toe protection. - Mitigates erosion of embankment but doesn't provide any additional floodplain storage and/or energy dissipation. - If properly constructed and allowed enough time to effectively vegetate, the wall is an effective erosion mitigation measure. - Crib walls require monitoring and maintenance to ensure no shifting or materials have become displaced.	 - Highly effective as new channel would be designed to be stable within the existing flow regime. - Potential to increase the capacity of the watercourse. - Natural channel would be designed to require minimal maintenance.	 - Conforms to the City of Ottawa Draft Official Plan that "Natural watercourses shall be kept in their natural condition" - Incorporates natural stream design. - Realignment require minor reclaiming of additional lands, however, won't result in impacts to residential lands, MUP or existing recreational facility. - Effective mitigation measure once vegetation establishes and Rip Rap protection properly sized at toe of slope. - Natural channel design requires minimal maintenance.
		Effectiveness of Erosion Mitigation and Embankment Stabilization	The ability to address the existing erosion condition within the study area both long and short term.			
		Durability	The ability to withstand wear, pressure or further erosion.			
		Maintenance	Minimal maintenance and is self-sustaining.			

PRELIMINARY EVALUATION OF ALTERNATIVE SOLUTIONS

Evaluation Criteria	Description of Criteria	Criteria Measures	Description of Criteria Measures	Alternative 4 Partial Creek Realignment with Live Crib Wall and Planting/Rip Rap	Alternative 6 Full Creek Realignment	Alternative 7 Partial Creek Realignment with Re-grading of Embankment and Stabilization using Live Bank/Rip Rap Treatments
Biological/ Physical/ Natural Environment	Criteria to evaluate the alternative Solution's effects on the natural heritage systems, natural environment and habitats, and water quality.	Fish/Aquatic Habitat	Presence of fish communities and aquatic habitats; and potential impacts, including to water quality.	 - Within the portion of the realigned creek, there will be opportunities to improve fish/aquatic habitat. - Duration of in-water works likely to be short. - Short-term impacts such as minor loss of mature trees and short-term impacts to riparian species. Post-construction site restoration will ensure no long-term adverse effects or changes to terrestrial habitat affected. - If terrestrial habitat is to be removed during construction, mitigation measures are to be implemented to protect SAR. - The design includes a low flow channel to maintain a natural process of sediment transport. - Mitigation measures (i.e. Rip Rap) will be provided to minimize the impact of directing flows at downstream bank. - This alternative does not provide as much opportunity to allow larger flows to have additional room for energy dissipation on the floodplain as is provided for Alternative 7 and potentially alternative 6.	 - Opportunity to improve fish/aquatic habitat in new channel. However, an extensive realignment would be required through the study area and adjacent lands, including areas that are currently not exhibiting any problems. - Greater short-term and long-term impacts due to the loss of significantly more greenspace and verequired to adequately realign the creek to be stable within the existing flow regime. - Extensive terrestrial habitat is to be removed during construction, mitigation measures are to be implemented to protect SAR. - In the short-term, this alternative will have the most impact to adjacent landscaping and will not be aesthetic pleasing. However, in the long-term, the new channel designed would include aesthetically pleasing enhancement features such as plantings, walking paths, etc. - New channel would be designed to be stable within the existing flow regime but does run the risk of negatively impacting upstream and downstream.	 - Opportunities to improve fish/aquatic habitat in realigned channel. - Short-term impacts such as minor loss of mature trees and short-term impacts to riparian species. Post-construction site restoration would ensure no long-term adverse effects or changes to terrestrial habitat affected. - More vegetation removal will be required with this alternative in comparison to alternative 4 due to the regrading of the embankments at 2.5H:1V and additional staging area. - Slightly shorter duration of in-water works likely compared to atlernative 4. - If terrestrial habitat is to be removed during construction, mitigation measures are to be implemented to protect SAR. - Incorporation of a bankfull bench allows the low flow channel to maintain a natural process of sediment transport while also allowing larger flows to have additional room for energy dissipation on the floodplain. - Channel realignment minimizes the impact of directing flows at downstream bank.
		Terrestrial Habitat (wildlife, habitat, and vegetation)	Presence of terrestrial wildlife habitat areas and potential impacts			
		Species-at-Risk	Presence of SAR and potential Impacts/ opportunities for mitigation.			
		Geomorphology	The ability to mitigate any short- and long-term impacts to the watercourse. Channel formation must consider fluvial and hydraulic properties of stream flow.			

