Centre Wellington

THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON

SCHEDULE B MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

REPLACEMENT OF STRUCTURE 24-P

3RD LINE WEST

PROJECT FILE

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

Transport Canada **Transports Canada**
Marine **Maritime**

RECEIVED
AUG 23 2010

Navigable Waters Protection Program
Programme de protection des eaux navigables
100 Front Street South
Sarnia, Ontario N7T 2M4

Your File Votre référence

Our File Notre référence
8200-2010-400382

B5144A
→ DAH
→ PFA
→ DAC
→ CPC CPC

August 19, 2010

Township of Centre Wellington
c/o Triton Engineering Services Ltd.
105 Queen Street West, Unit 14
Fergus, ON N1M 1S6

Attention: David G. Donaldson, P. Eng.

Dear Sir:

Re.: Review under the *Navigable Waters Protection Act* for the Bridge located at approximately 43° 42' 15.27" N – 080° 31' 13.76" W, 3rd Line West, Former Township of Pilkington, Township of Centre Wellington, Carrol Creek, in the Province of Ontario

Reference is made to your correspondence received on June 29, 2010.

Transport Canada officials have determined that the provisions of the *Navigable Waters Protection Act* (*NWPA*) **do not apply** to your project and, therefore, an Approval is not required.

This determination relates to navigation only and does not relieve you of your responsibility to obtain any other forms of approval under any applicable laws.

Should you have any questions, please do not hesitate to contact our office at (866) 821-6631 or by facsimile transmission at (519) 383-1989 or by e-mail at NWPontario-PENontario@tc.gc.ca.

Sincerely,

Sue MacDonald-Simcox
Navigable Waters Protection Officer
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

SMS/km

Canada

Comparison of Alternatives

TOWNSHIP OF CENTRE WELLINGTON STRUCTURE 24-P, THIRD LINE BRIDGE - CLASS ENVIRONMENTAL ASSESSMENT
TABLE 1 – COMPARISON OF ALTERNATIVES

	Alternative 1	Alternative 2	Alternative 3
CRITERIA	**Do Nothing**	**Rehabilitate Existing Structure**	**Replace Bridge**
Transportation			
• Operational Safety	• Inadequate traffic barrier is a safety hazard for motorists. • Single lane structure is a safety hazard • Travel deck width of 5.0m is less than the Township standard of 9.1m for the road	• Rehabilitated bridge would have traffic railing conforming to current standards, however this would reduce the already deficient width	• Replacement structure will be in full conformance with current codes and standards.
• Structural	• Poor condition of existing bridge requires posted load limit and will require eventual closure. • Lack of adequate traffic barrier exposes main structural elements to impact damage form vehicles	• Rehabilitation will repair/replace deteriorated components	• New structure with a service life of at least 75 years • Existing structure will be removed
• Road Geometry	• Horizontal alignment is straight; bridge is located at the bottom of a vertical curve. • Vertical road profile is sub-standard	• No change from existing – road profile sub-standard	• Horizontal alignment will remain straight; vertical road profile will be improved to meet current standard for 60 km/h design speed.
• Capacity	• Single lane operation results in delays to motorists • Current standards require a two-lane structure at this location	• No change from existing - Single lane operation will continue to results in delays to motorists • Current standards require a two-lane structure at this location	• Existing single lane restriction at bridge will be eliminated.
• Construction Impact	• No construction in this option, therefore no impact.	• Approximately four month duration. • Construction requires closure of the bridge.	• Approximately four month duration. • Construction requires closure of the bridge.
• **Natural Environment**			
• Vegetation	• No change	• No change	• Temporary loss of terrestrial plants – landscaping plan is incorporated to restore natural vegetation
• Fish Habitat	• No change	• No change	• Temporary loss of fish habitat , however proper mitiation will restore habitat
• Wildlife	• No change	• No change	• No change
• Construction Impacts	• None	• None	• Construction impacts will be negligible with proper mitigation.
• **Hydraulics**			
Minimum Top of Road Freeboard • The Design Flow (25-yr Storm) water surface elevation should be 0.3 m or greater below the top of road low point.	• No Change, existing configuration meets current codes/standards.	• No Change, existing configuration meets current codes/standards.	• Replacement structure will be in full conformance with current codes and standards.
Desired Top of Road Freeboard • The Design Flow (25-yr Storm) energy grade line elevation should be 0.3m or greater below the top of road low point	• No Change, existing configuration meets current codes/standards.	• No Change, existing configuration meets current codes/standards.	• Replacement structure will be in full conformance with current codes and standards.
Top of Road Overtopping • Check Flow water surface elevation should not exceed edge of road (Check Flow=100% of the 100-yr storm for Local Road)	• No Change, existing configuration meets current codes/standards.	• No Change, existing configuration meets current codes/standards.	• Replacement structure will be in full conformance with current codes and standards.
Relief Flow • Maximum depth of flow on the roadway should not exceed 0.3m for the Regulatory Storm. • Product of Velocity and Depth on the roadway should not exceed 0.8 m^2/s for the Regulatory Storm	• Not applicable, Regulatory Storm does not overtop road.	• Not applicable, Regulatory Storm does not overtop road.	• Not applicable, Regulatory Storm will not overtop road.

CRITERIA	Alternative 1 Do Nothing	Alternative 2 Rehabilitate Existing Structure	Alternative 3 Replace Bridge
Soffit Clearance • Normal Summer High Water Level (NSHWL) water surface elevation should be 2.0m or greater below the Soffit elevation. • The Design Flow (25-yr Storm) water surface elevation should be 0.3 m or greater below the Soffit elevation.	• Soffit clearance is adequate	• Soffit clearance is adequate	• New bridge soffit elevation will be increased along with clearance to suit proposed road profile adjustments. Therefore soffit clearance requirements will be satisfied.
Upstream floodlines: • Watercourse is regulated by Grand River Conservation Authority, floodlines are not to be increased.	• No change	• No change	• New bridge will have a slightly larger opening area to ensure that upstream floodlines are not increased.
• Socio-Economic Impact			
• Impacts to Private Property	• None	• None	• Raise road profile for improved vertical alignment will require additional property to accommodate expanded slopes
• Property Purchase Required	• None	• None	• Yes
• Impacts to Public Traffic	• Existing posted load limit of 9 tonnes. Over time, this limit will have to be reduced as the bridge continues to deteriorate culminating in eventual complete closure.	• Road closure during construction • Continued single lane operation results in delays to motorists • Rehabilitated structure will not require a load limit.	• Public traffic will experience road closure during construction; however, the road will be widened to 2 lanes and posted load limit will be removed
• Impacts to Businesses	• Load limit (as described above) restricts truck traffic and increases travel time for delivery of goods and services	• Road closure during construction	• Road closure during construction
• Heritage	• Retains the existing bridge	• Retains the existing bridge	• Existing bridge will be removed
• Constructability & Cost			
• Constructability	• No construction in this option, therefore no impact	• Construction will require use of temporary debris platforms, cofferdams and silt fence to prevent debris and construction materials from entering the watercourse.	• Construction will require use of temporary debris platforms, cofferdams and silt fence to prevent debris and construction materials from entering the watercourse.
• Utility Impacts	• None	• None	• None
• Cost (excluding Engineering and Property)	• N/A	• $700,000	• $1.1M
• Long-Term Maintenance Costs	• Monitoring and ongoing repairs will be required if rehabilitation or replacement is deferred.	• Rehabilitation will still leave 85 year old structure that will require future repairs / rehabilitation and complete replacement within 20 years.	• New structure will have a useful service life in excess of 75 years and require minimal maintenance for foreseeable future.

Geotechnical Investigation

GEOTECHNICAL INVESTIGATION
PROPOSED BRIDGE RECONSTRUCTION
3RD LINE WEST
BETWEEN COUNTY ROAD 17 AND SIDEROAD 5
CENTRE WELLINGTON, ONTARIO
for
TOWNSHIP OF CENTRE WELLINGTON
c/o TRITON ENGINEERING SERVICES LIMITED

4350G1.R01
September 2002

Naylor Engineering Associates Ltd.

DISTRIBUTION:
4cc: Agent
1cc: File

Naylor
Engineering
Associates Ltd.
CONSULTING ENGINEERS

353 Bridge Street East
Kitchener, Ontario N2K 2Y5
519-741-1313, Fax 741-5422
www.nayloreng.com

September 12, 2002

Township of Centre Wellington
c/o Triton Engineering Services Limited
175 Provost Lane
Fergus, Ontario
N1M 3N3

Attention: Mr. Denis Hollands, C.E.T.

Dear Sir:

Re: Geotechnical Investigation
Proposed Bridge Reconstruction
3rd Line West
Between County Road 17 and Sideroad 5
Centre Wellington, Ontario

Naylor Engineering Associates Ltd. is pleased to submit this report for the geotechnical investigation recently completed for the above referenced project.

This report outlines the investigation procedures and provides a summary of the subsurface conditions encountered. Geotechnical comments and recommendations are provided for the design of the new bridge.

We trust that this report is suitable for your present requirements and we thank the Township of Centre Wellington and Triton Engineering Services Limited for this opportunity to have provided geotechnical engineering services. If you have any questions or require further geotechnical consultation, please do not hesitate to contact our office.

Yours very truly,

Dennis Kelly, P.Eng.

TABLE OF CONTENTS

1. Introduction

Naylor Engineering Associates Ltd. was retained by Triton Engineering Services Limited on behalf of the Township of Centre Wellington to carry out a geotechnical investigation for the proposed reconstruction of a bridge on 3rd Line West, between County Road 17 and Sideroad 5, as shown on the appended Location Plan, Drawing 1. This work was authorized by Mr. Denis Hollands, C.E.T., of Triton Engineering Services Limited on August 6, 2002, following submission of a detailed proposal.

The project involves replacing the existing concrete bridge structure with a new bridge or culvert. It is expected that the new structure will have wingwalls.

The purpose of the investigation was to determine the subsurface conditions at the site and, based on that information, prepare this engineering report with geotechnical recommendations pertaining to foundations, excavations and dewatering, backfilling, and pavement reconstruction.

2. Investigation Procedure

The fieldwork for this investigation was carried out on August 21, 2002 and involved the drilling of two boreholes to depths of 10.9 and 11.2 m below existing grade at the locations shown on the appended Site Plan, Drawing 2. The boreholes were advanced with a CME-55 truck-mounted drillrig equipped with continuous flight hollow stem augers supplied and operated by Aardvark Drilling Inc.

Soil samples were recovered from the boreholes at regular 0.75 and 1.50 m depth intervals using a 50 mm O.D. split spoon sampler in accordance with the Standard Penetration Test (SPT) procedure. The SPT N-values recorded are plotted on the appended borehole logs.

Standpipes were installed in both boreholes to allow measurement of the stabilized groundwater levels. The installations comprised 13 mm diameter CPVC pipes with slotted screens, and bentonite seals near the ground surface. Groundwater levels were measured by Naylor Engineering Associates Ltd. on August 26, 2002. Details of the installations and groundwater observations and measurements are provided on the borehole logs.

The fieldwork was supervised throughout by a member of our engineering staff who directed the drilling and sampling procedures; conducted SPT testing; documented the soil stratigraphies; monitored groundwater conditions; installed the standpipes; and, cared for the recovered soil samples.

The borehole locations, ground surface elevations, and water level of the creek were surveyed by Naylor Engineering Associates Ltd. The boreholes were located relative to existing site features. The elevations are referred to the following temporary benchmark (TBM):

TBM: Bolt in east face of tree located along fence line near northwest corner of bridge, as shown on Drawing 2.

Elevation: 100.00 m (assumed)

All soil samples secured during this investigation were returned to our laboratory for visual examination, as well as moisture content tests, the results of which are plotted on the appended borehole logs. The soil samples will be stored for a period of four months from the date of sampling. After this time, they will be discarded unless prior arrangements have been made for longer storage.

3. Summarized Conditions

3.1 Site Description

For the purposes of this investigation it is assumed that 3rd Line West runs north-south. The road crosses a creek about 900 m south of County Road 17. The crossing structure comprises a concrete bridge that has a span of about 10 m. The road surface is approximately 3.2 m above the existing creek bed. The creek is about 8 m wide and the water level in the creek was 0.1 m deep at the time of the fieldwork. The creek flows from east to west.

At the creek crossing, 3rd Line West comprises a two-lane 5 m wide tar and chip paved road. Site photographs taken in August 2002 are presented in Appendix A.

3.2 Subsurface Soil Conditions

We refer to the appended borehole logs for detailed soil descriptions and stratigraphies; results of SPT testing; moisture content profiles; details of standpipe installations; and, groundwater measurements. We also refer to Drawing 3 for a simplified cross-section of the subsurface stratigraphy at the bridge. The subsurface stratigraphy comprises fill overlying native topsoil, which overlies sand and gravel at 2.6 to 3.1 m below road surface. These upper deposits are underlain by silt till at 6.4 to 7.0 m below road grade.

Both boreholes were drilled beside the pavement of 3rd Line West. Fill was contacted surficially at both locations and is 2.1 to 2.5 m thick. The upper 450 mm of fill comprises sand with some silt and gravel. Below this upper portion, the fill generally comprises topsoil and silt. The fill is loose to compact based on SPT N-values of 8 and 15 blows per 0.30 m penetration of a split spoon sampler. Moisture contents of 9 to 23% indicate that the fill is moist to wet.

Topsoil was contacted beneath the fill at 2.4 m depth on the south side of the bridge (Borehole 1); and, 2.1 m depth on the north side (Borehole 2). The topsoil is 300 to 500 mm thick and comprises dark brown silt. These deposits are wet based on the recorded moisture content of 30%.

A 0.3 m thick deposit of silt was contacted beneath the topsoil in Borehole 1. This deposit comprises silt with some sand and clay.

Sand and gravel were encountered beneath fill, topsoil, and silt at 2.6 to 3.1 m below road surface on both sides of the bridge. The sand and gravel deposit is 3.8 to 4.0 m thick and comprise silty sand and gravel or sand and gravel with some silt. SPT N-values of 24 to greater than 50 blows per 0.30 m indicate a compact to very dense relative density. The granular deposit is saturated as indicated by moisture contents ranging from 8 to 11%.

Silt till was contacted at 6.4 to 7.0 m depth below road surface. This deposit continued below the termination depths of both boreholes and comprises grey sandy silt with some gravel and trace clay. Some saturated sand layers were noted within the silt till. The silt till is very dense based on SPT N-values of greater than 50 blows per 0.30 m, and moist to very moist based on moisture contents of 8 to 11%.

3.3 Groundwater

Groundwater observations and measurements carried out in the standpipes are provided on the appended borehole logs. The groundwater levels were measured at 2.71 m depth in Borehole 1 and 2.72 m depth in Borehole 2. These depths correspond to Elevation 97.40 and 97.30 m, respectively. The water level in the creek was at Elevation 96.89 m at the time of the fieldwork.

Based on these measurements the groundwater is contained in the sand and gravel under unconfined (water table) conditions. Seasonal fluctuations would be expected in the groundwater levels.

4. Discussion and Recommendations

4.1 General

The project involves replacing the existing bridge on 3rd Line West, between County Road 17 and Sideroad 5 in Centre Wellington, as shown on the appended Location Plan, Drawing 1. The existing bridge has a span of about 10 m, and the road surface is about 3.2 m above the existing creek bed. It is expected that the bridge will be replaced with a new bridge or culvert, and that the new structure will have wingwalls.

The subsurface stratigraphy at the boreholes comprises fill overlying native topsoil, which overlies sand and gravel at 2.6 to 3.1 m below road surface. These upper deposits are underlain by silt till at 6.4 or 7.0 m below road grade. Groundwater levels were measured at about 2.7 m below the existing road grade and generally correspond with the water level in the creek. The groundwater is contained in the granular deposits under unconfined (water table) conditions.

The following subsections of this report contain geotechnical recommendations pertaining to foundations, excavations and dewatering, backfilling and lateral earth pressures, and pavement reconstruction.

4.2 Foundations

It is anticipated that conventional spread footings for the new structure would be constructed at about 1.0 m below the existing creek bed (about Elevation 95.8). At this elevation footings will be constructed on the native compact to dense sand and gravel. Footings founded on the sand and gravel may be designed using a bearing capacity at Serviceability Limit States for 25 mm of settlement of 300 kPa. The soil bearing capacity at Ultimate Limit States is 900 kPa.

The footing areas should be inspected by a geotechnical engineer to ensure that the soils are suitable to support the design bearing capacity. Any loose soils noted during the inspections should be subexcavated and replaced with concrete.

The native soils are susceptible to disturbance and therefore it is recommended that a skim coat of concrete be placed over the subgrade immediately following excavation and inspection.

The footings must be provided with a minimum 1.2 m of earth cover or equivalent insulation to provide protection against potential frost damage. The depth of potential scour along the footings must also be considered.

The resistance to sliding of spread footings on the native undisturbed soil may be calculated using the following formula:

$$T = \Sigma V \tan\delta$$

where:

T =	base resistance to sliding (ultimate)
ΣV =	summation of vertical forces acting on footing
$\tan\delta$ =	coefficient of friction for concrete on soil

For computing the resistance against sliding of poured concrete footings a coefficient of friction of 0.55 should be used for the sand and gravel. The resistance to sliding of spread footings can be increased by increasing the weight of the structure or keying the footings into the subgrade soil.

4.3 Excavations and Dewatering

It is anticipated that footings for the new bridge or culvert will be constructed at about 1 m below the stream bed. Excavations for the construction of footings will extend more than 1 m into saturated sand and gravel. Excavations into the saturated sand and gravel will experience rapid groundwater inflow from the sides and bottom of excavation. High capacity pumps and keg wells will be required for dewatering.

Excavation sidewalls should be cut back at 2 or 3 horizontal to 1 vertical below the groundwater table to ensure stability. Excavations above the groundwater table may be cut back at 1 horizontal to 1 vertical. In order to provide a dry work area, the stream should be diverted using cofferdams and high capacity pumps.

4.4 Backfilling and Lateral Earth Pressure

The abutments and wingwalls should be backfilled with granular material such as the excavated native sand and gravel. The excavated pavement granular material may also be suitable for reuse as backfill provided that the material is inspected prior to use. If there is a shortage of on-site material, then imported OPSS Granular 'B' aggregate should be used.

The backfill should be placed in thin lifts and compacted to 95% standard Proctor maximum dry density (SPMDD). Over-compaction should be avoided since this may cause excessive lateral earth pressures against the structure walls. It is recommended that the backfilling operation be inspected in order to approve the backfill materials and ensure the proper degree of compaction is being achieved.

The abutments and wingwalls should be provided with sufficient drainage to prevent the buildup of hydrostatic pressure behind the walls. The equivalent fluid pressures given in Table 6-7.4.4 of the Ontario Highway Bridge Design Code may be used for the computation of earth pressures in the design of the retaining walls.

4.5 Pavement Reconstruction

3rd Line West will be reconstructed following the installation of the new bridge or culvert structure. Any fill required to raise the grade below the pavement structure should comprise imported granular material or excavated native sand and gravel placed in 300 mm thick lifts and compacted to 95% SPMDD. The following pavement component thicknesses are recommended based on the subgrade conditions and anticipated road usage:

Asphaltic Concrete	80 mm
Granular 'A' Base Course	150 mm
Granular 'B' Subbase Course	450 mm

To ensure proper long-term performance and drainage of the pavement structure, it is critical that the Granular 'A' and Granular 'B' materials conform to the gradation requirements of OPSS 1010. Samples of the Granular 'A' and Granular 'B' aggregates should be checked for conformance prior to utilization on-site and during construction. The Granular 'A' base and Granular 'B' subbase courses must be compacted to 100% SPMDD as verified by insitu density testing.

The 80 mm thick layer of asphaltic concrete should comprise a binder layer of HL4 and a surface layer of HL3. It is recommended that the compacted thickness be 45 mm of HL4 and 35 mm of HL3.

The asphaltic concrete paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed according to OPSS 310 and compacted to at least 97% of the Marshall mix design bulk density.

This investigation was conducted for geotechnical purposes only. The conclusions in this report are based on information gathered at specific borehole locations and conditions between the boreholes will vary. Should conditions at the site be encountered which differ significantly from those at the borehole locations, we request that we be notified immediately in order to assess the additional information and its effects on our conclusions.

We trust that this report has been completed within our terms of reference and is suitable for your present requirements. If you have any questions or require further consultation, please do not hesitate to contact our office.

Respectfully submitted,

Jeff Dietz. P.Eng.

Dennis Kelly, P.Eng.

LIST OF ABBREVIATIONS

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Tests and Properties	
AS	auger sample	SPT	Standard Penetration Test
CS	chunk sample	UC	unconfined compression
RC	rock core	FV	field vane test
SS	split spoon	ø	angle of internal friction
TW	thin-walled, open	γ	unit weight
WS	wash sample	w_p	plastic limit
		w	water content
		w_l	liquid limit
		I_L	liquidity index
		I_p	plasticity index
		PP	pocket penetrometer

Penetration Resistances

Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60 ° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a standard split spoon sampler 0.30 m (12 in.)
WH	sampler advanced by static weight of hammer
PH	sampler advanced by hydraulic pressure
PM	sampler advanced by manual pressure

Soil Description

Cohesionless Soils	**SPT 'N' Value**	**D_r (%)**
Relative Density (D_r)	(blows per 0.30 m)	
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	over 50	80 to 100

Cohesive Soils	Undrained Shear Strength (C_u)	
Consistency	**kPa**	**psf**
Very Soft	less than 12	less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000

DTPL	Drier than plastic limit
APL	About plastic limit
WTPL	Wetter than plastic limit

Naylor Engineering Associates Ltd.
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BOREHOLE: 1 and 1A
Sheet 1 of 1

PROJECT Proposed Bridge Reconstruction - 3rd Line West
DATE 21 August 2002
JOB NO. 4350G01
LOCATION between County Road 17 and Sideroad 5, Centre Wellington, ON
FIELD ENG/TECH RM

DEPTH (m)	DESCRIPTION	ELEV.	NUMBER	TYPE	N-VALUE
	GROUND ELEVATION: 100.11				
0	FILL: brown sand, some silt and gravel, moist				
0.45					
0.60	some cobbles				
1	dark brown silt (topsoil), wet	99	1	SS	8
1.50	some brown silt mixed in topsoil				
2		98	2	SS	15
2.15	boulder or concrete				
2.45	TOPSOIL: dark brown silt, wet				
2.75					
3	SILT: brown silt, some sand and clay, moist	97	3	SS	49
3.05	SAND AND GRAVEL: dense to very dense brown sand and gravel, some silt, saturated				
4		96	4	SS	53 /225 mm
4.90	some cobbles				
5		95	5	SS	37 /150 mm
6		94	6	SS	34
7.00	SILT TILL: very dense grey sandy silt, some gravel, trace clay, moist to very moist; some sand layers, saturated	93	7	SS	50 /150 mm
8		92			
9		91	8	SS	60 /150 mm
10		90			
11		89	9	SS	63
11.15	Borehole terminated at 11.15 m.				

SHEAR STRENGTH, kPa(ksf)
FV. NAT. ■ REM. □
UC ✕ PP ▲
50(1)100(2)150(3)200(4)
PENETRATION RESISTANCE
DYNAMIC CONE ✕
STANDARD PENETRATION ●
20 40 60 80

WATER CONTENT (%)
Wp W Wl
10 20 30

GROUNDWATER OBSERVATIONS & PIEZOMETER DETAILS

At drilling completion, water level at 3.0 m.

August 26, 2002
Water level
at 2.71 m
(Elev. 97.40)

NOTES: Auger refusal at 2.15 m (Borehole 1A). Moved location 1.2 m S (Borehole 1)

DRILLING METHOD: Hollow Stem Augers

ENGINEER:

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

BOREHOLE: 2
Sheet 1 of 1

PROJECT Proposed Bridge Reconstruction - 3rd Line West
DATE 21 August 2002
JOB NO. 4350G01
LOCATION between County Road 17 and Sideroad 5, Centre Wellington, ON
FIELD ENG/TECH RM

DEPTH (m)	DESCRIPTION	ELEV.	NUMBER	TYPE	N-VALUE
	GROUND ELEVATION: 100.02				
0	FILL: brown sand, some silt and gravel, moist				
0.45	brown silt, some sand, gravel and topsoil, moist to wet	99	1	AS	
1			2	SS	*
2		98			
2.15	TOPSOIL: dark brown silt, wet		3	SS	18
2.60	SAND AND GRAVEL: compact to dense brown silty sand and gravel, saturated	97	4	SS	24
3					
4		96			
			5	SS	39
5		95			
6		94	6	SS	36
6.40	SILT TILL: dense to very dense brown sandy silt, some gravel, trace clay, moist				
7		93			
8		92	7	SS	94
9		91	8	SS	*
10		90			
10.90	Borehole terminated at 10.90 m.		9	SS	45 / 75 mm

SHEAR STRENGTH, kPa(ksf)
FV. NAT. ■ REM. □
UC ✠ PP ▲
50(1) 100(2) 150(3) 200(4)
PENETRATION RESISTANCE
DYNAMIC CONE ✕
STANDARD PENETRATION ●
20 40 60 80

WATER CONTENT (%)
Wp W Wl
10 20 30

GROUNDWATER OBSERVATIONS & PIEZOMETER DETAILS

At drilling completion, water level at 2.7 m.

August 26, 2002
Water level
at 2.72 m
(Elev. 97.30)

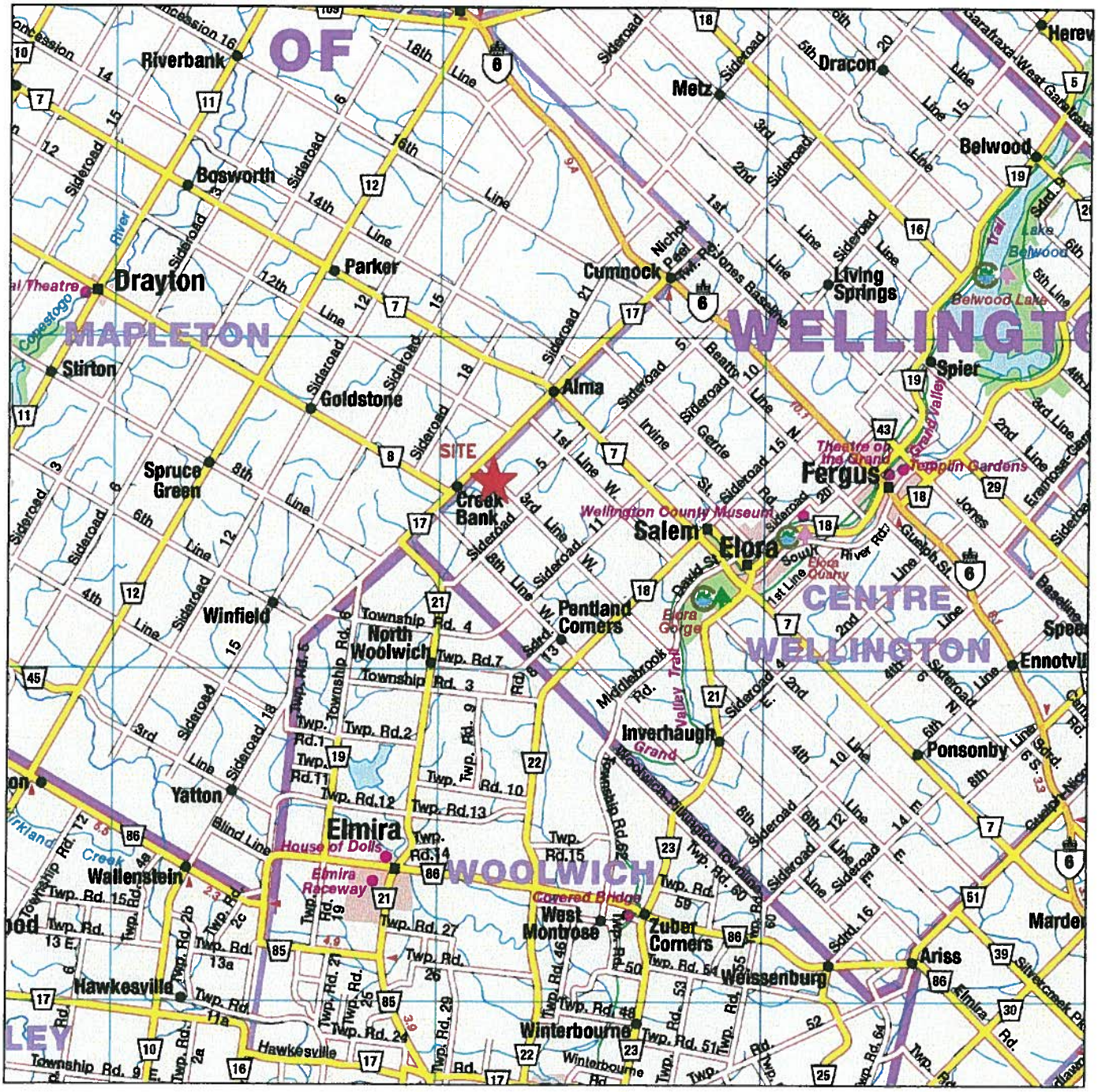
NOTES: * Sampler driving on gravel.

DRILLING METHOD: Hollow Stem Augers

ENGINEER:

No.	Revisions	Date
0	Report Issued	Sep 2002
1		
2		
3		

NORTH



Drawing Reference: Base drawing taken from page 22 of MapArt's Ontario Road Atlas

Proposed Bridge Reconstruction
3rd Line West between
County Road 17 and Sideroad 5
Centre Wellington, Ontario

Naylor Engineering Associates Ltd
CONSULTING ENGINEERS

LOCATION PLAN

Date	Scale	Job No.	Drawing No.
Sep 2002	1:15000	4350G1	1

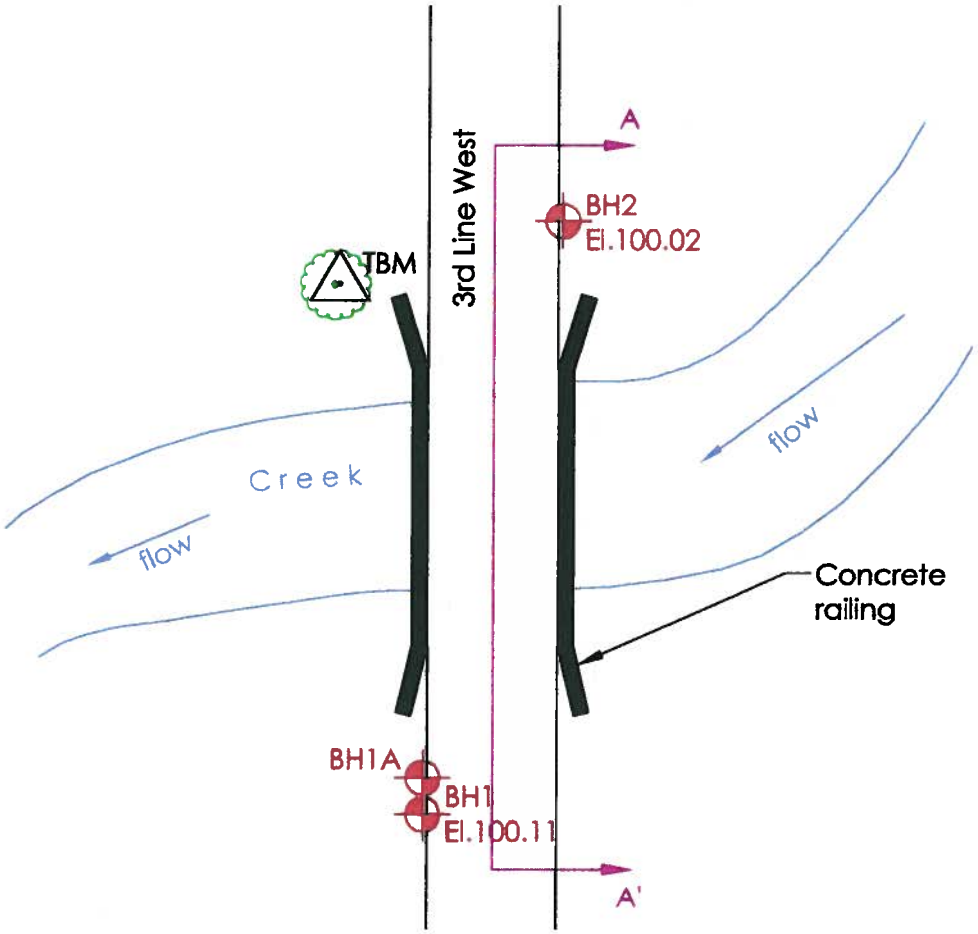
F:\4350\4350G1_1.dwg
August 20 09

Legend

- Borehole Location
- El.100.11 Ground Surface Elevation (m)
- Geologic Cross Section (see Drawing 3)
- Temporary Benchmark Bolt in East Face of Tree Elevation 100.00 (assumed)

APPROX. NORTH

No.	Revisions	Date
0	Report Issued	Sep 2002
1		
2		
3		



Drawing Reference: Drawing based on field measurements.

Proposed Bridge Reconstruction
3rd Line West, between
County Road 17 and Sideroad 5
Centre Wellington, Ontario

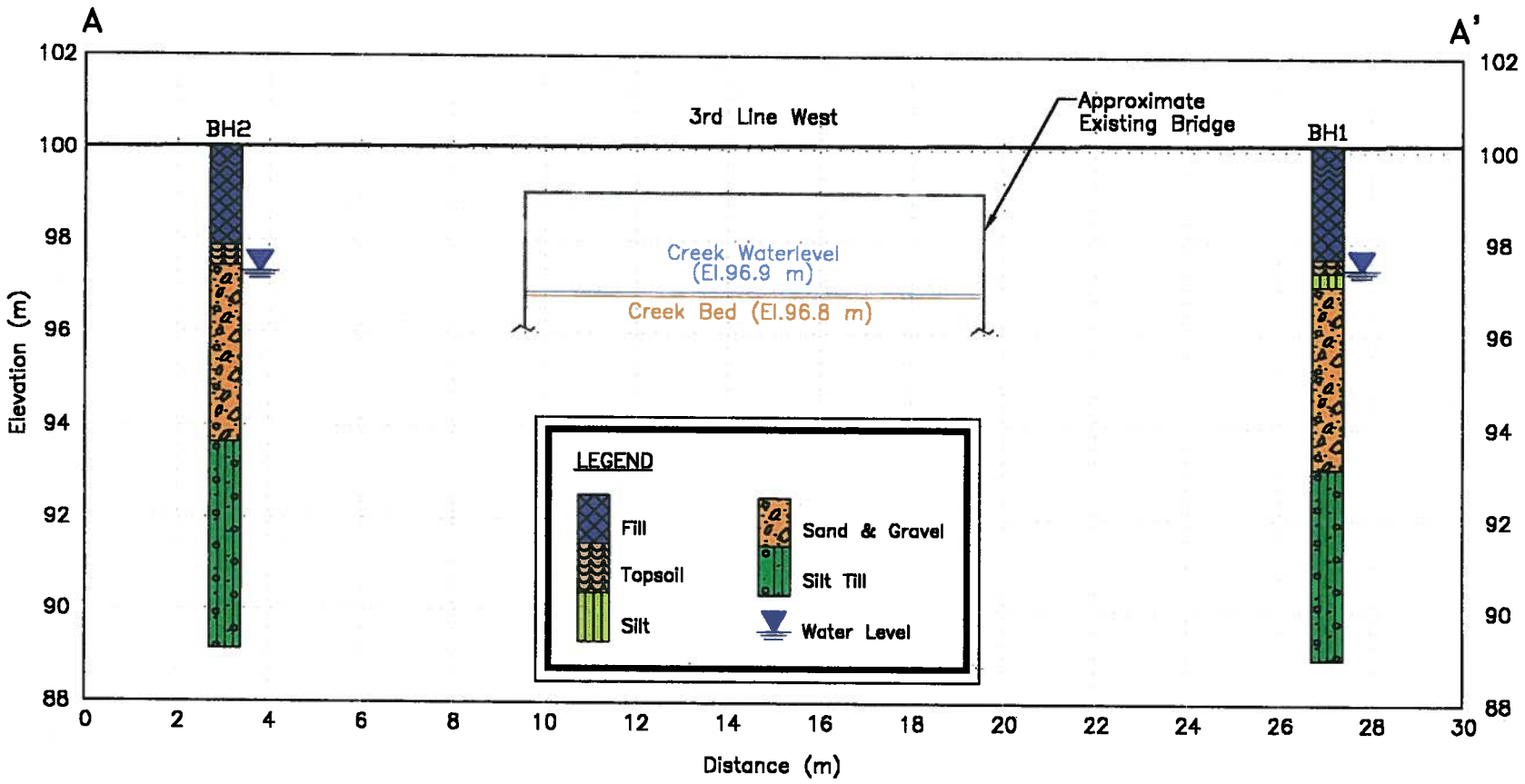
Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

SITE PLAN

Date	Scale	Job No.	Drawing No.
Sep 2002	1 : 300	4350G1	2

F:\4350\4...2.dwg
August 20...

F:\4347\4347g01\...-3.dwg
August 29, 2002 /jwd



Notes: Groundwater measurements taken on August 26, 2002. Seasonal groundwater fluctuations would be expected. The inferred stratigraphy shown on this cross section is based on the subsurface stratigraphy contacted at the boreholes. The subsurface conditions between the boreholes will vary.

Proposed Bridge Reconstruction
3rd Line West, between
County Rd. 17 and Sideroad 5
Centre Wellington, Ontario

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

CROSS SECTION A – A'

Date	Scale	Job No.	Drawing No.
Sep 2002	Vert 1:150 Hor. 1:150	4350G01	3

APPENDIX A

Site Photographs

***Photo 1:** Looking south along 3rd Line West towards bridge.*

***Photo 2:** Looking at east side of bridge.*

Naylor
Engineering
Associates Ltd.
CONSULTING ENGINEERS

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dlg
August 20(

Triton Engineering Services Limited

Draft Preliminary Scoped Environmental Impact Study (EIS)
3rd Line West Structure 24-P
Carroll Creek, Township of Center Wellington

Report

Triton Engineering Services Limited

Draft Preliminary Scoped Environmental Impact Study (EIS)
3rd Line West Structure 24-P
Carroll Creek, Township of Center Wellington

Prepared by:

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Project Number:

60163828

Date:

December 6, 2010

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Sean Spisani, B.Sc. ERGC
Senior Terrestrial Ecologist

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Appendices

1. Introduction

1.1 Background and Objectives

The Township of Centre Wellington has proposed the replacement and widening of the existing water crossing structure 24-P located on 3rd Line West within the Township of Center Wellington, Ontario, at Carroll Creek (Figure 1). To determine the environmental impacts associated with structure replacement activities, AECOM Canada Ltd. was retained by Centre Wellington, through Triton Engineering, to conduct an Environmental Impact Study (EIS) on aquatic and terrestrial resources located within the vicinity of the proposed work.

This report provides a summary of the existing conditions of the natural environment as well as potential impacts and general mitigation measures associated with the proposed work. Specific impacts, mitigation and compensation measures will be determined upon finalization of the structure design and layout.

1.2 Site Description, Surrounding Land Use and Watershed Context

As noted above, the study area is located on 3rd Line West just east of Wellington Road 17 within the Township of Centre Wellington. Surrounding land use is predominantly agricultural including both pasture and crop fields. Several rural residential properties are also present. Within the study area, Carroll Creek is surrounded by a naturalized wetland corridor. Topography can be described as gently undulating.

Carroll Creek is part of the Carroll Creek sub-watershed. Its headwaters are located north of Highway 7 and west of Wellington Road 17. Carroll Creek subwatershed is part of the larger Grand River Watershed. Regionally, it flows south-easterly towards the Grand River where it meets south of the Town of Elora. The Grand River flows south and ultimately outlets into Lake Erie, as part of the larger Great Lakes Basin.

2. Environmental Policy Context

The following policies and legislative requirements are associated with the replacement of the 3rd line watercourse crossing structure.

2.1 Ontario Provincial Policy Statement, 2005

The Ontario Provincial Policy Statement (PPS) is issued under Section 3 of the *Ontario Planning Act*, R.S.O. 1990. Section 3 of the Act requires that decisions affecting planning matters “shall be consistent with” policy statements issued under the Act. The new PPS came into effect on March 1st, 2005, and applies to all applications submitted on or after this date.

The PPS provides policy direction on land use planning and development matters that are of provincial interest which protect the natural environment as well as public health and safety.

Section 2.0 Wise Use and Management of Resources, provides policies on protecting the Province’s natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. Section 2.1 Natural Heritage, identifies seven types of natural heritage features to be protected:

- significant habitat of endangered species and threatened species;
- provincially significant wetlands;
- fish habitat;
- significant woodlands south and east of the Canadian Shield;
- significant valleylands south and east of the Canadian Shield;
- significant wildlife habitat; and
- significant areas of natural and scientific interest

Development and site alteration is not permitted in significant habitat of endangered species and threatened species, in provincially significant wetlands in Ecoregions 5E, 6E and 7E (an approximate area between Sault St. Marie and North Bay that extends south), or in significant coastal wetlands.

Development and site alteration may be permitted within and adjacent to the remaining significant natural heritage features if the ecological function has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions. To demonstrate no negative impacts, an Environmental Impact Statement (EIS) is required.

The Natural Heritage Reference Manual (MNR, 2010) provides technical guidance for implementing the natural heritage policies of the PPS. The manuals present's the Province's recommended technical criteria and approaches for being consistent with the PPS in protecting natural heritage features and areas and natural heritage systems in Ontario.

The Significant Wildlife Habitat Technical Guideline also provides technical guidance on determining significant wildlife habitat in Ontario. It was developed to support the Natural Heritage Reference Manual and is a more detailed technical manual that provides information on the identification, description and prioritisation of significant wildlife habitat.

2.2 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Ontario Regulation 150/06, 2006

The *Regulation of Development, Interface with Wetlands and Alterations to Shorelines and Watercourses* (Ontario Regulation 150/06, issued under *Conservation Authorities Act,* R.S.O. 1990, Chapter 27 (also known as the "Generic Regulation" 1990, Chapter 27. Through this regulation, the (GRCA) has the responsibility to regulate activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, slopes and the Lake Huron shoreline). As the study area has been identified within GRCA regulation limits with the presence of a watercourse (Carroll Creek) and locally significant wetland (Creek Valley Wetland) a permit will be required from the GRCA under the Reg. 150/06. As these features are also located within 30m of the proposed works, an Environmental Impact Study (EIS) is required to evaluate and demonstrate that there will be no negative impacts on the natural features or on their ecological functions.