PRELIMINARY EVALUATION OF ALTERNATIVE SOLUTIONS

Evaluation Criteria	Description of Criteria	Criteria Measures	Description of Criteria Measures	Alternative 4 Partial Creek Realignment with Live Crib Wall and Planting/Rip Rap	Alternative 6 Full Creek Realignment	Alternative 7 Partial Creek Realignment with Re-grading of Embankment and Stabilization using Live Bank/Rip Rap Treatments
Social and Cultural Environment	Criteria to evaluate the alternative Solution's effects on community and social features, and properties within the study area.	Public Safety	Protect, maintain and enhance the watercourse through naturalization and improved stability of the the embankment.	 - Eroding embankment will be stabilized and regraded to a safer slope. - The new crib will stay within the existing creek valley and improves the stability of the embankment. However, less of a natural channel design than alternative 6 & 7. - Minor pedestrian and residential impacts during construction - Moderate disturbance – typically requires larger machinery during construction for placement of logs. - Smallest construction area.	 - Longer construction period leads to a higher risk to public safety. - The new realignment will not stay within the existing creek valley. Additional land would be required for the full realignment, which would extend into the adjacent recreational faculties. - Significantly long construction period which will have an impact on residences, recreational activities and schools. Extensive staging requirements. - Difficult to construct due to current landuses. - Largest construction area and extensive staging requirements.	 - Eroding embankment will be stabilized and regraded to a safer slope. - Provides a natural channel design and improves the stability of the embankment for residence to enjoy. - Minor pedestrian and residential impacts during construction. - Moderate disturbance – typically requires larger machinery during construction for re-grading purposes and placement of Rip Rap and planting.
		Land Use/Socio Conditions	Potential to impact residences, community, public parks, institutions or recreation within or adjacent to the study area.			
		Construction Impacts	Duration of construction, staging options and potential for construction-related impacts on public, access, noise and dust.			
Implementation	Criteria to evaluate the financial implications and implementation opportunities of the alternative Solution.	Capital Costs	Capital cost of proposed improvement	 - Lower development and labour cost over other alternatives. - Long term sustainability and therefore reduced maintenance costs but will still require monitoring and maintenance. - Construction duration is anticipated to be approximately 8 weeks	 - High development and labour cost over other alternatives. - Natural channel design requires minimal maintenance costs. - Dependent on design, construction duration could be anywhere from 6-18+ months	 - Lower/moderate development and labour cost over other alternatives. - Natural channel design requires minimal maintenance costs. - Construction duration is anticipated to be approximately 8 weeks
		Operational and Maintenance Costs	Operational and maintenance costs of proposed improvement over life-cycle.			
		Estimated Construction Duration	Duration of construction anticipated for implementation of design alternative.			