2.3 Canadian Fisheries Act, 1985

Pursuant to Section 35 of the *Fisheries Act*, the Grand River Conservation Authority (GRCA) has a Level 3 agreement with the Department of Fisheries and Oceans (DFO) which grants them the authority to conduct a technical review of proposed project plans on behalf of DFO to determine the potential for harmful alterations, disruptions or destructions of fish habitat (HADD) within their jurisdiction. Through review of this report, the GRCA

shall determine whether impacts to fish and fish habitat can be appropriately mitigated, if so, issue a Letter of Advice with respect to their findings. If impacts to fish and fish habitat cannot be fully mitigated, an Authorization under the Fisheries Act is required. In support of the Authorization, the GRCA and DFO will provide guidance and input in the preparation of a fish habitat compensation plan. DFO will then issue a Fisheries Act Authorization. Any conditions (i.e. compensation, compliance monitoring, etc.) of this Authorization must be adhered to throughout the course of the project.

2.4 County of Wellington's Official Plan

Wellington County is an upper tier governance structure with an Official Plan overseeing local municipalities such as Center Wellington. According to Schedule A1 of the Official Plan all lands located within the vicinity of the bridge structure are considered part of both the "Core Greenlands" and "Greenland" systems. Section 5.3 of the Official Plan states the following; "The Greenlands System will be maintained or enhanced. Activities which diminish or degrade the essential functions of the Greenlands System will be prohibited. Activities which enhance the health of the Greenlands System will be encouraged where reasonable". Section 5.4.1 states "All wetlands in the County of Wellington are included in the Core Greenlands" and "will be protected in large measure and development that would seriously impair their future ecological functions will not be permitted".

Development will be permitted if according to section 5.6.1 of the Official Plan if the following are met:

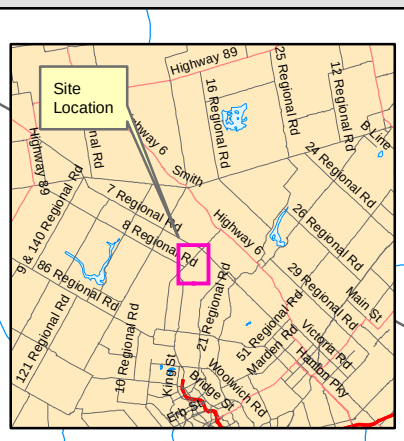
- there are no negative impacts on provincially significant features and functions and no significant negative impacts on other greenland features and functions;
- Any natural hazards present can safely be overcome; and
- The development conforms to policies of the applicable adjacent or underlying designation.

2.5 Forest Conservation By-Law 5115-09

The Forest Conservation by-law was introduced in September 2009 replacing the former Tree By-law 3961. According to Section 3-Exemptions, this by-law does not apply to (a) activities or matters undertaken by a municipality or a local board of a municipality. Therefore it is our understanding that a Forest Conservation By-law permit would not be required to conduct tree removal.

2.6 Migratory Birds Convention Act, 1994

The federal *Migratory Birds Convention Act*. The Act is applied through *The Regulations Respecting the Protection of Migratory Birds* that states that "[…] no person shall disturb, destroy or take a nest, egg […] of a migratory bird." This law protects all birds aside from the introduced species European Starling, House Sparrow, and Rock Pigeon. Bird nests that are destroyed during the course of construction and other related activities is referred to as "incidental take" and is illegal except under the authority of a permit obtained through the CWS (Canadian Wildlife Service).



Elora Rd
Simpson St
Raglan St
King St
Peel St
Rebecca St
Nesbitt St
ALMA
Graham St
Muir St
Church St
Queen St
Hanna St
Twelfth Line
Wellington 7 Rd
Mapleton
18 Siderd
Wellington 17 Rd
First Line W
5 Siderd
Carroll Creek
Windo'er Lake
Wellington 8 Rd
Third Line W
Centre Wellington
Eighth Line W
5 Siderd
Arthur St N
Siderd 5 W
11 Siderd
Woolwich

Basemapping from Ontario Ministry of Natural Resources and GRCA. Orthophotography:

N
W E
S

Metres
0 125 250 500 750 1,000

1:20,000

UTM Zone 17N, NAD 83

Legend

Watercourse Crossing 24-P

Roads
- Highway
- Major Road
- Local Road

Rivers
- Intermittent Stream
- Permanent Stream

Lakes and Wetlands
- Waterbody
- Wetland Area
- Municipal Division

Triton Environmental Impact Assessment

Study Location

November 2010
60163828

AECOM

Figure 1

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3. Natural Heritage Features and Functions

3.1 Terrestrial Assessment

3.1.1 Desktop Study

Existing terrestrial ecology information pertaining to the study area was collected from the Ministry of Natural Resources (MNR), Natural Heritage Information Center (NHIC) – Biodiversity Explorer, the GRCA and the County of Wellington Official Plan. Findings of the background desktop investigations identified the presence of the locally significant Creek Bank Valley wetland complex. The existing water crossing structure (3rd Line) dissects this wetland complex as indicated in Figure 2.

The identified wetland boundary was derived through MNR/GRCA Wetland Reconciliation project, completed in the fall of 2005. This boundary was reviewed and approved by both MNR and GRCA staff. The wetland was originally evaluated by Ecologistics Ltd. in the summer of 1988 followed by the completion of additional fieldwork in the summer of 1994 by staff from the MNR. The Creek Bank Valley wetland complex is a Non-Provincially significant (locally significant) wetland complex approximately 170.6 hectares in size located within both Waterloo and Wellington Counties. The wetland complex consists of five individual wetlands, composed of two wetland types (89% swamp and 11% marsh) and is riverine in nature.

The Wellington County Official Plan has identified the study area as part of both the “Core Greenlands” and Greenland system on Schedule A1 of the County of Wellington’s Official Plan.

3.1.2 Field Assessment

3.1.2.1 Methods

Terrestrial field investigations were conducted on October 12th, 2010. Investigations included the delineation of vegetation communities and the compilation of fall season flora species list. Vegetation community delineation was carried out with a combination of protocols that included the MNR’s Ecological Land Classification (ELC) guidelines (Lee *et al.*, 1998, revised 2009), and the Ontario Ministry of Natural Resources Wetland Evaluation System for Southern Ontario (3rd edition). Assessments were completed 30 m upstream and 30 m downstream of the bridge structure. Due to timing of field investigations spring and early summer species were not conducted as part of these investigations. Representative photographs of individual species and communities are provided in Appendix A.

Incidental wildlife observations were also documented at the time of investigations.

Wetland community evaluation forms, as per the MNR’s Wetland Evaluation System, are provided in Appendix B. Wetland communities are recognized as assemblages of plant species representing one or more “forms”. Form is the physical structure or shape of a plant, determined by such features as height, branching pattern and leaf shape. The Wetland Evaluation guidelines utilize 16 forms. These include the following:

Carroll Creek

Creek Bank Valley Wetland

Third Line W

Carroll Creek

Creek Bank Valley Wetland

Basemapping from Ontario Ministry of Natural Resources and GRCA. Orthophotography:

N
W E
S

Metres
0 2.5 5 10 15 20

1:500

UTM Zone 17N, NAD 83

Legend

Watercourse Crossing 24-P

Roads

Major Road

Local Road

Evaluated Wetlands

Locally Significant Wetland (NRVS Boundary)

Rivers

Permanent Coolwater System

Ecological Land Classification

SWCM1-1: White Cedar Mineral Coniferous Swamp Type

SWM: Mixed Swamp Type

Triton Environmental Impact Assessment

3rd Line West Structure 24-P Carroll Creek

November 2010
60163828

AECOM

Figure 2

Map Document: (D:\Projects\AECOM\60163828\GISSpatial\mxd\Third Line\60163828_Fig-2_ThirdLine.mxd)
11/19/2010 -- 4:17:10 PM

- h- deciduous trees
- c- coniferous trees
- dh – dead deciduous trees
- dc – dead coniferous trees
- ts – tall shrubs
- ls – low shrubs
- ds – dead shrubs
- gc – herbs (ground cover)
- m – mosses
- re – robust emergents
- ne – narrow leaved emergents
- be – broad leaved emergents
- f – floating plants (rooted)
- ff – free floating plants
- su submerged plants
- u – unvegetated

3.1.2.2 Vegetation Communities

Vegetation communities within proximity to the bridge structure upstream and downstream of the crossing consist of coniferous swamp, swamp thicket, and deciduous forest. Provided below are both the ELC designations as well as the wetland units. These communities are part of the previously mentioned, locally significant Creek Bank Valley Wetland. Given that a single season survey was conducted (fall) the floral species list provided should not be considered a comprehensive representation of the species present. Vegetation community delineations are shown in Figure 2 and described below:

Upstream

S1 - SWCM1-1: White Cedar Mineral Coniferous Swamp Type – This community occurs on the south west side of the bridge structure. The area is actively being used by resident farmers for cattle grazing (Photographs 1 & 2 in Appendix A1). As a result many of the wetland plant species that would typically been seen in a wetland community have disappeared due to grazing. The community is dominated by white cedar (*Thuja occidentalis*) with some basswood (*Tilia americana*) and black cherry (*Prunus serotina*). The latter two species observed were not located within the main portion of the community although concentrated along the road. Shrub species observed include red osier dogwood (*Cornus sericea*), bittersweet nightshade (*Solanum dulcamara*), gray dogwood (*Cornus racemosa*), rose species (*Rosa sp*), common buckthorn (*Rhamnus cathartica*), and hawthorn species (*Crataegus sp*). Species observed within the herb layer were concentrated along the eastern side of the watercourse closest to the bridge structure. Areas further away from the structure had a lower concentration of herbaceous species due to active grazing. The western side was completely grazed and ground cover was reduced to grasses. Dominant species observed on the eastern side included reed canary grass (*Phalaris arundinacea*), spotted joe-pye weed (*Eupatorium maculatum*), Canada anemone (*Anemone canadensis*), Virginia strawberry (*Fragaria virginiana*), whorled loosestrife (*Lysimachia quadrifolia*), rough avens (*Geum laciniatum*), meadow rue (*Thalictrum pubescens*), agrimony (*Agrimonia gryposepala*), jewelweed (*Impatiens capensis*), angelica *(Angelica atropurpurea*), willow herb species (*Epilobium sp*), and common burdock (*Arctium minus*). Watercress (Rorippa nasturtium-aquaticum) and water speedwell (*Veronica anagallis-aquatica*) were located within a small area of the watercourse approximately 25 metres upstream from the bridge structure. The south east side of the structure contained the same dominant species however was less disturbed by grazing.

Delineation of this community as per the Southern Ontario Wetland System is as follows:

S1
h: basswood, black cherry **c*:** white cedar **ls**: red osier dogwood, bitter nightshade, gray dogwood, buckthorn **ne:** reed canary grass, **re**: spotted joe-pye weed **gc:** jewelweed, Canada anemone, meadow rue, willow herb species

*Notes : * - denotes dominant vegetation form*

Downstream

S2 – SWM: Mixed Swamp – This community is located on the north east and north west sides of the crossing structure. The community is dominated by treed species on the west side of the watercourse while the east side has a small pocket dominated by shrubs before being once again dominated by trees. Dominant species observed include cottonwood (*Populus deltoides*), white cedar, basswood, silver maple (*Acer saccharinum*), black cherry, and white ash. The shrub layer, being most abundant within a small pocket nearest to the bridge, was dominated by red osier dogwood and red raspberry (*Rubus idaeus*). Other species observed include bittersweet nightshade, mock cucumber (*Echinocystis lobata*), hawthorn species, and enchanter's nightshade (*Circaea lutetiana ssp. canadensis*). The herb layer consisted of reed canary grass, jewelweed, spotted joe pye weed, Canada anemone, rough avens, grass-leaved goldenrod (*Euthamia graminifolia*), vervain (*Verbena hastata*), common burdock, and dandelion (*Taraxacum officinale*).

S2
H*: basswood, silver maple, cottonwood **c*:** white cedar **ls**: red osier dogwood, red raspberry **ne:** reed canary grass, **re**: spotted joe-pye weed **gc:** jewelweed, Canada anemone, meadow rue, willow herb species, blue vervain

3.1.2.3 Wildlife

No wildlife species was observed during field investigation.

3.1.3 Discussion

The Creek Bank Valley wetland vegetation communities observed at the 24-P location are naturally occurring features that are experiencing considerable anthropogenic influence. This includes the use of the upstream portion of the watercourse for cattle grazing which has reduced the number of plant species observed, fragmentation due to the road cutting through the patch causing a division in the upstream and downstream communities By limiting the use of this area by cattle a higher diversity of plant species could be re-established and the wetland would in turn restore itself. All other areas are undisturbed and diverse in nature. All species observed during site investigations are common and widespread throughout Wellington County, however, an early season flora survey is recommended within the proposed area of disturbance, once established through detailed design. Although rare species are not expected, the inventory may identify areas warranting topsoil and/or seed bank salvage and reincorporation efforts.

3.2 Aquatic Assessment

3.2.1 Desktop Study

Existing aquatic ecology information pertaining to the site was collected from the MNR, NHIC- Biodiversity Explorer, DFO and the GRCA.

The findings of the background search determined Carroll Creek to be a cool water fishery with potential for restoration to a cold water fishery (GRCA, 2010). Survey records show the presence of coldwater species such as Brown Trout *(Salmo trutta),* Brook Trout *(Salvelinus fontinalis),* and Mottled Sculpin (*Cottus bairdi Girard).* Warm water species such as Largemouth Bass (*Micropterus salmoides)* were also reported within the study area.

Historical fish collection records indicate the presence of fifteen species in Carroll Creek within the general study area. These species are presented in Table 1. Details on the life history of these fish are provided in Appendix C.

Table 1: Historical Fish Records

Common Name	Scientific Name
Brook Trout	*Salvelinus fontinalis*
Brown Trout	*Salmo trutta*
Bluntnose Minnow	*Pimephales notatus*
Brook Stickleback	*Culaea inconstans*
American Brook Lamprey	*Lampetra appendix*
Central Stoneroller	*Campostoma anomalum*
Rainbow Darter	*Etheostoma caeruleum*
Fantail Darter	*Etheostoma flabellare*
Blackside Darter	*Percina maculata*
Largemouth Bass	*Micropterus salmoides*
Mottled Sculpin	*Cottus bairdi Girard*
River Chub	*Nocomis micropogon*
Northern Hog Sucker	*Hypentelium nigricans*
Common White Sucker	*Catostomus commersonii*
Black Redhorse (1982 NHIC Record)*	*Moxostoma duquesni*

**Listed as Threatened under COSEWIC and SARO*

As indicated in Table 1, historical records obtained from NHIC identified a 1982 record of Black Redhorse (*Moxostoma duquesni*) in the study area. The Black Redhorse is classified as threatened under COSEWIC but not afforded protection under the Species at Risk Act (SARA, 2007). It is also listed provincially as threatened under Species at Risk in Ontario (SARO) and rare (S2 rank) by the NHIC. Through communication with the local MNR Species at Risk biologist it was found that Carroll Creek has been surveyed extensively over the years, and the Black Redhorse has never been detected there. The most recent survey undertaken (2006) was approximately 500 m downstream of the 3rd Line West crossing with no Black Redhorse found. Consequently, it is unlikely that the Black Redhorse occurs in Carroll Creek at the 3rd Line West crossing, and further sampling is not warranted for the above reasons (pers.comm Pickett, 2010).

3.2.2 Field Assessment

3.2.2.1 Methods

Field investigations relating to aquatic resources were conducted on October 12, 2010. The detailed assessment area included 100 m downstream and 50 m upstream from the current bridge location, as well as beneath the structure. Pictures obtained as part of the assessment are provided in Appendix A. Information collected included:

a) mapping of in-stream fish habitat features;
b) flow characteristics of features, with particular emphasis on fish habitat availability;
c) channel morphological characteristics; and
d) riparian characteristics.

3.2.2.2 Aquatic Habitat Features

Carroll Creek is a perennial creek and flows in a south easterly direction discharging directly into the Grand River located approximately 8 km south east of the study area. Carroll Creek follows a natural, meandering course running perpendicular to the 3rd Line West crossing structure (Figure 2). The study area of Carroll Creek runs primarily through rural, residential and agricultural lands.

In the vicinity of the 3rd Line West crossing structure, Carroll Creek is described as a coolwater system (Figure 2). Both coolwater and coldwater species are present upstream and downstream as well as within the study area (See Section 4.2.1, Table 1). Due to the presence of these coldwater species Carroll Creek should be treated as a coldwater fishery.

The average channel wet width for the creek upstream and downstream of the bridge at the time of the assessment was 4-6 m, with an average wetted width in the immediate area of the bridge of 10 m. The average depth upstream of the bridge was 0.20 m with an average depth downstream of the bridge of0.45 m (Table 2). The streambed consisted mainly of cobbles, sand, gravel, silt and boulders. Suitable spawning habitat is available within the upstream and downstream reaches, although not within the immediate vicinity of the existing structure. Significant in-stream cover is provided mainly by cobbles and boulders as well as woody debris and aquatic vegetation. Upstream and downstream plant species included common waterweed (*Elodea canadensis),* water speedwell *(Veronica anagallis-aquatica*), water milfoil Sp. *(Myriophyllum sp*.), pondweed Sp. (*Potamogeton sp*.) and watercress (*Nasturtium officinale)*. Watercress is often an indicator of groundwater discharge. Groundwater seepage contributes to stream base flow and acts to cool water temperatures during the summer resulting in more favourable conditions for cold water fish species.

The upstream reach (50 m) flows through an unrestricted cow pasture with evidence of recent livestock crossings. Stream morphology consists of riffle/run/pool with some flat areas. Riparian vegetation consists mainly of Eastern white cedar, red osier dogwood, and low herbaceous vegetation. This vegetation provides a very small amount of overhanging vegetative cover along the left bank and in-stream woody debris to the study reach. Overall canopy cover for the creek was poor and did not provide much in-stream shading. An assessment of terrestrial vegetation is provided in section *4.1.2 Terrestrial Vegetation.* Banks were generally stable and gradually sloping as the creek lies within a wide floodplain. There was evidence of livestock trampling along both banks causing some bank stability concerns. There were no undercut banks in the upstream reach. The steeply sloped area at the base of the bridge showed signs of minor erosion. No man-made fish barriers are known to be present upstream or downstream of the study area.

The downstream reach (100 m) was characterized mainly with large deep pools with some riffle and run areas. The downstream reach flows through a naturalized area and riparian vegetation consisted mainly of white cedar, red-osier dogwood, and raspberry. Canopy cover in this reach was good and consisted of large white cedars and shrubs. The first 30 m of the downstream reach was characterized mainly as one straight flat with an average depth of 0.50 m. The reach widens significantly in the area approximately 30 m downstream of the bridge, a wide flat and deep pool characterized this area. The pool depth was approximately 0.9 m. The stream reach then narrows and flows through cobble dominated area creating a riffle/run area. The stream velocity increases in this area, mainly due to the stepped gradient. The water then flows into a large deep pool, approximately 15-20 m long and 10 m wide. The expected maximum depth is greater than 1 m. Fish were observed utilizing both these pools, at the time of the investigation and are expected to act as a refuge area for fish.

The area under the bridge structure is described as one large deep pool along the right bank. Substrates in this area consisted mainly of silt and sand with some cobbles. There were several large pieces of cement in the pool which had fallen from the bridge. Several fish were observed utilizing this pool.

Overall, the study reach provides suitable mixed cold-cool water fish habitat and is generally of good quality. Complex in-stream structure is present within the downstream reach and has moderate in-stream shading. The upstream reach is impacted by unrestricted cattle access therefore decreasing the amount of in-stream shading potential due to regular trampling. The creek may also be impacted by agricultural and road surface run off during spring melt and rain events. Moreover, due to the potential presence of groundwater input into the stream within this reach, it provides the creek with cold, clear, flowing water favourable to coldwater species. Several deep pools provide overwintering habitat as well as refuge habitat for fish populations during lower flow periods.

Table 2: Carroll Creek Aquatic Habitat Features within the Study Area

Station No.[1]	Station Length (m)	Mean Wetted Width (m)	Mean Depth (m)	Max. Pool Depth (m)	Substrate Conditions (ranked, 1=most abundant)	Channel Morphology	In-stream Cover (%)	Stream Shading (%)
1	100	6.10	0.52	1.0	1. .Cobble 2. .Sand 3. .Gravel 4. .Boulder 5. .Silt	Pool ..... 50% Flats..... 20% Riffle ..... 20% Runs 10%	Rock ..... 60% Overhanging Vegetation.30% Woody Debris 15%	40%
2	6	10	1.0	1.0	1. .Silt 2. .Sand 3. .Gravel	Pool 100%	Debris……..30%	100%
3	50	4.75	0.36	0.42	1. .Cobble 2. .Sand 3. .Silt 4. .Gravel 5. .Boulder	Riffle ..... 40% Run..... 25% Pool ..... 20% Flat..... 15%	Rock ..... 70% Vegetation ..... 15% Organic Debris..... .5%	25%

Notes: [1] *Station 1 – 0 to 100 m downstream of bridge crossing*
Station 2 – below bridge
Station 3 – 0 to 50 m upstream of bridge crossing

3.2.3 Discussion

Carroll Creek is classified as a permanent, coolwater system. The fish community is comprised of cool water and cold water salmonid, cyprinid and centrarchid communities. There are no aquatic species at risk identified in the area. Direct fish habitat is present and is described as good quality habitat for all life history stages.

4. Assessment of Significance

4.1 Sensitive Species & Species at Risk

No terrestrial or aquatic species at risk were identified through the desktop study nor observed during field investigations. A historical (1982) NHIC record of the fish species Black Redhorse was identified but confirmed by the MNR species at risk biologist to not be currently located in Carroll Creek.

Sensitive coldwater species are present within the study area reach of Carroll Creek, these include Brown and Brook Trout. Mottled Scuplin are also present and are generally considered a species limited to coldwater habitats.

4.2 Significant Features

No significant habitat of endangered and threatened species, provincially significant wetlands, significant woodlands, significant valleylands, significant wildlife habitat or significant areas of natural and scientific interest (ANSI's) are present within the study area.

Direct fish habitat is present within Carroll Creek. Carroll Creek is classified as a coolwater fishery with resident Brook and Brown Trout populations. Sensitivity of the fish and fish habitant present is discussed further in section 4.3 *Sensitivity of Fish Habitat*.

The naturalized area surrounding the bridge is recognized as Core Greenlands within Schedule A1 of the County of Wellington's Official Plan.

The locally significant Creek Bank Valley Wetland is present upstream and downstream of the water crossing at Carroll Creek.

4.3 Sensitivity of Fish and Fish Habitat

In order to assess the significance of fish habitat in Carroll Creek, *Section 6: Analysis of Fish and Fish Habitat Sensitivity* from the *Ministry of Transportation Environmental Guide for Fish and Fish Habitat* (MTO, 2009) Manual. This guide is used as a tool to determine the sensitivity of both fish and fish habitat found in the study area. The assessment encompasses four primary attributes to determine the sensitivity level of both fish species present and fish habitat which include:

- Fish Species Sensitivity;
- Species Dependence on Habitat;
- Rarity; and
- Habitat Resiliency

The analysis defines fish habitat within five categories:

1) rare sensitivity (presence of rare species- listed SAR);
2) highly sensitive (i.e. trout habitat);
3) moderately sensitive (i.e. sport fish habitat –bass);
4) low sensitivity (i.e. baitfish habitat); and
5) no sensitivity (not fish habitat)

Based on the existing conditions and historical fish records Carroll Creek is classified as highly sensitivity. Rationale for determination is provided below in Table 3.

Table 3: Attributes for Determining the Sensitivity of Fish and Fish Habitat

Attribute	Ranking	Qualifier	Rationale
Species Sensitivity	High	Species resiliency to change and perturbation	Species present are highly sensitive to perturbations (Brown Trout, Brook Trout)
Species Dependence on Habitat	High	Function of habitat for fish community (i.e. migration, refuge, spawning, rearing, over wintering)	Potential spawning habitat, large deep pools provide excellent fish refuge habitat (overwintering habitat), coldwater Trout habitat
Rarity	Low	Rarity of species and habitat features & presence of SARA listed species	Fish species are and fish habitat are commonly occurring and abundant
Habitat Resiliency	High	Thermal regime, Physical Characteristics, Flow Regime	Carroll Creek is a permanent coolwater system with coldwater restoration potential

5. Description of Proposed Works

Structure design, layout and construction specifications are not known at this time.

6. Assessment of Potential Impacts

The following is a preliminary assessment of potential impacts from the proposed undertaking. The full extent of impacts on the terrestrial and aquatic resources of the study area cannot be determined until the design specifications have been finalized.

6.1 Terrestrial

Terrestrial impacts will be mainly related to clearing and grubbing activities associated with the widening of the bridge and construction staging areas. No significant plant or animal species were found within 30 metres of the bridge structure. Potential construction-related impacts that are of particular relevance to the proposed bridge expansion are:

- Construction-related surface water runoff contributing to erosion of soils, siltation, etc. and subsequent deposition within the wetland communities;
- Loss of individual trees within the expansion area;

- Compaction of soils within tree rooting zones along the plantations edge;
- Potential for spill from construction equipment into the wetland communities;
- Scarring and decreased health of adjacent trees damaged by machinery or affected by construction related dust and sedimentation;
- Disturbance to wetland community vegetation and native seed banks ;
- Potential disturbance to nesting habitat of breeding birds;
- Construction-phase disturbance to wildlife caused by increased noise, lighting, and construction traffic;
- Introduction of aggressive non-native plant species into the adjacent wetland communities, reducing the natural integrity of the area.

While many of the potential impacts are avoidable, if they are not managed through proper installation and by monitoring of mitigation measures, they may lead to damage to ecological features and consequently functions.

6.2 Aquatic

For the purpose of this impact assessment, risks to aquatic habitat and fish have been divided into:

1) potential impacts related to the design or layout of the new water crossing structure and;
2) potential impacts related to construction activities occurring in or near a watercourse.

Corresponding mitigation & compensation measures are discussed in Section 8.1 - *Mitigation*.

6.2.1 Design Impacts

As design specifications of the structure and layout have not been identified at this time, detailed discussion on design impacts cannot be completed Included below are potential impacts that are generally associated with the replacement of a water crossing structure:

- loss of natural substrates;
- loss of in stream habitat (structure/cover);
- loss of riparian habitat (reduced bank stability, change to in-stream shading, etc.);
- change in stream hydrology, and;
- the temporary displacement of fish communities

6.2.2 Construction Activity Impacts

Impacts associated with construction in and around aquatic habitat The potential for impacts to aquatic environments is generally associated with the length of the construction window (i.e., days, weeks, months) however; un-mitigated impacts have the potential to cause lasting effects beyond the construction window, or permanent impacts. Potential impacts to fish and fish habitat from construction activities are associated with the following:

- **Water Quality**: A release of a deleterious substance (i.e. sediment, oil & grease, etc.) impacting water quality. Changes in water quality may impose significant behavioural and physiological stress on fish

species, resulting in impaired spawning, feeding or routine activities. Under prolonged conditions where water quality remains at levels unacceptable for aquatic life, death of aquatic organisms may result.

- **Fish Habitat Disruption**: Temporary disruption of substrates/habitat is likely to occur at locations where in-water work is required (i.e. bridge abutment removal). Disruption of fish habitat has potential to impair spawning, feeding or routine activities of the resident fish community. There is also potential for fish to display avoidance behaviour of the actively disturbed area, this can result in the temporary displacement of fish. Fish passage within the channel may also become temporarily (i.e. days) restricted as a result of construction activities, disrupting migration patterns.

- **Dewatering:** Additional potential impacts associated with surface water dewatering are discussed in Section 7.2.2.1 - *Dewatering*.

6.2.2.1 Surface Water Dewatering

Short term, isolated dewatering to remove surface water from excavation areas may be necessary during the construction phase. If surface water dewatering is not managed properly, there is potential for impacts to occur to the associated watercourse. Potential impacts to fish habitat are associated with the following:

- **Water Quality** – sediment laden surface water released or discharged into the adjacent watercourse or drainage features has potential to cause immediate impacts on the fish community of the receiving watercourse. Changes in water quality may impose significant behavioural and physiological stress on fish species, resulting in impaired spawning, feeding or routine activities. Under prolonged conditions where water quality remains at levels unacceptable for aquatic life, death of aquatic organisms may result.

- **Stream Erosion & Sedimentation** - Increased flows to watercourses from temporary surface water discharges have potential to cause streambed and/or bank erosion and downstream sedimentation if not managed properly.

- **Isolated Stream Flow Loss** – Potential impacts resulting from dewatering portions of a watercourse include the temporary restriction of fish passage and habitat loss.

7. Environmental Management Plan

7.1 Mitigation

Mitigation techniques must be implemented to offset possible effects of the construction activities. As design and construction details are not known at this time, only generic mitigation has been provided.

7.1.1 Terrestrial

In order to reduce and / or eliminate potential impacts to terrestrial habitat, several avoidance measures, design modifications and mitigation techniques are recommended. The following is a summary of generic environmental protection measures to be implemented:

7.1.1.1 Erosion and Sediment Control

Mitigation measures must be used for erosion and sediment control to prohibit sediment from entering the water and adjacent vegetation communities. The primary principles associated with sedimentation and erosion protection measures are to: (1) minimize the duration of soil exposure, (2) retain existing vegetation, where feasible, (3) encourage re-vegetation, (4) divert runoff away from exposed soils, (5) keep runoff velocities low, and (6) trap sediment as close to the source as possible.

To address these principles, the following mitigation measures are proposed:

- *According to Ontario Provincial Standard Specifications, silt fencing (OPSD 219.110) is required along all construction areas.*
- *All surfaces susceptible to erosion should be re-vegetated through the placement of native seeding, upon completion of construction activities. Dogwood (Cornus sp.), alder (Alnus sp.) and willow (Salix sp.) are suggested along the areas of the watercourse.*

These measures should be incorporated into the initial detailed design drawings and contract specifications.

7.1.1.2 Tree Removal

Clearly delineate tree removal limits with high visibility fencing or marking. Install tree protection fencing and establish buffer setbacks in consultation with a GRCA or qualified biologist prior to any tree removal or start-up of construction. A tree removal or Protection Plan will be required as part of the application, trees identified for protection should be hoarded as directed by By-law or qualified professionals.

7.1.1.3 Wetland Vegetation Clearing

A permit may be necessary to complete any vegetation clearing within the wetland communities. This shall be discussed in consultation with GRCA to determine if permits are necessary once it is established how much vegetation is designated for removal.

7.1.1.4 Breeding Birds

Vegetation clearing should be completed within an allotted time period as to not interfere with breeding bird activity and shall adhere to the *Migratory Birds Convention Act*. Breeding generally occurs in southern Ontario between

May 1 and July 31 but may differ at the site level. Clearing outside of this timing window is acceptable. For vegetation clearing in small areas between May 1 and July 31 a qualified ecologist must survey the area for breeding bird activity and advise whether vegetation clearing may proceed at that time.

7.1.1.5 Exposed Soils

Limit the duration of exposed soils and re-establish native vegetation as soon as possible in order to prevent invasive species from entering the areas.

7.1.1.6 Construction Timing

Construction activities should be limited to a period after 7am and before 7pm daily. Also, construction during early spring bird breeding should be avoided. Reasons to avoid the bird nesting period are due to the need to not interfere with territory selection, mate selection, nest construction, egg-laying, and nestling to fledgling periods.

Depending on the timing of construction, netting to prevent nest establishment may be required for areas under the existing bridge structure.

7.1.1.7 Controlled Construction Vehicle Access

Construction vehicle access should be limited to outside the wetland communities to prevent soil compaction and/or the initiation of soil erosion events.

7.1.1.8 Compensation

A compensation plan should be implemented in consultation with GRCA to replace any removed vegetation within the area. The compensation plan should consider salvage and reincorporation of topsoil and native seed banks.

7.1.1.9 Staging Areas

Staging areas should not be located within the vicinity of the wetland communities or watercourse as to avoid contamination through a chemical spill and the compaction of the soil.

7.1.2 Aquatic

Mitigation measures recommended to minimize risk associated with potential impacts to the aquatic environment during construction include the implementation of standard best management practices (BMP's) as described in the following subsections (7.1.2.1.through to 7.1.2.6.). Site-specific mitigation measures will be identified once the final structure designs have been provided.

Although appropriate mitigation measures will be employed, there is always potential that construction activity may result in loss of fish habitat. If this occurs, adequate compensation will be required.

7.1.2.1 Timing of Works

All in-stream construction activities must adhere to watercourse specific timing windows set by the MNR as to avoid critical spawning/migration periods. In general, construction activities near water or in-water should take place within the low flow period in the late summer months as to avoid or minimize impacts. In the case of rain events (20 mm in 24 hours) and snow melts, construction should be prepared to temporarily stop until soils stabilize as to not

exacerbate erosion and the potential for sediment releases into nearby watercourses. A Flood Response Plan should also be developed to deal with on-site flooding as to mitigate any possible effects to the aquatic environment.

7.1.2.2 Erosion & Sediment Control

To minimize the potential for construction related sediment release into nearby watercourses a comprehensive erosion and sediment control (ESC) plan will be developed. The ESC plan will minimize sediment and erosion impacts to stream through the incorporation of specific elements as per the *Erosion and Sediment Control Guideline for Urban Construction*, December 2006 (ESC Guideline), prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHACA). This also includes the development and implementation of a site specific ESC Plan prior to the commencement of construction.

The goal of the ESC plan is to preserve and protect the aquatic resources and other natural features of identified environmentally-sensitive sites affected by the construction. On all sites, multiple layers of protection are to be employed prior to the commencement of construction along with a regulated process for monitoring and maintenance to ensure that the measures are functioning within approved limits. ESC condition reports will be prepared as part of the monitoring and maintenance plan. Where ESC measures are found to be in an unacceptable condition they are to be repaired or replaced immediately.

7.1.2.3 Construction Equipment

To minimize impacts from construction equipment, machinery should be operated in a manner that minimizes disturbance to the banks and bed of the watercourse. Equipment should stay outside of the watercourse and bank area as much as possible. Any waste materials removed from the construction site should be stabilized to prevent them from entering the nearby watercourse. This could include covering stockpiles with biodegradable mats or tarps as well as hanging netting or tarps underneath the crossing structure (if applicable).

Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks. Machinery must be refuelled, washed and serviced away from all watercourses and drainage features to prevent any deleterious substances from entering a watercourse. Fuel and other construction related materials should be stored securely away from any drainage features.

A Spill Response Plan (SRP) must be developed prior to commencement of construction. This SRP should provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. A spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP.

A spill is defined in the Ontario EPA as a discharge “into the natural environment, from or out of a structure, vehicle or other container, that is abnormal in quality or quantity in light of all the circumstances of the discharge”. Such spills will be identified as major spills, which must be reported to the MOE immediately.

7.1.2.4 Fish Passage

If construction requires that an instream work area be isolated from the primary channel, an adequate portion of channel with sufficient width and depth to allow for fish passage must be retained. In the event that an area must be blocked from bank to bank, a temporary by-pass channel must be constructed to allow fish passage around the construction area.

7.1.2.5 Bank Stabilization

Stream banks should be stabilized prior to construction or as quickly into the construction schedule as possible to prevent collapse. Stabilization may include the use of rock reinforcement/armouring and riparian planting. Where rock will be utilized, large, clean, angular rocks should be used. The natural stream bank slope should also be maintained. Shoreline planting after construction should be implemented to stabilize the riverbanks and encourage rapid re-vegetation of disturbed soils. Seeding should be completed as soon as weather permits, following reconstruction of the slope. Seeds should also be protected with a layer of erosion control matting to assist in stabilizing the slope and propagating seed. Additional restoration of banks may require application of topsoil, native seed mix and native shrubs such as willows (*Salix* sp.) and dogwoods (*Cornus* sp.).

7.1.2.6 Dewatering

Limited surface dewatering is anticipated for construction in the area surrounding the existing structures. Since these areas will be isolated (i.e. coffer dams) surface dewatering is not expected to interfere with creek levels or baseflows. Applicable mitigation measures for surface dewatering are provided for the following impacts:

- Water quality;
- Stream erosion and sedimentation; and,
- Stream flow loss

Water Quality

To mitigate for potential effects associated with the discharge, *in-situ* turbidity measurements must be obtained prior to discharge to ensure the quality is suitable for discharge and will not result in an impact to the receiving watercourse. If the surface water is not suitable for discharge, adequate settling or filtration must be carried out. At minimum, water is to be passed through a sediment filtration (i.e. filter bags) prior to discharge into a watercourse.

Erosion and Sedimentation

Erosion thresholds should be determined by a fluvial geomorphologist prior to discharging to any watercourse. This will ensure the proposed discharge rate is ecologically appropriate as to not cause erosion or damage to fish habitat to the receiving watercourse. Depending on rates and erosion thresholds, discharge may be required to be split to more that one location in the watercourse. Flow dissipaters (i.e. sand bags, hay bales, etc) should also be installed at the location of discharge(s) to mitigate potential for erosion.

Isolated Stream Flow Loss

Prior to dewatering, all fish should be removed from the area to be dewatered. Fish should be released downstream of the work area and nets installed to prevent their reintroduction into the work area. Dewatering pump intakes should be screened (*Freshwater Intake End-of-Pipe Fish Screen Guidelines*, DFO) in a manner that prevents fish from becoming impinged and injured. Fish passage must be maintained at all times, see Section 3.2.4 - *Fish Passage.* Silt and debris accumulated around the temporary cofferdams should be removed prior to the removal of all isolation materials to prevent entry of sediments to the watercourse.

8. Summary

Wetland communities adjacent to the bridge are recognized as part of the Creek Bank Valley locally significant wetland. If the associated wetland communities are to be disturbed or trees are to be removed, GRCA biologists will need to be consulted to discuss required permitting. Although no significant plant or animal species were observed within 30 m of the bridge structure, detail design should include early season surveys for flora and breeding birds to inform the environmental management plan.

As Carroll Creek is highly sensitive coldwater Trout habitat, all in-stream construction activities must occur within the low flow period in late summer and within the cold-water timing windows set by MNR. Structure design and construction specifications should give consideration to minimize risk to fish habitat. During construction activities, the potential for impacts on the aquatic environment should be minimized through the application of mitigation measures including the use of standard best management practices (BMP's). Moreover, appropriate mitigation, enhancements and/or compensation to protect against a net loss of fish habitat are required. Such measures should strive to minimize risk to fish and fish habitat and ideally offer a net improvement to the aquatic environment compared with the existing condition.

In summary, bridge design should give consideration to value of the presence of a sensitive coldwater fishery and locally significant wetland habitat within the immediate area of the bridge. Specific impacts, mitigative measures and compensation will be determined upon review of the finalized design and construction specifications.

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Appendix A

Photo Log

Appendix A1 – Terrestrial Photolog

Photograph 1 ↑
View of upstream side of the watercourse with evidence of grazing

Photograph 2 ↑
View 2 of the upstream portion of the watercourse

Photograph 3 ↑
View of the upstream of vegetation cover

Photograph 4 ↑
View of downstream portion of the watercourse

Photograph 5 ↑
View of small thicket patch downstream on the east side the bridge structure

Photograph 6 ↑
View of the west side of the wetland

Appendix A2 – Aquatic Photolog

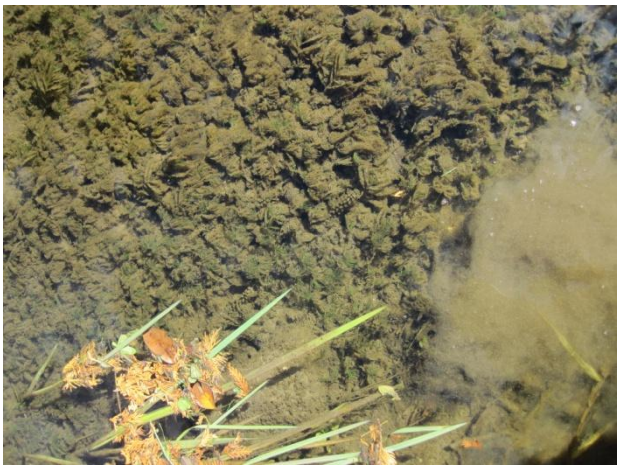
Photograph 1 ↑
Upstream Reach – facing upstream from bridge

Photograph 2 ↑
Upstream Reach – facing upstream view of substrates

Photograph 3 ↑
Upstream Reach – facing upstream approximately 15 m upstream of bridge

Photograph 4 ↑
Upstream Reach – facing upstream approximately45 m upstream of bridge

Photograph 5 ↑
Upstream Reach - watercress



Photograph 6 ↑
Upstream Reach – aquatic vegetation

Photograph 7 ↑
Upstream Reach – livestock trampling along right bank

Photograph 8 ↑
Bridge structure – upstream side

Photograph 9 ↑
Bridge structure – upstream side left bank

Photograph 10 ↑
Bridge structure – upstream side right bank

Photograph 11 ↑
Bridge structure – upstream side view of pool under bridge

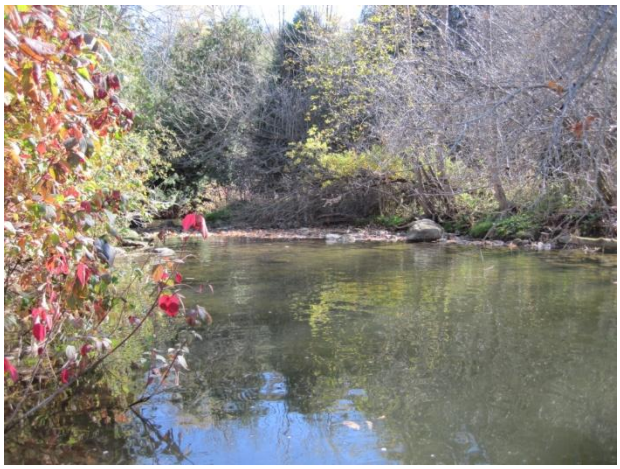
Photograph 12 ↑
Bridge structure – view of bridge from 3rd Line West

Photograph 13 ↑
Bridge structure – downstream side

Photograph 14 ↑
Bridge structure – downstream side view of pool and debris along right bank