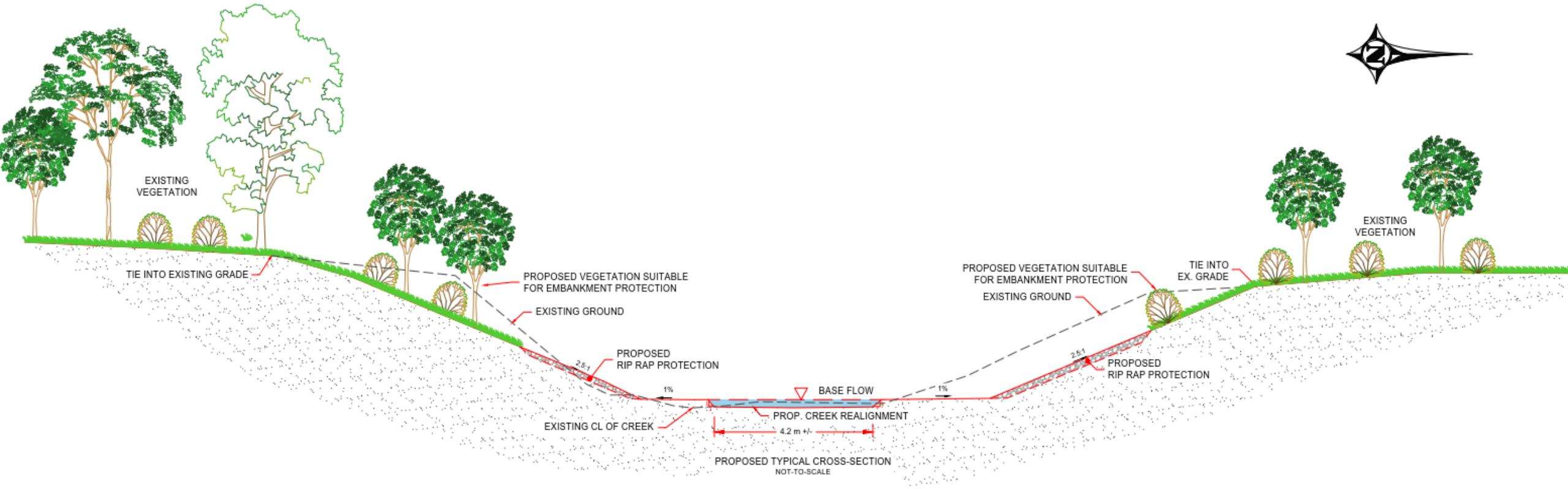
PRELIMINARY TECHNICALLY PREFERRED ALTERNATIVE

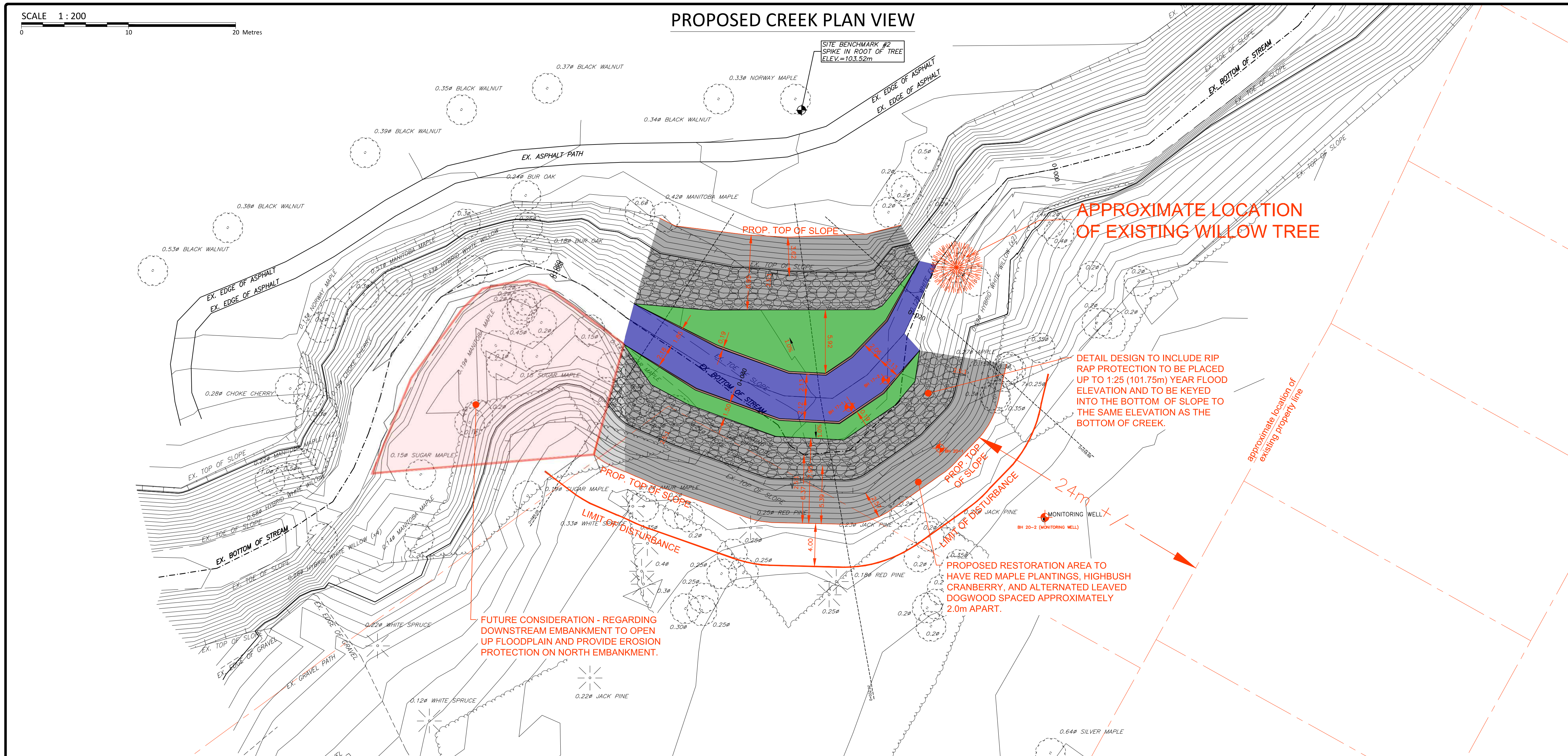
Alternative 7: Partial Realignment with Re-grading of Embankments and Stabilization using Live Bank/Rip Rap Treatments. In accordance with preliminary discussion and evaluation, the preliminary TPA consist of a partial realignment of the channel to the north and re-grading the eroded embankment within the study area (south bank) back to a stable slope. The re-graded slopes will be stabilized using natural material such as live bank (planting, live stakes, etc.) and Rip Rap treatments. Slight re-grading of banks upstream and downstream of apex of eroded bank will be required to tie back into the existing embankment.