Photograph 15 ↑
Downstream Reach – facing downstream from bridge

Photograph 16 ↑
Downstream Reach – facing downstream at 25 m from bridge



Photograph 17 ↑
Downstream Reach – facing downstream 30 m from bridge

Photograph 18 ↑
Downstream Reach – facing downstream view of riffle/ run area

Photograph 19 ↑
Downstream Reach – facing downstream 60 m from bridge

Photograph 20 ↑
Downstream Reach –facing downstream view of large pool

Photograph 21 ↑
Downstream Reach – facing upstream at end of large pool

Photograph 22 ↑
Downstream Reach – facing downstream

Photograph 23 ↑
Downstream Reach – water cress

Appendix B

Plant List

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS WELL/ DUFF
	SOURCE		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	1989
Anemone	*canadensis*	Canada Anemone	3	-3		S5			G5	
Acer	*negundo*	Manitoba Maple	0	-2		S5			G5	
Acer	*saccharinum*	Silver Maple	5	-3		S5			G5	
Achillea	*millefolium var. millefolium*	Common Yarrow		3	-1	SE?			G5T?	
Agrimonia	*gryposepala*	Tall Hairy Agrimony	2	2		S5			G5	
Angelica	*atropurpurea*	Dark-purple Alexanders	6	-5		S5			G5	
Arctium	*minus*	Common Burdock		5	-2	SE5			G?T?	
Asclepias	*syriaca*	Common Milkweed	0	5		S5			G5	
Aster	*puniceus var. puniceus*	Purple-stemmed Aster				S5			G5T?	
Bromus	*inermis ssp. inermis*	Awnless Brome		5	-3	SE5			G4G5T?	
Cichorium	*intybus*	Chicory		5	-1	SE5			G?	
Circaea	*lutetiana ssp. canadensis*	Enchanter's Nightshade	3	3		S5			G5T5	
Cirsium	*arvense*	Canada Thistle		3	-1	SE5			G?	
Cirsium	*vulgare*	Bull Thistle		4	-1	SE5			G5	
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5			G5	
Cornus	*racemosa*	Red Panicled Dogwood	2	-2		S5			G5?	
Crataegus	*species*	Hawthorn species								
Dactylis	*glomerata*	Orchard Grass		3	-1	SE5			G?	X
Daucus	*carota*	Wild Carrot		5	-2	SE5			G?	
Dipsacus	*fullonum ssp. sylvestris*	Wild Teasel		5	-1	SE5			G?T?	
Echinocystis	*lobata*	Prickly Cucumber	3	-2		S5			G5	
Echium	*plantagineum*	Purple Viper's Bugloss				SE1			G?	
Epilobium	*species*	Willow-herb species								
Eupatorium	*maculatum*	Spotted Joe-pye-weed	3	-5		S5			G5T5	
Euthamia	*graminifolia*	Flat-topped Bushy Goldenrod	2	-2		S5			G5	
Fragaria	*virginiana*	Virginia Strawberry	2	1		SU			G5T?	
Fraxinus	*americana*	White Ash	4	3		S5			G5	
Geum	*laciniatum*	Rough Avens		-3		S4			G5	
Impatiens	*capensis*	Spotted Touch-me-not	4	-3		S5			G5	
Lysimachia	*quadrifolia*	Whorled Loosestrife	8	5		S4			G5	
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5			G5	
Mentha	*arvensis*	American Wild Mint	3	-3		S5				
Parthenocissus	*quinquefolia*	Five-leaved Virginia-creeper	6	1		S4?			G5	X
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5			G5	X
Phragmites	*australis*	Common Reed	0	-4		S5			G5	
Polygonum	*persicaria*	Lady's-thumb		-3	-1	SE5			G?	X
Populus	*deltoides*	Eastern Cottonwood	4	-1		SU			G5T?	X
Prunus	*serotina*	Black Cherry	3	3		S5			G5	
Rhamnus	*cathartica*	Common Buckthorn		3	-3	SE5			G?	
Rorippa	*nasturtium-aquaticum*	watercress		-5	-1	SE?			G?	
Robinia	*pseudo-acacia*	Black Locust		4	-3	SE5			G5	
Rubus	*idaeus ssp. idaeus*	Red Raspberry				SE1			G5T5	
Salix	*fragilis x alba*	Crack Willow		-1	-3	SE5			G?	X
Schoenoplectus	*tabernaemontani*	American Great Bulrush/softstem bulrush	5	-5		S5			G?	X
Solanum	*dulcamara*	Bitter Nightshade		0	-2	SE5			G?	
Solidago	*nemoralis ssp. nemoralis*	Gray Goldenrod	2	5		S5			G5T?	
Solidago	*canadensis*	Canada Goldenrod	1	3		S5			G5	
Solidago	*canadensis var scabra*	Tall Goldenrod	1	3		S5				
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5			G5	X
Thalictrum	*pubescens*	Tall Meadow-rue	5	-2		S5			G5	X
Taraxacum	*officinale*	Common Dandelion		3	-2	SE5			G5	
Thuja	*occidentalis*	Eastern White Cedar	4	-3		S5			G5	X
Tilia	*americana*	American Basswood	4	3		S5			G5	
Typha	*latifolia*	Broad-leaved Cattail	3	-5		S5			G5	X
Ulmus	*americana*	White Elm	3	-2		S5			G5?	X
Urtica	*dioica ssp. gracilis*	American Stinging Nettle	2	-1		S5			G5T?	X
Veronica	*anagallis-aquatica*	Water Speedwell		-5	-1	SE5			G5	
Verbena	*hastata*	Blue Vervain	4	-4		S5			G5	

FLORISTIC SUMMARY & ASSESSMENT

Species Diversity			
Total Species:		**52**	
Native Species:		**34**	65.38%
Exotic Species		**18**	34.62%
Total Taxa in Region (List Region, Source)		10000	
% Regional Taxa Recorded		0.52%	
Regionally Significant Species		enter manually	
S1-S3 Species		enter manually	
S4 Species		0	
S5 Species		31	
Co-efficient of Conservatism and Floral Quality Index			
Co-efficient of Conservatism (CC) (average)		**2.97**	
CC 0 to 3	*lowest sensitivity*	22	64.71%
CC 4 to 6	*moderate sensitivity*	11	32.35%
CC 7 to 8	*high sensitivity*	1	2.94%
CC 9 to 10	*highest sensitivity*	0	0.00%
Floral Quality Index (FQI)		**17.32**	
Presence of Weedy & Invasive Species			
mean weediness		**-1.78**	
weediness = -1	*low potential invasiveness*	9	50.00%
weediness = -2	*moderate potential invasiveness*	4	22.22%
weediness = -3	*high potential invasiveness*	5	27.78%
Presence of Wetland Species			
average wetness value		**-0.08**	
upland		8	15.38%
facultative upland		14	26.92%
facultative		6	11.54%
facultative wetland		18	34.62%
obligate wetland		7	13.46%

Appendix C

Life History Table

Appendix C. Life History Table

COMMON NAME	SCIENTIFIC NAME	GRANK	NRANK	SRANK	COSEWIC	ORIGIN (Ontario)	ABUNDANCE	TOLERANCE	GENERAL HABITAT	THERMAL REGIME	TROPHIC CLASS	SPAWNING SEASON	HABITAT	NOTES
Bluntnose Minnow	*Pimephales notatus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	warmwater	detritivore	summer	sand and gravel bottomed shallows of clear lakes, creeks, rivers and ponds; preferred water temperature 26.3°C	fractional spawner; tolerant of siltation and organic enrichment; moderately tolerant of turbidity
Brook Stickleback	*Culaea inconstans*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	planktivore/invertivore	spring summer	small, boggy headwater streams, shallow lake margins, ponds, and clear pools and backwaters of creeks and small rivers; usually associated with aquatic vegetation; occasionally brackish water; preferred water temperature 21.3°C	tolerant of low dissolved oxygen, acidity and alkalinity; intolerant of turbidity; often only species occurring in marginal habitats
Brown Trout	*Salmo trutta*	G5	NNA	SNA	-	introduced	common	intolerant	lacustrine, riverine	coldwater	invertivore/carnivore	fall	cool creeks and rivers with moderate flow, gravelly substrates and riffle-pool habitat, and lake shallows; preferred water temperature range 15-18°C	native to Europe and western Asia; anadromous life-strategy for Great Lakes stocks, although entirely freshwater; lake and stream residents occur; hybrids with Brook Trout called "tiger trout"
Brook Trout	*Salvelinus fontinalis*	G5	N5	S5	-	native/introduced	common	intolerant	lacustrine, riverine	coldwater	invertivore/carnivore	fall	cold, clear, well-oxygenated streams, rivers, ponds and lakes with maximum water temperature less than 22°C; preferred water temperature range 13-17°C	amphidromous populations occur in Hudson Bay; Great Lakes populations that forage in the lakes and spawn in tributaries are known as "coasters"; hybrids with Brown Trout called "tiger trout", while hybrids with Lake Trout called "Splake"
Mottled Sculpin	*Cottus bairdii*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coldwater	invertivore	spring	cobble and gravel riffles of cool creeks, small rivers and rocky shores of lakes (<16 m deep); preferred water temperature range 13-18°C	hybrids with Slimy Sculpin are reported from Lake Ontario; competition from introduced Round Gobies have led to declines in Great Lakes populations
White Sucker	*Catostomus commersonii*	G5	N5	S5	-	native	common	tolerant	lacustrine, riverine	coolwater	generalist	spring	pools and riffles of creeks and rivers, warm shallow lakes and embayments of larger lakes usually at depths of 6-9 m; preferred water temperature range 22-26°C	very tolerant of polluted waters; hybrids with longnose sucker are reported
Largemouth Bass	*Micropterus salmoides*	G5	N5	S5	-	native/introduced	common	tolerant	lacustrine, riverine	warmwater	invertivore/carnivore	spring	clear, warm, shallow lakes, bays, ponds, marshes and backwaters and pools of creeks and small to large rivers, often with soft mud or sand substrate and dense aquatic vegetation; usually at depths <6 m; preferred water temperature range 26-30°C	lies in a semidormant state during winter; tolerant of high water temperature (36.5°C) and wide range of pH (5-10); intolerant of low dissolved oxygen; moderately tolerant of turbidity
American Brook Lamprey	*Lampetra appendix*	G4	N4	S3	-	native	common	intolerant	riverine	coldwater	herbivore	spring	adults in gravel/sand riffles and runs of creeks and small- to medium-sized rivers with strong flow and clear waters; ammocoetes in sandy or silty pools; preferred water temperature range 9-12°C	adults nonparasitic and die after spawning; sensitive to pollution and turbidity
Central Stoneroller	*Campostoma anomalum*	G5	N1N2	S4	-	native/introduced	limited distribution	intermediate	riverine	coolwater	herbivore	spring	pool/riffle/run habitats of small to medium-sized streams; rare in lakes and large rivers; preferred water temperature range 19-27°C	expanding its range in Ontario through bait-bucket transfer and natural dispersal; tolerant of low dissolved oxygen and fluctuating turbidity
Rainbow Darter	*Etheostoma caeruleum*	G5	N3	S4	-	native	uncommon	intolerant	riverine	coolwater	invertivore	spring	fast-flowing gravel and cobble riffles of clear creeks and small to medium rivers; preferred water temperature 19.8°C	sensitive to pollution and siltation; tolerant of nutrient enrichment; commonly associated with Fantail Darter and Johnny Darter
Fantail Darter	*Etheostoma flabellare*	G5	N4N5	S4	-	native	common	intolerant	riverine	coolwater	invertivore	spring	shallow, rocky riffles of creeks and small to medium rivers with deep pools and slow to moderate currents; preferred water temperature 22.4°C	fractional spawner; intolerant of intermittent flow; less sensitive to siltation than other darters
Blackside Darter	*Percina maculata*	G5	N3N4	S4	-	native/introduced	uncommon	intermediate	riverine	coolwater	invertivore	spring	quiet reaches and pools of creeks and small to medium rivers with moderate current and cobble, gravel or sand substrates	species is less benthic than other darters, and uses mid-depths; intolerant of some organic pollutants; tolerant of turbidity; common associate of Smallmouth Bass and Rock Bass
River Chub	*Nocomis micropogon*	G5	N4	S4	-	native/introduced	common	intermediate	riverine	coolwater	generalist	spring	swift currents and pools in medium sized creeks and rivers of high to moderate gradients with clean clear water and gravel to boulder substrates; preferred water temperature 21.7°C	bait-bucket introductions have expanded range in Ontario; hybrids with Longnose Dace reported
Northern Hog Sucker	*Hypentelium nigricans*	G5	N3	S4	-	native	common	intermediate	riverine	warmwater	generalist	spring	riffles, runs and pools of clear creeks and small rivers with gravel, cobble substrates; rare in lakes; preferred water temperature 26.6°C	intolerant of turbidity, siltation and industrial pollution; commonly associated with Smallmouth Bass
Black Redhorse	*Moxostoma duquesnei*	G5	N2	S2	Threatened	native/introduced	rare	intolerant	riverine	warmwater	invertivore	spring	pools and runs of creeks and small to medium rivers with sand, gravel and rocky substrates where siltation is minimal	intolerant of turbidity, siltation and pollution; often associated with Golden Redhorse and Shorthead Redhorsse

Table created using data from The Ontario Freshwater Fish Life History Database (http://www.fishdb.ca/home.htm) accessed September 3, 2008

COSEWIC Status: Species designation assigned by the Committee on the Status of Endangered Wildlife in Canada.

Threatened (T): A wildlife species likely to become endangered if limiting factors are not reversed.

GRank (Global Rank): Global conservation status ranks are assigned by NatureServe scientists with input from relevant natural heritage member programs and experts on particular taxonomic groups. These ranks reflect an assessment of the condition of the species across its entire range.

G4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 **:** Secure; common, widespread, and abundant.

NRank (National Rank): National conservation status ranks in Canada are assigned similar to global ranks. The condition of a species can vary from one country to another, and national conservation status ranks document its condition in a particular country.

N1: Critically Imperiled; critically imperiled in the nation because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

N2: Imperiled; imperiled in the nation because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.

N3: Vulnerable; vulnerable in the nation due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

N4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

N5 **:** Secure; common, widespread and abundant in the nation.

NNA **:** Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

N#N# **:** Range Rank; a numeric rank is used to indicate the range of uncertainty about the status of the species.

?: Inexact or Uncertain; denotes inexact or uncertain numeric rank.

SRank (Subnational Rank): Subnational conservation status ranks are assigned for Ontario by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species.

S2: Imperiled; imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.

S3: Vulnerable; vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 **:** Secure; common, widespread and abundant in the province.

SNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

December 2010

HERITAGE IMPACT ASSESSMENT

Structure 24-P - Carroll Creek Bridge
Schedule 'B' Class Environmental Assessment
Township of Centre Wellington
Wellington County, Ontario

Submitted to:
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REPORT

Report Number: 10-1136-0054-R01
Distribution:

3 Copies - Triton Engineering Services Ltd.
1 Copy - Wellington County Library
1 Copy - Wellington County Museum and Archives
2 Copies - Golder Associates Ltd.

Acknowledgements

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Proponent Contact	David G. Donaldson, P. Eng., Triton Engineering Services Ltd.

Executive Summary

Centre Wellington Township, Wellington County, retained Triton Engineering to conduct a Schedule B Class EA on Bridge 24-P that the township is considering for repair, renovation or replacement. Triton engaged Golder Associates to perform a heritage impact assessment on the structure. The Carroll Creek Bridge (24-P) is a simple "T beam" structure sitting approximately 10 km northwest of the village of Elora.

The objective of this heritage impact assessment was to compile all available information about the known and potential cultural heritage value of the Carroll Creek Bridge and provide specific direction for the protection, management, and/or mitigation of those attributes of the bridge that were deemed to have value, consistent with the Ministry of Tourism and Culture guidelines.

While little historical information on this bridge was recovered during archival visits, the structure was likely built in the 1930s and despite its age, is not a unique structure either in design or construction. Because of its age and the finite useful life of concrete, the bridge is in a considerable state of deterioration. Repair or restoration is likely not feasible and, because of a low heritage rating of 12 on the Ontario Heritage Bridge Criteria, is not recommended. The best alternative conservation action would be replacement.

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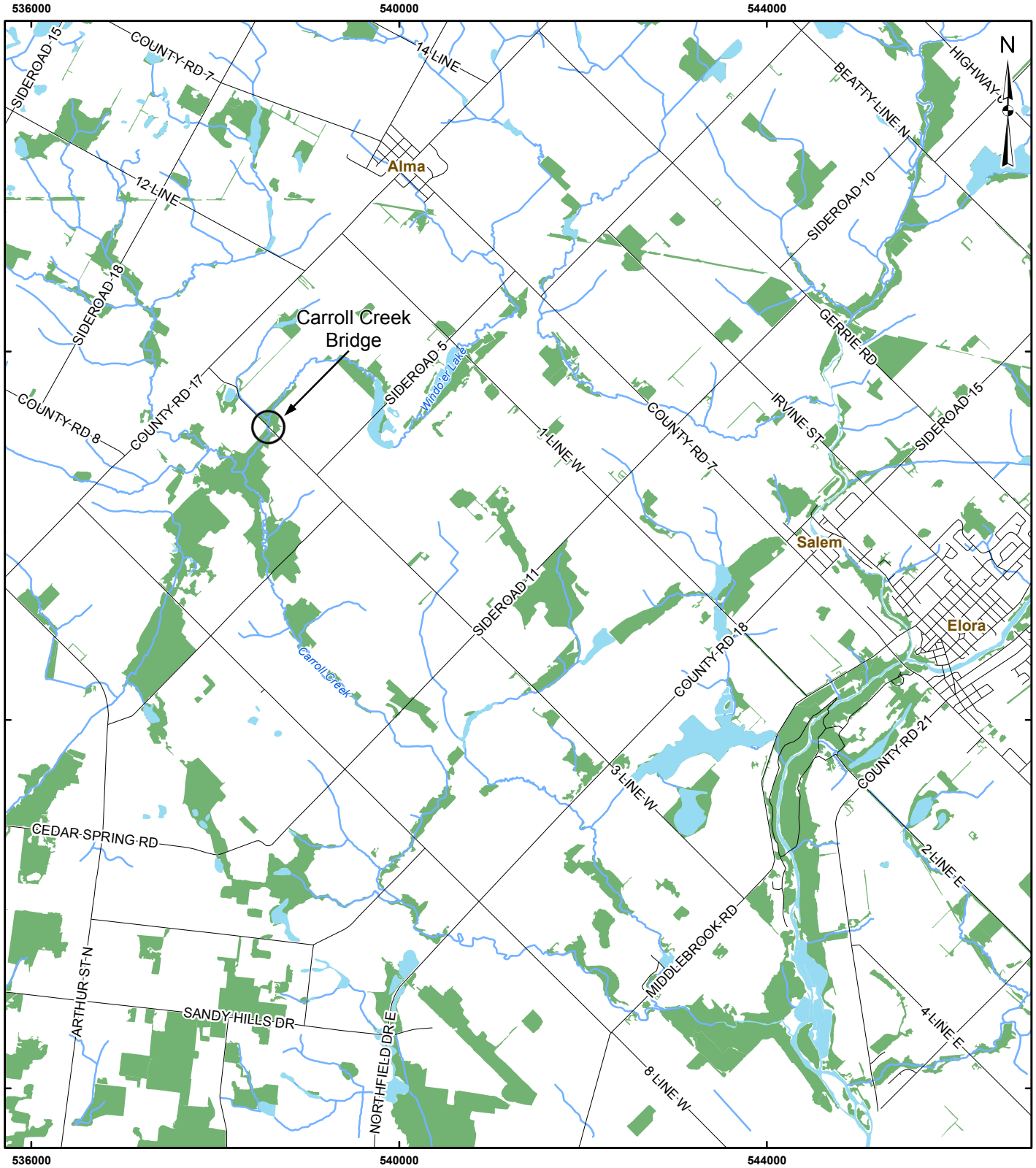
PLATES

1.0 STUDY PURPOSE AND METHOD

Centre Wellington Township, Wellington County, retained Triton Engineering to conduct a Schedule B Class EA on Bridge 24-P that the township is considering for repair, renovation or replacement. Triton engaged Golder Associates to perform a heritage impact assessment on the structure. The Carroll Creek Bridge (24-P) is a simple "T beam" structure sitting approximately 10 km northwest of the village of Elora. (See Figures 1 and 2).

A site visit of the bridge was undertaken on October 1, 2010 and archival research at the Wellington County Library occurred on October 1, and October 14, 2010. Research was undertaken using both primary and secondary information and is listed in the sources section of this report. The analysis was based on the *Ontario Heritage Bridge Guidelines (January 11, 2008).*

Between 1971 and 1984 Canada adopted the metric system. All structural dimensions in this text are given in Imperial and metric units. In general the use of Imperial rather than metric is preferred for describing historic structures. Engineered structures were built to standard Imperial dimensions and distinctive patterns within such structures can be obscured by converting the original Imperial into metric units. Unless there are historical issues (i.e. contract specifications), all distances and other common measurements are given in metric units.



LEGEND

- Road
- Water
- Wooded Area

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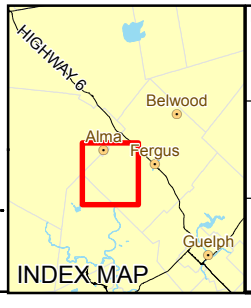

PROJECT

TRITON ENGINEERING

TITLE

CARROLL CREEK BRIDGE STUDY AREA

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1136-0054			SCALE AS SHOWN	REV.
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GIS	PP	9 Nov. 2010		
CHECK				
REVIEW				

FIGURE: 1

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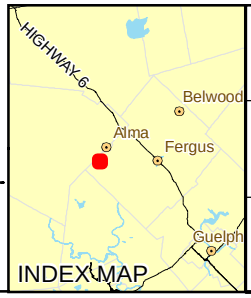

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2008.4
Obtained from GRCA. Flown Spring 2006, 30 cm resolution
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

PROJECT

TRITON ENGINEERING

TITLE

SETTING OF CARROLL CREEK BRIDGE

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1136-0054			SCALE AS SHOWN	REV.
DESIGN	PP	9 Nov. 2010	FIGURE: 2	
GIS	PP	9 Nov. 2010		
CHECK				
REVIEW				

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2.0 BACKGROUND RESEARCH

2.1 Historic Setting

2.1.1 Settlement

Carroll Creek Bridge (24-P) sits on the road allowance within Lot 3 between concessions 3 and 4 in the former Pilkington Township, now Centre Wellington Township. In 1784, the Crown granted a significant land parcel to the Six Nations aboriginal group following the American Revolution. In the late 18th century, Mohawk Chief Joseph Brant sold several blocks of their original grant to raise money for his tribe. In 1789, William Wallace purchased 30,000 acres of Upper Woolrich Township from Chief Brant and in 1799 sold half, 15,000 acres, to Capt. Robert Pilkington of England for development.

Pilkington, a captain in the Corps of Royal Engineers, saw service in Canada for several years in the 18th century in both Toronto and Niagara before returning to England in 1796 where he was eventually promoted to major-general. Although he may have never actually visited his Wellington County land, local historian Jean Hutchinson suggested he had selected a picturesque parcel overlooking the Grand River and intended to build a retirement home there.[1]

Pilkington apparently had trouble persuading anyone to settle on his land and even attempted enticements such as offering 100 acres of free land to the first twelve families to move there. While Pilkington died in England in 1834 apparently still trying to develop his land, his heirs declined to follow through with his offers to new settlers. Pilkington's estate, however, was not likely in order which was a good reason to dismiss earlier promises for free land. Agents for the English Court of Chancery that held jurisdiction over trusts and land law eventually put the property up for sale in 1842 and Pilkington's land remained part of Woolwich Township until 1852 when it was granted its own township.[2]

Centre Wellington Township was established on January 1, 1999 by amalgamating the town of Fergus, the village of Elora and parts of West Garafraxa, Nichol, Pilkington and Eramosa townships. In 2006 Centre Wellington had a total population of 26,046.

Although not necessarily associated with the Carroll Creek crossing on 3 Line West, local historian Jean Hutchinson wrote about Pilkington Township resident bridge-builder, Richard Boyle, who early in life used to walk over an old log bridge in Salem to work and, dissatisfied with the crossing, decided to build a new bridge. In 1860, the young Boyle drew draw up plans for and likely built a new bridge over the Irvine River at County road 18 in 1860. From this early success, he built several bridges in Wellington, Halton, and Dufferin counties. The Elora Express reported that in Dec. 1903, Richard Boyle and his men built a 2-span bridge, sixty feet in length over Carroll's creek in Middlebrook, approximately 10 km downstream from 24-P, in a mere four days.[3]

[1] Ibid., 169

[2] Ibid., 169.

[3] Ibid., 179.

2.1.2 Bridge Construction

Carroll Creek Bridge (24-P) is a simple, single-span, reinforced concrete "T" beam slab bridge with non-structural precast concrete railing on both sides. The Pinkerton Township Bridge Survey indicates an estimated date of construction of 1935.[4]

The simplest bridge type is a single structure, such as a tree trunk or concrete slab, set on mounds or abutments over a narrow crossing. While this may be a sufficient structure for light or limited loads and short crossings, without some sort of structural reinforcement, heavy loads will deflect the structure in the center causing damage or failure. While bridge engineers often have several designs to choose from, structural reinforced-cast concrete became a flexible, relatively inexpensive, and often used material.

The "T" beam essentially incorporates a concrete beam girder into a concrete bridge deck as a single monolithic unit. Integrated steel reinforcement rods sit in the lower section of the "T" and accept the downward load from the bridge surface in tension, while the top portion of the "T" is in compression and together provides a relatively stiff member to build the deck onto. In the early 20th century, "T" beams traditionally were limited to 50 feet crossings and were an often chosen design for municipalities needing to build or replace a bridge over a short crossing. Today, "T" beams can extend significantly farther.

Concrete, introduced into North American bridge making in 1871, has several advantages over steel. First it can usually be made with local materials, it is relatively low-tech, can be formed into myriad shapes simply, has high relative compressive strength, and it is largely maintenance free through the useful life of the structure—meaning it does not need to be tended to at regular intervals like steel. However, because of its low tensile strength, concrete needs to be reinforced with steel rods to be a useful structural material. The first reinforced concrete bridge in North America appeared in 1890.[5]

[4] "Municipal Structure-Appraisal Sheet-Rural" (Pinkerton Township Bridge Survey, for structure 003, June 10, 1977 and April 10, 1988), 2.

[5] Parsons Brinckerhoff and Engineering and Industrial Heritage, *A Context for Common Historic Bridge Types,(NCHRP Project 25-25, Task 15*, 2005), 2-17.

3.0 BRIDGE DESCRIPTION

3.1 Landscape

The Carroll Creek Bridge (24-P) crosses Carroll Creek on 3 Line West between Sideroad 5 and Wellington Road 17 in Centre Wellington Township, Wellington County, oriented northwest to southeast. Upstream, the southwest-flowing tributary turns and flows south under 24-P, then generally continues south and east to its confluence with the 290 km Grand River just upstream from Invernaugh. The creek valley is relatively gently sloped and 3 Line West descends from a small rise south of the bridge at Sideroad 5, down to the crossing, then follows another creek tributary for several hundred meters before rising again as it approaches Wellington Road 17 to the north (See Plate 1). With the exception of the river bed and riparian plain which tend to be wooded wetlands, the region on both sides of the creek is agricultural surrounded by active farms (See Figure 2 and Plate 2).[6] 3 Line West and Sideroad 5 are largely rural agricultural access ways with few buildings beyond farmhouses and support buildings, none of which are visible near the bridge. The chief commercial areas for Centre Wellington are the villages of Elora and Fergus, picturesque former mill towns, established in the 19th century to take advantage of the15m drop in river elevation and water power potential. The area near the bridge crossing apparently has several high-flowing artesian wells that led to the creation of large trout farms in the late 20th century.[7]

Plate 1: 3 Line West at Carroll Creek Bridge looking south.

[6] Canadian Heritage Rivers Board. "Grand River," accessed October 13, 2010, www.chrs.ca/Rivers/Grand/Grand-F_e.htm#1

[7] Jean Hutchinson, *The History of Wellington County (Landsborough, 1998), 179.*

Plate 2: Carroll Creek Bridge setting showing east railing, creek, and local landscape.

3.2 Bridge Components

Carroll Creek Bridge (24-P) is a simple single-span, reinforced concrete "T" beam slab bridge with an 11.1 m (36.4 ft) deck length, 5.6 m (18.37 ft) deck width, and a 10.4 m (34.1 ft.) span. The bridge has a plain, non-structural cast concrete railing on both sides and was likely constructed in the 1930s. The short bridge is a simple structure likely constructed as a two-lane crossing, but with the size and weight of modern automobiles and agricultural vehicles, and structural deterioration, is now limited to a single lane. The posted safe loading is 9 tonnes but inspection reports now twenty years old list that weight as deficient for the location.[8] The bridge itself is in very poor condition with spalling concrete, failing abutments, and missing rails and balustrades.

[8] "Municipal Structure-Appraisal Sheet-Rural" (Pinkerton Township Bridge Survey, for structure 003, June 10, 1977 and April 10, 1988), 1.

3.2.1 Abutments

Both abutments on the bridge are cast concrete and appear to be simple squared structures with no ornamentation. Wing walls that are set back from the abutment ends giving the abutment the appearance of a pier when viewed from the side, although only one original wing wall is visible. The North abutment shows no indication of repairs outside of a skin coat on the west side (that may be original) but exhibits significant deterioration on the east side likely due to ice and debris impacts during floods (See Plate 3).

Plate 3: Detail of north abutment and west inset wing wall. Note spalling concrete resurfacing.

The west wing wall may have been rebuilt as evident by the clean lines and different color, or merely coated with new concrete like the abutment end. The east wing wall shows no sign of repair and has significantly eroded exposing reinforcement and showing little of the original surface.

The south abutment, however, has had new wing walls cast in place over the existing walls on both sides substantially increasing the width of the wing walls. The new concrete covers, however, are separating from the original at the abutment faces (See Plates 4 and 5). The limited pieces of visible reinforcement and large sized cobbles in the exposed section of the south abutment concrete suggest the reasons for the separation and a potentially incorrect initial concrete mixture.

Plate 4: Carroll Creek bridge, south abutment showing "T" beams and deck bottom. Note new(er) wing wall castings separating from abutment and relatively clean edges of "T" beams.

Plate 5: Detail of south east wing wall separation from south abutment. Note limited reinforcement and large cobbles.

3.2.2 Bridge Deck

3.2.2.1 Girders

The two “T” beams show modest wear with several cracks and failures in the concrete surface near the lower reinforcement likely due to water encroachment, reinforcement corrosion, and freeze and thaw cycles (See Plates 6 and 7).

Plate 6: Two “T” beams and south abutment showing edge failures.

Plate 7: Detail of east "T" beam showing exposed reinforcement in lower beam half and connecting reinforcement integrating the beam into the bridge deck. Note missing concrete from beam bottom likely from corroding reinforcement and spalling concrete.

3.2.2.2 Deck

The asphalt wear surface on the deck surface has significantly worn away giving much of the surface the appearance of an unpaved road (See Plate 1). The west edge of the deck appears largely intact with a clean surface and few cracks. The east, upstream, edge of the deck however has had significant failures with very little original surface left likely due to ice and debris impacts during floods. Most of the deck edge on this side has significant erosion and exposed reinforcement. The sections of the east deck edge directly adjacent to each abutment show even greater erosion (See Plates 8 and 9).

Plate 8: West deck edge showing relatively clean surface, but significant rail deterioration possibly due to collisions.

Plate 9: East deck edge showing significant deterioration likely due to ice and debris impacts during floods but relatively intact rail system.

3.2.2.3 Railing

The railing system is made up of eight assembled, pre-cast concrete sections (on each side) including reinforced balustrades and individual reinforced railings (See Plates 8 and 9). Most balustrades are square with pyramidal tops and four chamfered edges extending from below the top railing opening to below the bottom railing opening (See Plate 10). Decorative inset circles were cast into the balustrade faces without railing openings, at the level of the top rail. The rails are cast concrete beams squared on three sides with a peaked and pitched top side likely to facilitate rain runoff. Despite the very poor condition of the east-side deck edge, the east side railing system is completely intact and largely in good repair except for some spalling concrete near reinforcement rods on the center balustrades and some broken edges on the rails.

Curiously, the west side railing, sitting on the solid west deck edge has demonstrated significant failures. Only five of the eight balustrades exist and only four of them are in good repair. While one of the balustrades is halved and only held together by reinforcement rods, three are broken off at openings for the lower railings or at the openings of the top railing opening suggesting collisions with moving vehicles (See Plate 11). The two end balustrades on the west side have flat tops opposed to the pyramidal tops of all the other balustrades whose tops still exist. On both sides of the bridge, inside the railings, the township lined the crossing with a wood-slated snow fence likely to provide a stronger visual location of the bridge edge for moving vehicles because it would provide no resistance to impacting vehicles and only modest resistance to pedestrians who may be inclined to cross the bridge edge (See Plate 1 and 12).

Plate 10: Balustrade detail of east rail showing pyramidal cap, chamfered edges, and decorative circular inset, and rail detail.

Plate 11: Failed balustrade and missing rails from west side railing.

Plate 12: Snow fencing lining the east railing of Carroll Creek Bridge.

4.0 EVALUATION

4.1 Method of Evaluation

The criteria for evaluating the cultural significance, or value, of historic resources structures and landscapes have been developed by the Ministry of Tourism and Culture and published as *Ontario Regulation 9/06.* The criteria are detailed below:

1) The property has ***design value or physical value*** because it:

- Is a rare, unique, representative or early example of a style, type, expression, material or construction method;
- Displays a high degree of craftsmanship or artistic merit; or
- Demonstrates a high degree of technical or scientific achievement.

2) The property has ***historic value or associative value*** because it:

- Has direct associations with a theme, event, belief, person, activity, organization, or institution that is significant to a community;
- Yields, or has the potential to yield information that contributes to an understanding of a community or culture; or
- Demonstrates or reflects the work or ideas of an architect, artist, builder, designer, or theorist who is significant to a community.

3) The property has ***contextual value*** because it:

- Is important in defining, maintaining or supporting the character of an area;

  Is physically, functionally, visually or historically linked to its surroundings; or is a landmark.

4.2 Cultural Significance of Carroll Creek Bridge

4.2.1 Design Value or Physical Value

The cast concrete “T” beam design was a quick, stable, inexpensive, and simple solution for short crossings that is still used today for some small and medium bridge designs. While it would be difficult to claim that any particular bridge design dominates in a particular setting because of the many different types, the “T” beam has certainly been an often chosen design. Further, the Carroll Creek Bridge cast concrete railing system was assembled from an unmatched set of very commonly used balustrades and rails for the county.

4.2.2 Historic or Associative Value

Because no reference to the construction of the bridge was located in township council minutes, the bridge cannot be associated with a particular designer or builder. Further, the crossing is a relatively modest one over a short span serving largely agricultural needs and the bridge does not have a name associated with a local land owner.

4.2.3 Contextual Value

The Carroll Creek Bridge is a relatively minor structure over a minor crossing. It is not physically prominent because it is a relatively short, simple structure and is a common design constructed of a very common material. However, the bridge has an appropriate scale for its function, and fits well into its landscape.

Table 1: Ontario Heritage Bridge Guidelines Evaluation Criteria

	Possible Score	Actual Score	Comments
A. Design/Physical Value			
Functional Design	20	0	
Visual Appeal	20	6	
Materials	10	0	
B. Contextual Value			
Landmark	15	0	
Character Contribution	10	6	
C. Historic/Associative Value			
Designer/Construction Firm	15	0	
Association with a historic theme, person, event	10	0	
Totals	100	12	

4.3 Statement of Significance

The Carroll Creek Bridge scored 12 on the Ontario Heritage Bridge Criteria because it has common design features, details, and materials.

4.4 Heritage Attributes of Carroll Creek Bridge

The following site characteristics, or attributes, represent the heritage significance of the structure:

- Cast concrete “T” beam represents an important and very often used design because of its simplicity and cost benefits especially for municipalities seeking cost-effective solutions for short crossings in rural locations.

5.0 PROPOSED UNDERTAKING

Centre Wellington Township, Wellington County, retained Triton Engineering to conduct a Schedule B Class EA on Bridge 24-P that the township is considering for repair, renovation or replacement. Triton engaged Golder Associates to perform a heritage impact assessment on the two structures.

5.1 Heritage Conservation Alternatives

According to the Ontario Heritage Bridge Guidelines (OHBG), there are eight conservation options for listed or potentially listed provincially-owned bridges.[9] These guidelines are required for provincially owned bridges but should be interpreted as guidelines for municipally owned bridges. The guidelines include:

1) Retention of existing bridge with no major modifications undertaken

2) Restoration of missing or deteriorated elements where physical or documentary evidence (e.g. photographs or drawings) exists for their design;

3) Retention of existing bridge with sympathetic modification;

4) Retention of existing bridge with sympathetically designed new structure in proximity;

5) Retention of existing bridge no longer in use for vehicular purposes but adapted for a new use. For example, prohibiting vehicle or restricting truck traffic or adapting for pedestrian walkways, cycle paths, scenic viewing, etc.;

6) Retention of bridge as a heritage monument for viewing purposes only;

7) Relocation of smaller, lighter single span bridges to an appropriate new site for continued use or adaptive re-use;

8) Bridge removal and replacement with a sympathetically designed structure: a. where possible, salvage elements/members of bridge for incorporation into new structure or for future conservation work or displays; b. Undertake full recording and documentation of existing structure.

The Ontario Heritage Bridge Guidelines state that before a provincial bridge is replaced, at least one of the following conditions must be demonstrated in the Structural Planning[10]:

1) **The safety of the existing structure is compromised to the extent that rehabilitation is not a practical option**. Structural deficiencies that can be addressed through rehabilitation should not be considered under this category.

[9] Ministry of Transportation, "Ontario Heritage Bridge Guidelines for Provincially Owned Bridges," (MTO, Heritage Bridge Guidelines (Interim) January 11, 2008), 20.

[10] Ibid., 21.

2) **The cost of rehabilitation is prohibitive compared to replacement.** This may be the case for a bridge that is severely deteriorated and structurally compromised. Rehabilitation costs that exceed replacement costs by approximately 10% are not considered prohibitive given the intrinsic value of preserving a heritage structure. It is also recognized that long term maintenance costs may be higher for the rehabilitated bridge, however, this fact cannot be a determining factor when considering the retention vs. replacement options.

3) **The bridge has been severely altered from its original form**. This would be the case for bridges where only a small part of the original structural character remains following repeated rehabilitation episodes. A cultural heritage bridge does not need to be in its original condition. Few survive without alterations on the long journey between their date of origin and today. Integrity is a question of whether the surviving physical features (heritage attributes) continue to represent or support the cultural heritage value of the bridge or its associated landscape.

4) **Replacement is required to meet demand requirements that are not achievable through rehabilitation or upgrading of the existing structure.** All alternatives to demolition should be considered under this category and documented. For example, has a detailed analysis of all alternative crossings been completed? Where the decision to replace a Listed bridge has been made based on one of the above criteria, the Structural Planning Report will be reviewed by MTO Heritage Bridge Committee, and then submitted to the Ministry of Culture for review of the proposed mitigation option(s).

5.2 Analysis and Mitigation

This section evaluates the alternatives based on the Ontario Ministry of Transportation publication *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges*, Interim, January, 2008 (OHBG). From the eight OHBG options listed above four basic conservation alternatives emerge including A) do nothing, B) rehabilitate the existing bridge, C) replace the bridge, and D) build a new bridge nearby retaining the existing bridge.

5.2.1 Conservation Alternative A: Do Nothing (OHBG Conservation Option 1)

The “Do Nothing” alternative does not provide for any repair work that would permit the bridge to continue in service for a reasonable period of time. In the short term, the original bridge would remain unaltered. However, over time it would continue to deteriorate to a point at which more severe intervention than that proposed in Conservation Alternative B (below) would be necessary.

5.2.2 Conservation Alternative B: Rehabilitate Bridge (OHBG Conservation Options 2 and 3)

Alternative B provides for the rehabilitation of the existing structure. This would enable the bridge to continue in use. Of the general design alternatives, Alternative B would have the least impact on physical character of the bridge and its associated cultural landscape.

The success of Alternative B would depend upon the type of rehabilitation work that is undertaken. If the rehabilitation was done without regards to the existing character of the bridge, the historic value of the bridge could be diminished. If this alternative is selected, the bridge should be designated under part IV of the *Ontario Heritage Act* to increase its awareness in the community and the ongoing conservation of the structure.

In undertaking Alternative B, the rehabilitation should be as sensitive as possible to the original fabric of the bridge: as little material as possible should be replaced and, when necessary, new materials should be of similar sectional dimensions, color, and texture to the existing members.

5.2.3 Conservation Alternative C: Replace Bridge in Same Location (OHBG Conservation Option 8)

Replacing the existing bridge on the same location would result in the destruction of the original bridge and visual changes to the surrounding cultural landscape.

The design of the new bridge should be sympathetic to the existing character of the setting. For example the new bridge should be a small span of similar colouring to the existing bridge. Ideally it should have a thin deck and open railings to recreate the visual lightness of the existing design.

5.2.4 Conservation Alternative D: Replace Bridge in New Location (OHBG Conservation Options 4, 5, and 6)

Replacing the existing bridge at a new location would have similar adverse impacts as Alternative C. The cultural heritage landscape impact would be greater because the new crossing would be at a different location than the historic crossing.

The design of the new bridge should follow the same guidelines as for Alternative C (above). For example the new bridge should be small span of similar colouring to the existing bridge. Ideally it should have a thin deck and open railings to recreate the visual lightness of the existing design.

6.0 RECOMMENDATIONS

6.1 Replace Bridge in Same Location

Recommendation is to replace the bridge with a new structure in the same location as the current Carroll Creek crossing. While the most desired option in the case of the Carroll Creek Bridge would include its retention and conservation in the landscape, it rates a low heritage value. Further, the bridge shows serious concrete deterioration and reinforcement corrosion, and because of the physical nature of reinforced concrete structures may be beyond repair without completely recasting its chief structural components. Also, the bridge itself, currently rated at a single lane with a 9 tonne load capacity, is likely too small for the agricultural community is primarily serves.

6.2 Deposit Copies

Copies of this report and other historic documentation gathered as part of this bridge assignment should be deposited at the:

Wellington County Museum & Archives
0536 Wellington Road 19
Fergus, Ontario
N1M 2W3

Wellington County Library
Fergus Branch
190 St Andrew St W
Fergus, Ontario N1M 1N5

GOLDER ASSOCIATES LTD.