Applications and Effectiveness:

- Stabilize the Carp Creek embankment within the study area and provides erosion control;
- Complies with the City' draft Official Plan Policy, Section 4.9.2 which states "Natural watercourses shall follow natural channel design to restore the embankment. Where an alteration is assessed as being environmentally appropriate and consistent with a Council-approved study, watercourse alterations shall follow natural channel design". To restore the embankment back to a natural and functional feature of the watercourse.";
- Provides more floodplain storage and potential for energy dissipation within study area;
- Creates a stable alignment with stable bank slopes through the placement of stone protection at the toes of slope for immediate protection and plantings for long-term stability along the embankments, top of bank and proposed bench within the floodplain, and
- Maintains a natural embankment which will support various terrestrial, fish, aquatic and SAR habitat.

PRELIMINARY TECHNICALLY PREFERRED ALTERNATIVE TYPICAL CROSS-SECTION





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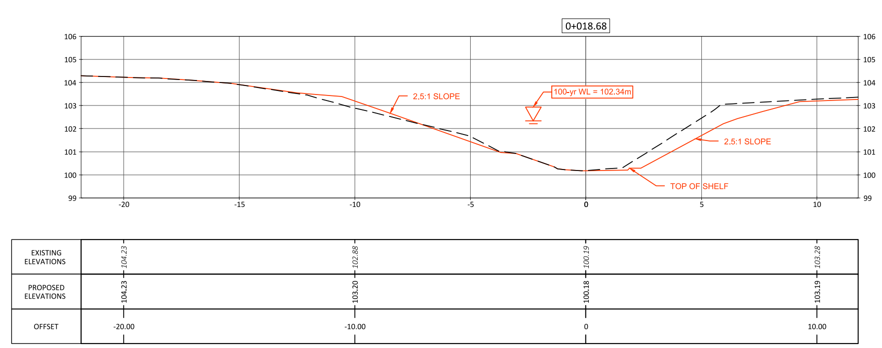

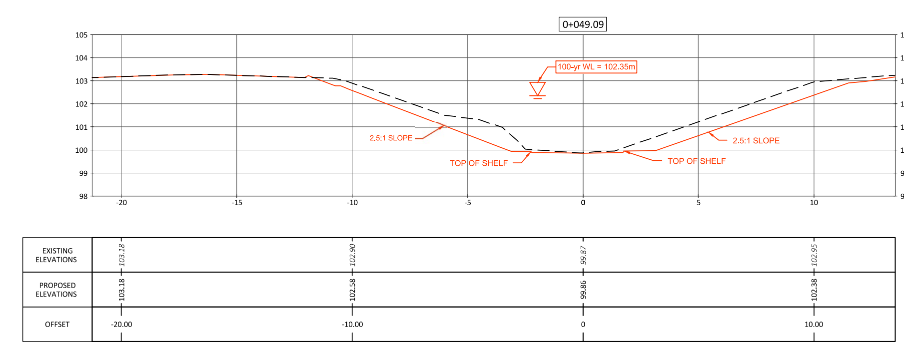

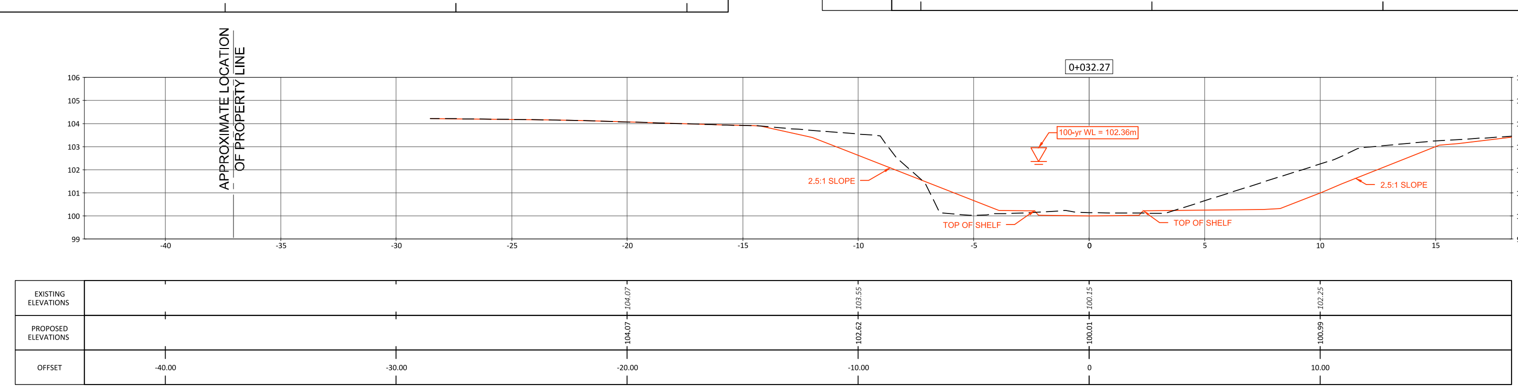

GENERAL NOTES:

1. ALL DIMENSIONS AND ELEVATIONS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
2. ORIGINAL TOPOGRAPHY, GROUND ELEVATION AND SURVEY DATA SHOWN ARE PROVIDED BY OTHERS AND SUPPLIED FOR INFORMATION PURPOSES ONLY AND IMPLY NO GUARANTEE OF ACCURACY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION OBTAINED FROM THEM.
3. THIS PLAN IS TO BE READ IN CONJUNCTION WITH ALL LANDSCAPING PLANS, DETAILS AND ANY OTHERS WHICH MAY APPLY.
4. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
5. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT.
6. THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
7. RESTORE ALL TRENCHES AND SURFACES OF PUBLIC ROAD ALLOWANCES TO CONDITION EQUAL OR BETTER THAN ORIGINAL CONDITION AND TO THE SATISFACTION OF THE CITY OF OTTAWA AUTHORITIES.
8. EXCAVATE AND DISPOSE OF ALL EXCESS EXCAVATED MATERIAL, SUCH AS ASPHALT, CURBING AND DEBRIS, OFF SITE AS DIRECTED BY THE ENGINEER AND THE CITY OF OTTAWA.
9. TOPSOIL TO BE STRIPPED AND STOCKPILED FOR REHABILITATION. CLEAN FILL TO BE PLACED IN FILL AREAS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
10. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION, AND REMOVAL OF ALL NECESSARY SIGNAGE, DELINEATORS, MARKERS AND BARRIERS.
12. DO NOT ALTER GRADING OF THE SITE WITHOUT PRIOR APPROVAL OF THE CITY OF OTTAWA
13. THE SITE GRADING CONTRACTOR IS RESPONSIBLE FOR ENSURING INSTALLATION OF EROSION AND SEDIMENT CONTROLS PRIOR TO COMMENCING CONSTRUCTION. CARE SHALL BE TAKEN AT THE REMOVAL STAGE TO ENSURE THAT ANY SILT THAT HAS ACCUMULATED IS PROPERLY HANDLED AND DISPOSED OF.

BENCHMARK INFORMATION:

TBM - OBVERT AT DOWNSTREAM END OF EXISTING BOX CULVERT APPROXIMATELY 100m UPSTREAM OF WORK ZONE
APPROXIMATE GEODETIC ELEVATION = 102.22m

No.	Revision/Issue	Date
2	REVISED CONCEPT DESIGN	OCT 26/20
1	CONCEPTUAL DESIGN	SEPT 18/20

Check and verify all dimensions before proceeding with the work

Do not scale drawings

McINTOSH PERRY
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Stamp:

Client:
MISSISSIPPI VALLEY CONSERVATION AUTHORITY
10970 ON-7, CARLETON PLACE
ON K7C 3P1

Project:
CARP CREEK EMBANKEMENT RESTORATION

Drawing Title:
PROPOSED ALIGNMENT CROSS SECTIONS

Scale:	AS SHOWN	Project Number:	CM-17-0429-02
Drawn by:	R.F.		
Checked By:	L.M.	Drawing Number:	
Designed By:	B.A., R.F.		
Date:	09/18/20	SHEET 1 of 1	C101A

NEXT STEPS & SCHEDULE

Milestone	Deadline
Notice of Public Information	January 28, 2021
Public Information Review Period Expires	February 11, 2021
Select Technically Preferred Alternative	February 15, 2021
Prepare Project Plan Report and Preliminary Design	February 19, 2021
Mandatory Consultation - Notice of Filing to an Addendum for Review (15-day period)	February 2021
Deadline for Comments and Part II Orders	March 2021

For further information on the Carp Creek Embankment Restoration Project, please contact:

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The Preliminary Project Plan Addendum Report is currently available for viewing on MVCA website's (https://mvc.on.ca/carp-creek)