Bode Morin, Ph.D.
Built Heritage Engineering Specialist

Jim Wilson, M.A.
Associate, Senior Archaeologist

BM/JAW/sc

7.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder Associates Ltd. has prepared this report in a manner consistent with the standards and guidelines developed by the Ontario Ministry of Tourism and Culture, Programs and Services Branch, Cultural Services Unit, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

This report has been prepared for the specific site, design objective, developments and purpose described to Golder Associates Ltd., by Triton Engineering Services, Ltd. the factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

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8.2 Archival

Pilkington Township

1928-1932 *Council Minutes*.

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DRAFT

Stage 1 and 2 Archaeological Assessment
3rd Line Bridge Reconstruction
Township of Centre Wellington
(Former Pilkington Township)
Wellington County, Ontario

Prepared for
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&
The Ontario Ministry of Tourism and Culture

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Reviewed By
Paul J. Racher, M.A., CAHP
Ontario Ministry of Tourism and Culture Licence #P-007
Project #P007-274
PIF #P007-274-2010

November 2010

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Executive Summary:

This Stage 1 and 2 archaeological assessment was conducted on lands with the potential to be impacted by the proposed reconstruction of the 3rd Line Bridge in the Township of Centre Wellington (former Pilkington Township), Wellington County, Ontario.

The Stage 1 and 2 assessment was carried out by **Archaeological Research Associates, Ltd. (ARA)** in October of 2010 under licence #P007, PIF #P007-274-2010. Stage 1 research indicated that the study area, in its pristine state, would have a high potential for both Pre-Contact and Euro-Canadian archaeological sites. The Stage 2 assessment was carried out under optimal conditions after legal Permission to Enter (PTE) had been granted by the property owner. Archaeological materials were not discovered during the assessment. Accordingly, **ARA** recommends that the project be allowed to proceed without further heritage concerns.

Personnel:

Project Director: Paul J. Racher, M.A., CAHP, MTC Licence #P-007
Project Manager: Paul J. Racher
Field Director: A.J. Wong, MTC Licence #R-326
Field Work: S. Knight, H.J. Maurice, D. Standfast, A.J. Wong
Photography: A.J. Wong
Background Research: C.J. Gohm, M.A.
Report Preparation: C.J. Gohm
Graphics: C.J. Gohm, P. Hoskins

Acknowledgements:

Special thanks for his research assistance are extended to Mr. Robert Von Bitter, Archaeological Data Coordinator, Archaeology Unit, Heritage Branch, Ontario Ministry of Tourism and Culture, Toronto.

1.0 Introduction

Under a contract awarded in October of 2010, **Archaeological Research Associates Ltd. (ARA)** carried out a Stage 1 and 2 archaeological assessment of lands with the potential to be impacted by the proposed reconstruction of the 3rd Line Bridge in the Township of Centre Wellington (formerly Pilkington Township), Wellington County, Ontario. The assessment was conducted in October of 2010 under licence #P-007, PIF #P007-274-2010. The work was completed under contract to **Triton Engineering Services Limited** as part of a Municipal Class Environmental Assessment – Schedule B.

The Stage 1 and 2 archaeological assessment was carried out in order to:

- Identify any known archaeological sites that might be found near or within the study area;
- Empirically determine the presence of any unknown archaeological resources which may be extant within the study area; and
- If identified, suggest appropriate strategies for the protection and management of these sites.

The assessment was managed with permission for the landowner to access the property and remove artifacts, and was conducted in accordance with the provisions of the *Ontario Heritage Act* (R.S.O. 1990), and *Draft Standards and Guidelines for Consultant Archaeologists* (Ontario Ministry of Culture 2009). All notes, photographs and records pertaining to this assessment are housed in Archaeological Research Associates' Head Office, 97 Gatewood Road, Kitchener, Ontario.

The Ministry of Tourism and Culture is asked to review the results and recommendations presented in this report.

2.0 Location

The study area consists of a 165 m long corridor along the right-of-way for 3rd Line West, between Wellington Road 17 and Sideroad 5, in the Township of Centre Wellington (former Pilkington Township), Wellington County, Ontario (see Figures 1-3, Appendix). Historically, the study area falls within a road allowance of the former Pilkington Township, and is bordered on the east by Lot 3N (north), Concession 3 and on the west by Lot 3N, Concession 4.

Carroll Creek traverses the central part of the study area. The project lands are situated approximately 1.8 km southwest of Windo'er Lake and 6.7 km northwest of the Grand River and the Elora Gorge.

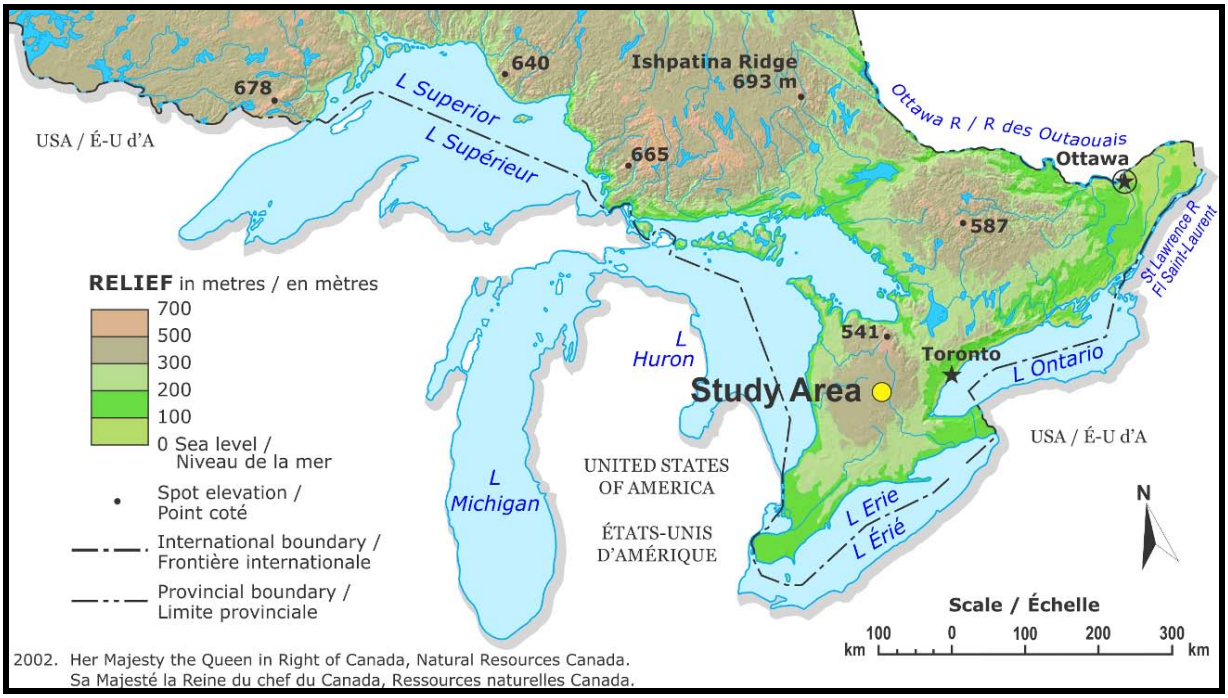

Figure 1: Location of Study Area in the Province of Ontario

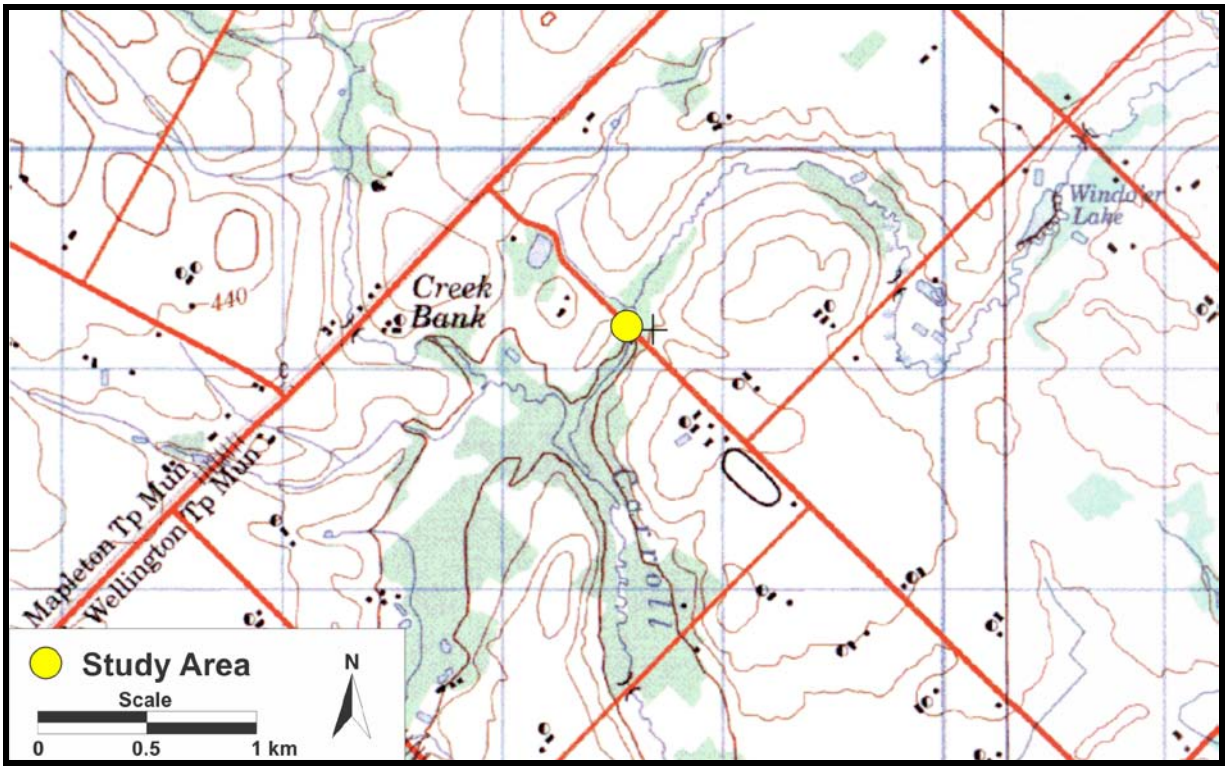

Figure 2: Study Area in the Township of Centre Wellington

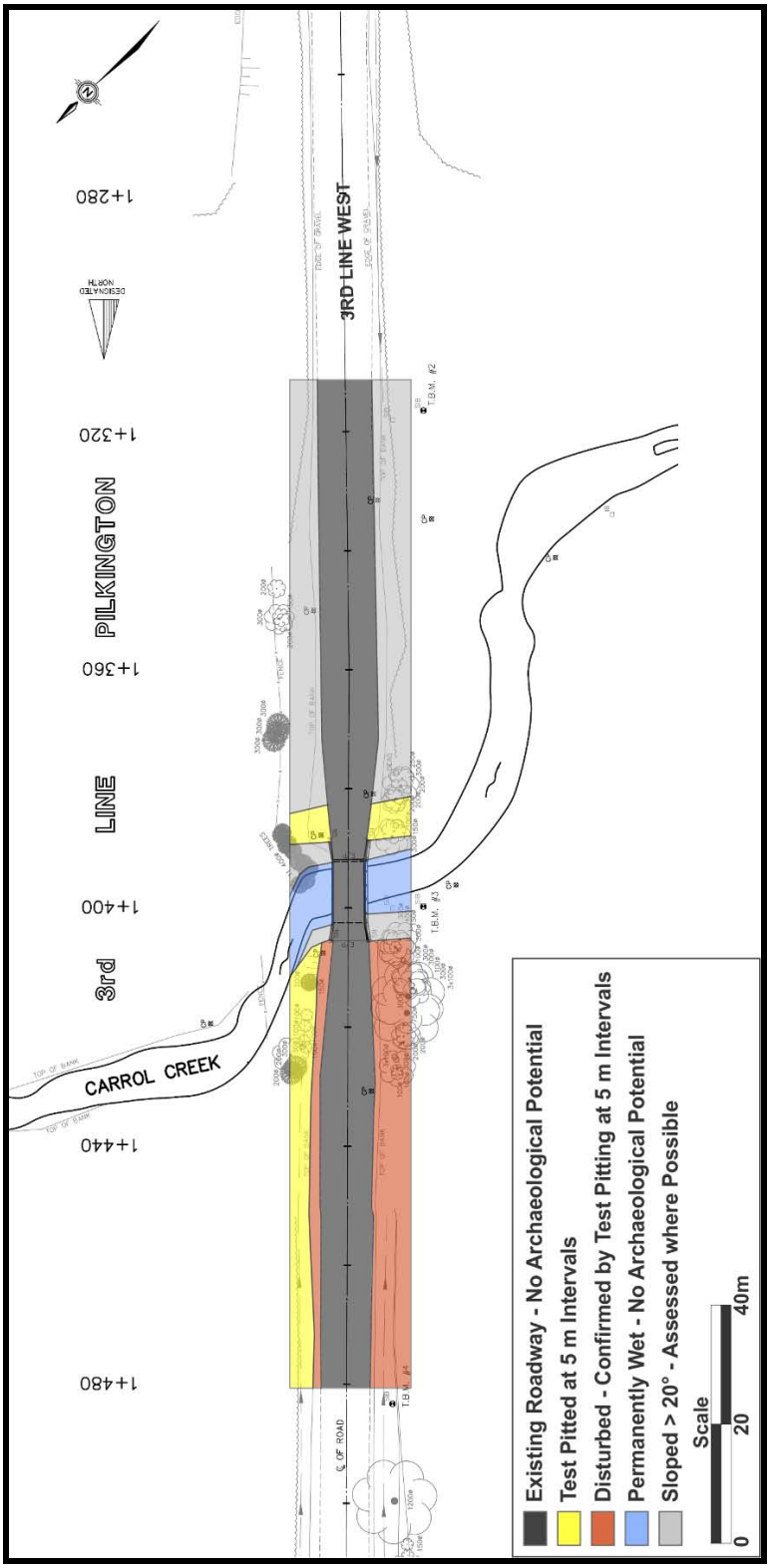

Figure 3: Study Area in Detail

3.0 Geography

It has long been understood that environment plays a key role in determining site location, particularly in small societies with non-complex, subsistence-oriented economies. The local environment of the study area lies within the Great Lakes-St. Lawrence Forest, which is a transitional zone between the southern Deciduous Forest and the northern Boreal Forest. Vegetation here consists of a mixture of coniferous trees and deciduous trees, as well as many species of ferns, fungi, shrubs and mosses. The most prominent conifers are eastern white pine, red pine, eastern hemlock and white cedar, while deciduous trees are best represented by yellow birch, sugar and red maple, basswood and red oak. Other species more commonly occurring in the north are also present, including white and black spruce, jack pine, aspen and white birch (Ontario Ministry of Natural Resources 2009).

In the Great Lakes region it is believed that the First Nations used some 500 plant species as food, food flavourings, drinks, medicines, building materials, fibres, dyes, and basketry (Mason 1981:59). As such, it is clear that vegetation played an important role in the site selection processes employed by Pre-Contact Aboriginal groups. Furthermore, this vegetation served as home and food for a wide range of game animals such as white tailed deer, turkey, passenger pigeon, cottontail rabbit, elk, muskrat, and beaver (Mason 1981:60).

The local climatic region is characterized by cold winters and warm summers, with average temperatures ranging from -6.1 to -7.2 ºC and 18.3 to 18.8 ºC, respectively. The vicinity of the study area experiences a growing season that typically lasts between 189 and 196 days, with approximately 147 frost-free days per year. The mean annual precipitation level is 743 mm, with snowfalls reaching upwards of 1295 mm in southern Wellington County (Hoffman et al. 1963:15).

Physiographically, the study area lies in the region known as the Guelph Drumlin Field, which lies northwest of the Paris Moraine and includes roughly 300 broad oval drumlins of various sizes. The drumlins themselves consist largely of loamy and calcareous till, and analyses have placed the average grain sizes in the neighbourhood of 50% sand, 35% silt and 15% clay. These drumlins are not closely grouped, and the intervening low ground supports mainly fluvial materials created by river action (Chapman and Putnam 1984:137-138). Soils in the vicinity of the study are consist entirely of Harriston Loam, which is a Grey-Brown Podzolic overburden made up of loam till with good drainage qualities (Hoffman et al. 1963:Soil Map South Sheet). This area falls within the Great Lakes Lowlands geological zone in a place where the bedrock is part of the Middle and Lower Silurian Guelph Formation, consisting primarily of dolostone (Davidson 1989:37, 42).

4.0 Previous Archaeological Research

An archival search was conducted using the Ontario Ministry of Tourism and Culture's Archaeological Sites Database in order to determine the presence of any registered heritage resources which might be located on or within a 2 km radius of the study area. No registered sites were found within these limits. This absence is likely related to the lack of archaeological exploration in the area rather than being representative of any meaningful settlement patterns.

5.0 Historic Land Use Summary

5.1 The Pre-Contact Era

The first settlers in southern Ontario were the Palaeo-Indian people who arrived after the retreat of the Wisconsinan glaciers, approximately 9000 BC. For approximately 1,500 years the Palaeo-Indians lived as hunter-gatherers in the area's boreal-like landscapes, ranging over very wide territories in order to live sustainably in an environment with low biotic productivity (Ellis and Deller 1990:52-54). Traditionally, Palaeo-Indians have been conceptualized as 'big game hunters' who lived on caribou and other Pleistocene megafauna. However, given the poor preservation of these sites (which are mostly understood only from stone tool and debris from their manufacture), much about the lifeways of these people remains unknown (Ellis and Deller 1990:38). In general, the impacts that humans left on their environment at these times were small (less than 200 sq. m) and ephemeral (Ellis and Deller 1990:51).

Beginning around 8000 B.C. the biotic productivity of the environment began to increase as the climate warmed and the watershed was colonized by deciduous forest. As a result, more opportunities arose for the exploitation of both animal and plant food sources. The resulting broad-based economy was the basis for the archaeological cultures that are referred to as 'Archaic'. During this period (ca. 8000 to 800 B.C.) there was an explosion in the number and variety of raw materials, tool forms, site types, and the number of sites themselves. Because Archaic sites are more recent than Palaeo-Indian ones, preservation tends to be better. Artifacts composed of bone, shell, and even wood are not unheard of. During the Late Archaic period, heavy wood-working tools appear, suggesting that people were building shelters or other objects, such as transportation aids (Ellis et al. 1990:66-67).

It is clear from the toolkits that have been unearthed that Archaic peoples had an encyclopaedic understanding of the environment that they inhabited. The number and density of the sites that have been found suggest that the environment was exploited in a successful and sustainable way over a considerable period of time. The success of Archaic lifeways is attested to by clear evidence of steady population increases over time. Eventually, these increases set the stage for the final period of Pre-Contact occupation – the Woodland Period (Ellis et al. 1990:120).

The Woodland Period began around 800 BC and is characterized by the appearance of pottery. It is believed that hunting and gathering remained the primary subsistence strategy throughout the Early Woodland Period (800 to 300 B.C.) and well into the Middle Woodland Period (300 B.C. to A.D. 700) (Spence et al. 1990:128, 168). The Saugeen complex is perhaps the best attested in the vicinity of the study area, and numerous sites have been identified in southern Ontario between Lake Huron, Lake Erie and Lake Ontario (see Figure 4). This complex is characterized by shell-stamped ceramics, a wide variety of chipped stone tools and a lifeway geared towards the exploitation of seasonally-available resources such as game, nuts and fish (Finlayson 1977; Spence et al. 1990:147-156).

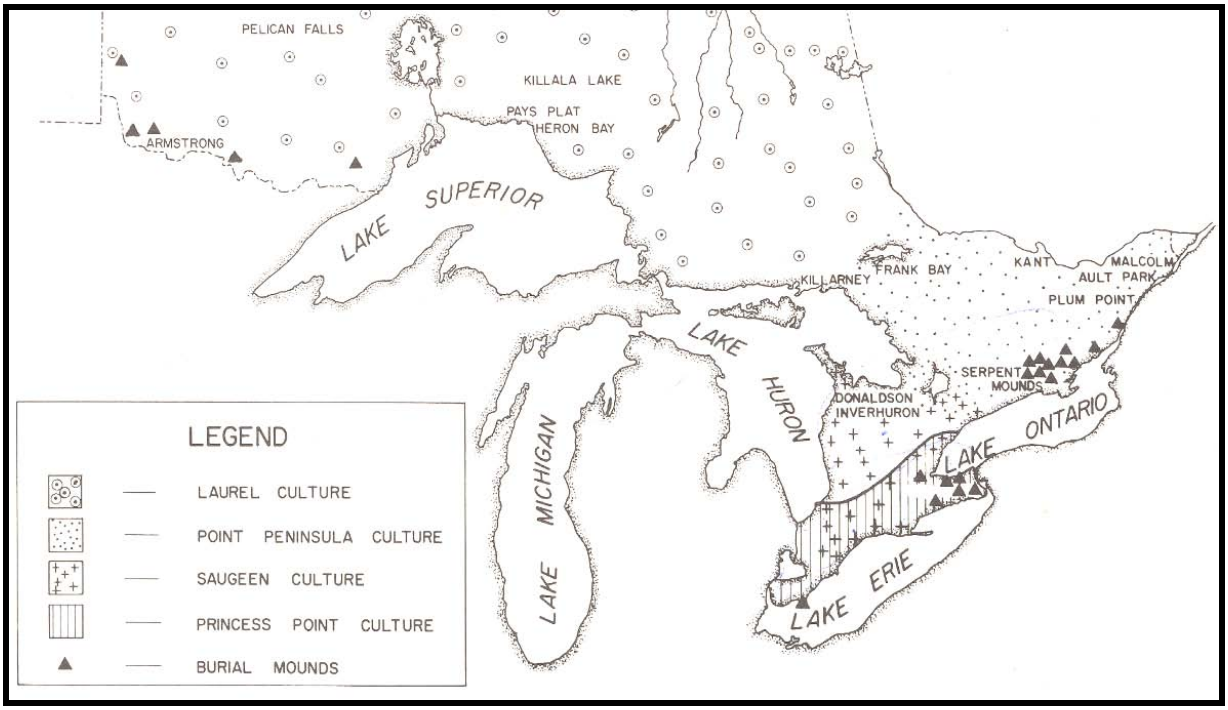

Figure 4: Map of Middle Woodland Period Complexes (Wright 1972:Map 4)

During the Middle to Late Woodland transition the first rudimentary evidence of maize (corn) horticulture appears in southern Ontario, and settled agriculturalists emerge in some areas (Fox 1990:171, Figure 6.1). The Grand Banks site, near Cayuga, Ontario (ca. A.D. 400 to 600), has yielded the earliest evidence of maize horticulture in northeastern North America. This site is well known for providing the earliest archaeological manifestations of the Princess Point culture (ca. A.D. 500 to 1000), whose distinctive artifacts and reliance on corn as a staple suggests that they are directly ancestral to the later Iroquoian-speaking peoples of southern Ontario (Warrick 2000:427).

Many Princess Points sites appear to represent semi-permanent settlements that may have been returned to again and again over successive centuries. The remains of the Grand Banks site, for instance, extend for one kilometre along the bank of the Grand River. At other sites artifact recovery rates of over a thousand per sq. m are not unheard of. Intriguingly, approximately half of the documented Princess Point sites in Ontario have been discovered along the Grand River (see Figure 5).

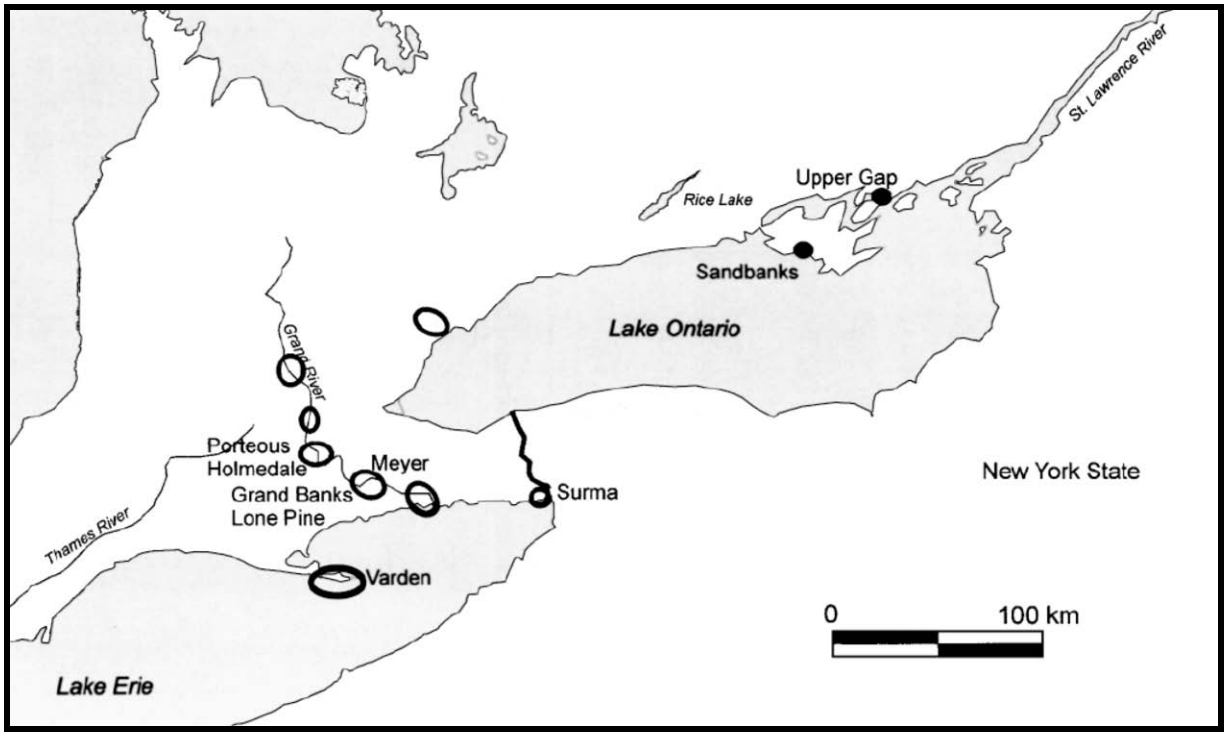

Figure 5: Princess Point Site Clusters in Southern Ontario (Warrick 2000:Fig. 3)

During the Late Woodland Period (ca. A.D. 700 to 1650) maize horticulture spread beyond the confines of the Grand and Credit Rivers, allowing for population increases which in turn led to larger settlement sizes, higher population density, and increased social complexity among the peoples involved. Between A.D. 1000 and 1300 'Early' Iroquoians began living in small villages (0.4 ha) comprised of four or five longhouses, producing pottery with decorated incised rims, and using pipes to smoke tobacco (Warrick 2000:434-438). From A.D. 1300 to 1400 'Middle' Iroquoian culture became even more developed, and two 50 year sub-stages (the Uren and Middleport) have been identified and studied in detail (Dodd et al. 1990:356-359; Warrick 2000:439-446). Essentially, the lifeways that were observed by the first Europeans to venture into the area were in place by this time.

By A.D. 1450, near the beginning of the 'Late' Iroquoian period (A.D. 1400 to 1650), it is possible to differentiate between the archaeologically-represented groups that would become the Huron and the Neutral of the Early Contact period (see Figure 6). The study area falls within the territory of the Neutral Nation, whose material culture included ceramic vessels and pipes, lithic chipped stone tools, ground stone tools, worked bone, antler and teeth, and exotic goods obtained through trade with other Aboriginal and European groups (Lennox and Fitzgerald 1990:411-437). The Neutral lived in large villages, which sometimes swelled to as much as 5 ha in size and had longhouses reaching over 100 m in length. It is believed that some villages may have held as many as 2,500 inhabitants (Warrick 2000:446-454). In total, the Neutral are believed to have numbered upwards of 40,000, with the total population distributed between 28 to 40 villages and smaller settlements (Lennox and Fitzgerald 1990:410).

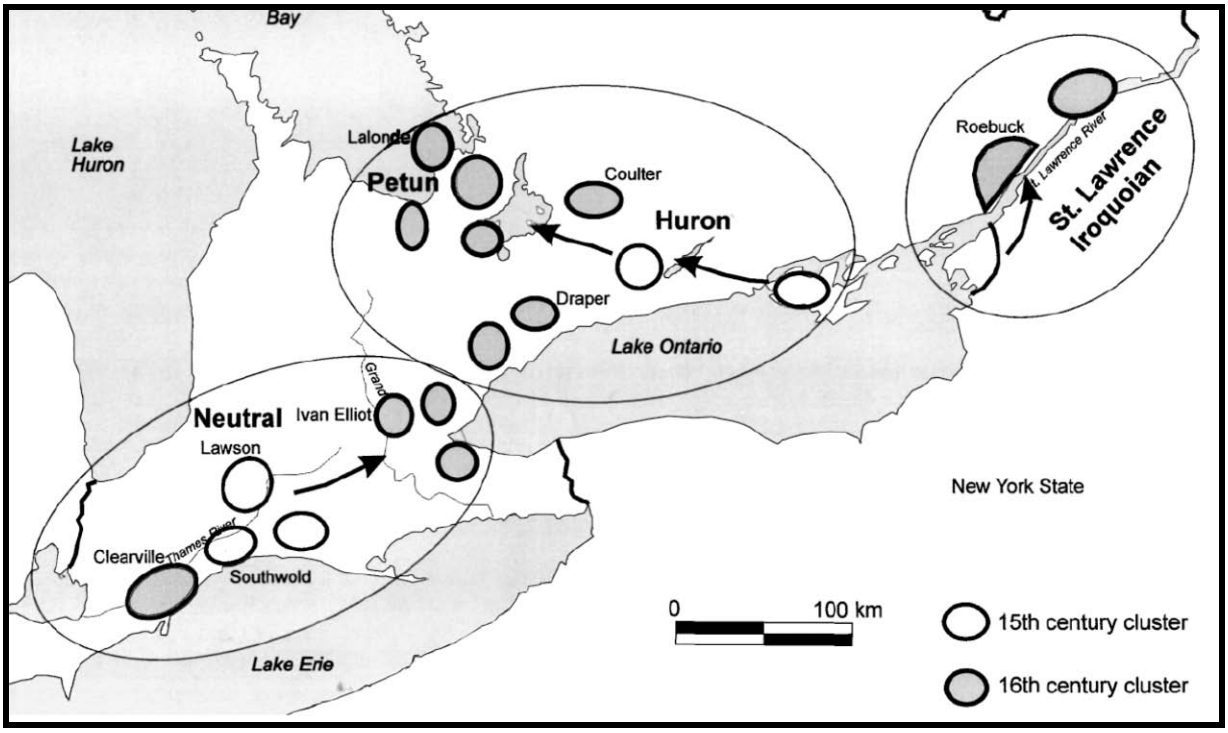

Figure 6: Pre-Contact Iroquoian Site Clusters
(Warrick 2000:Fig. 10)

It has been suggested that the size of these villages, along with the necessary croplands to sustain them, may have had some enduring impacts on the landscapes that surrounded them. In particular, there has been a correlation postulated between Pre-Contact era corn fields and modern stands of white pine (Janusas 1987:69-70, Figure 7). While the studies involved have been far from comprehensive, the notion that depleted corn fields may have taken some time to recover their fertility, and that the natural succession of plants growing on them would be affected, seems logical.

5.2 The Early Contact Period

The first European to venture into what would become Ontario was Etienne Brulé, who was sent by Samuel de Champlain to visit the area and learn the language and customs of the First Nations there. Champlain himself made two trips to Ontario, first in 1613 and later from 1615 to 1616 (Gervais 2004:182). The First Nations encountered by Champlain in this part of southern Ontario included the Huron (Wendat), the Petun (Tobacco) and "la nation neutre" (the Neutrals). The first two groups were concentrated in what would become the Counties of Simcoe and York and in the Grey-Bruce region, respectively. The Neutrals, on the other hand, occupied the territory immediately west of Lake Ontario and along the northern shore of Lake Erie, and Neutral sites have been identified throughout the Niagara Peninsula and as far west as Chatham. The study area falls within the territory of this last group (Lennox and Fitzgerald 1990:Figure 13.1).

Jean Boisseau's *Description de la Nouvelle France* (1643) shows the territory of the Neutral Nation, although the orientation and distribution of the Great Lakes is clearly an abstraction (see Figure 7). Nicholas Sanson's *Le Canada, ou Nouvelle France* (1656) is much more representative, and the Neutral can be seen in lands west of Lake Ontario (see Figure 8).

Figure 7: Detail of Jean Boisseau's *Description de la Nouvelle France* (1643) (McGill University 2005:W. H. Pugsley Collection)

Figure 8: Detail of Nicholas Sanson's *Le Canada, ou Nouvelle France* (1656) (McGill University 2005:W. H. Pugsley Collection)

The first half of the 17th century saw a marked increase in trading contacts between the First Nations and European colonists. These trading contacts, however, eventually led to increasing factionalism and tension between the First Nations as different groups vied for control of the lucrative fur trade. In what would become Ontario, the Huron, the Petun, and their Anishinabeg trading partners allied themselves with the French. In what would become New York State, the League of the Haudenosaunee (Iroquois Confederacy) allied themselves with the British. At that time the Iroquois Confederacy consisted of the independent nations of the Mohawk, Cayuga, Onondaga, Oneida and Seneca, which were later joined by the Tuscarora in 1722 to form the Six Nations. Interposed between the belligerents, the Neutral Nation declined to align itself with either group.

Tensions boiled over in 1649, a situation likely exacerbated by epidemics brought by the Europeans and the associated decimation of the Aboriginal populations, and the Five Nations invaded southern Ontario. The Iroquois directed their assaults against the Neutrals in 1650 and 1651, taking multiple frontier villages (one with over 1,600 men) and numerous captives (Coyne

1895:18). The advance of the Iroquois led to demise of the Neutral Nation as a distinct cultural entity and the dispersal of the Wendat and Petun nations (Lennox and Fitzgerald 1990:456, Ramsden 1990:384). The remnants of the affected nations formed new communities, settling in Quebec (the modern-day community of Wendake), near lake St. Claire (where they were known as the Wyandot), and in the area of Michilimackinac. Many were probably adopted into the League of the Haudenosaunee (Ramsden 1990:384).

After the fall of the Neutrals and the dispersal of the Wendat, southern Ontario remained an underpopulated wilderness for several generations (see Figure 9), sitting "cold and empty and windswept" (Ramsdem 1990:384). It has been described as an "unbroken forest", teeming with wildlife and exploited by the Iroquois as a rich hunting ground (Coyne 1895:20).

Figure 9: Detail of Henry Poppel's *A Map of the British Empire in America* (1733) (Cartography Associates 2009:David Rumsey Collection)

For the next 40 years the Haudenosaunee/Five Nations exploited southern Ontario for its furs and traded them with the Dutch and the English, and also traded for furs with the northern

Algonkian-speaking peoples (Smith 1987:19). In 1669, the Haudenosaunee allowed an expedition of Sulpician missionaries to travel through their territory. This expedition, which included Francoi Dollier de Casson and René de Brehant de Galinée, managed to reach and explore the Grand River, which they named *le Rapide* after the swiftness of its current. The priests descended the Grand to reach Lake Erie, and they wintered at the future site of Port Dover (Coyne 1895:21). Their map is one of the earliest documented representations of the Grand River (see Figure 10).

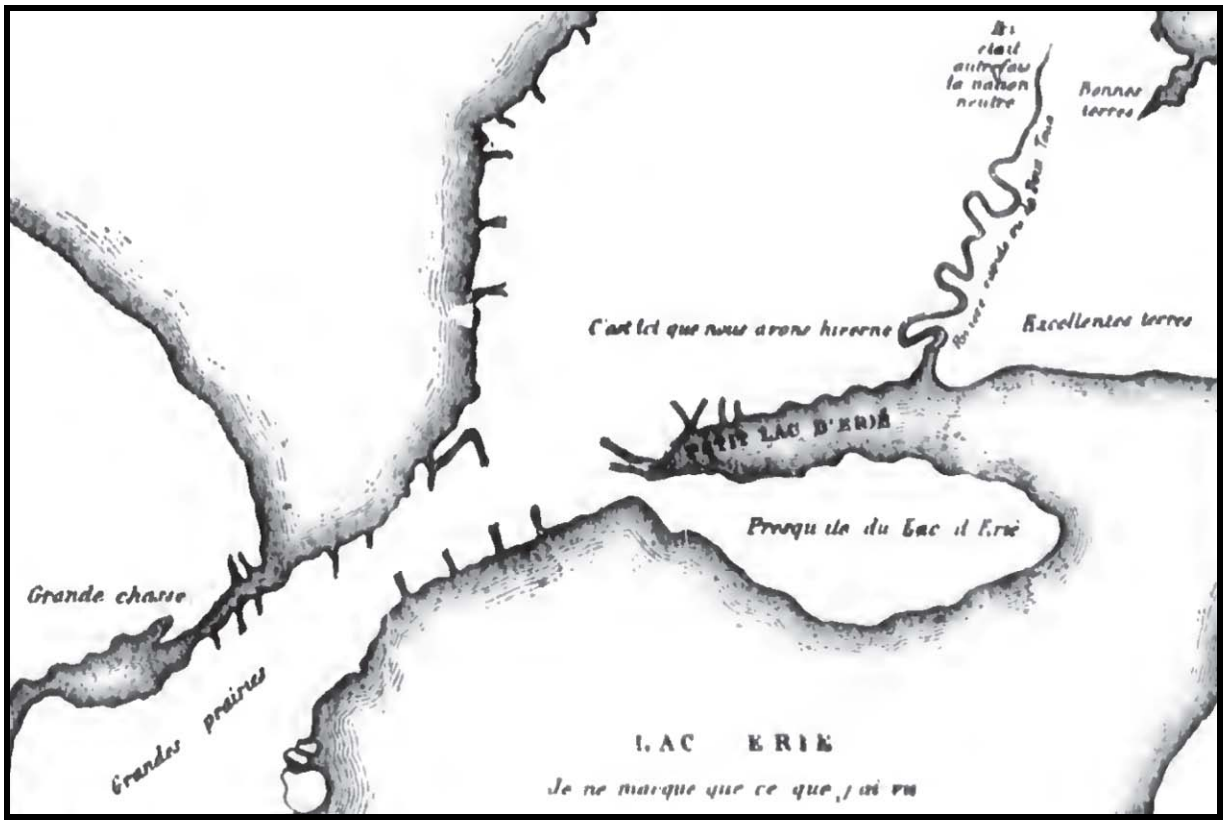

Figure 10: Detail from Dollier de Casson and de Galinée's *Carte du Canada et des Terres découuertes vers le lac Derié (*1670*),* Showing the Grand River (Coyne 1895:Map)

Five Nations' fortunes changed by the mid-1690s, and disease and casualties from battles with the French had taken their toll on the formerly robust group (Smith 1987:19). On July 19, 1701, the Iroquois ceded lands in southern Ontario to King William III, with the provision that they could still hunt freely in the territory, but this agreement appears to have lacked any binding formality (Coyne 1895:28; Six Nations Council 2010:1).

In truth, it is difficult to evaluate the level of control the Iroquois exercised over the area at this time. The northern traditions of the Algonkian-speaking Anishinabeg maintain that Ojibway bands expanded into these Iroquoian-held lands in an effort to trade directly with the French and the English (Smith 1987:19). This competition exacerbated tensions between the Haudenosaunee and the Ojibway, and the Ojibway are traditionally held to have defeated the Iroquois in a series of battles, culminating in complete victory near Burlington Bay. By the early 18th century Haudenosaunee settlements appear to have contracted back into New York State. Peace was then established between the Anishinabeg and the Iroquois (Coyne 1895:28).

Bands of Anishinabeg subsequently moved into southern Ontario, many of which were mistakenly lumped together by the Europeans under the generalized designations of 'Chippewa/Ojibway' and 'Mississauga'. The 'Mississaugas', first documented in 1640 as an Aboriginal band on the northwestern shore of Lake Huron (Smith 1987:19), became a term applied to all Algonkian-speaking people around Lake Ontario (see Figure 11). Throughout the 1700s (and into the early 1800s), these 'Mississaugas' hunted, fished, gardened and camped along the rivers, floodplains and forests of southern Ontario (Warrick 2005:2). The footprint left by these people on the landscape they inhabited was exceedingly light, and archaeological sites dating to this time of early European contact are both rare and difficult to detect.

Figure 11: Detail of Laurie and Whittle's *A New and General Map of the Middle Dominions Belonging to the United States of America* (1794)
(Cartography Associates 2009:David Rumsey Collection)

The 18th century saw the continued competition between the French and the English over the fur trade, which the Anishinabeg took full advantage of and were consequently well supplied with European trade goods. The Mississaugas in particular are known to have traded furs with the French at numerous locations, and received "everything from buttons, shirts, ribbons to combs, knives, looking glasses, and axes" (Smith 1987:22). The British, on the other hand, were well-rooted in New York State and tended to enjoy more success and prosperity than their counterparts.

In 1754, hostilities over trade and territorial ambitions led to the Seven Years' War (often called the French and Indian War in North America), in which the Mississaugas fought on behalf of the French. After the French surrender in 1760 they adapted their trading relationships accordingly, and formed a new alliance with the British (Smith 1987:22). However, with the American Revolutionary War (1775-1783) and the resultant flood of United Empire Loyalists into the Province of Quebec (which included what would become Ontario), conditions became less advantageous. Population growth caused many to move into European territory, but the death of the fur trade left the Anishinabeg with little to exchange for European goods aside from their land.

5.3 The Euro-Canadian Era

During the American Revolutionary War (1775-1783), most of the League of the Haudenosaunee/Six Nations (except for the Oneida) supported the Loyalist/British cause, which is unsurprising given their longstanding history of allegiance and cooperation. In 1779, two years after joining the conflict, most Seneca, Onondaga and Cayuga towns became targets of American forces and were destroyed. This caused the Iroquois to seek retribution, and under the leadership of the Mohawk captain Joseph Brant, Iroquois forces attacked and burned rebel forts and settlements as far east as Schenectady, New York (Ramsden 2010). The war ended in 1783, and Great Britain and the newly incorporated United States established their formal boundaries, a process which involved numerous treaties lacking Aboriginal input and involvement. The governor of what was then the Province of Quebec, Lord Frederick Haldimand, arranged to purchase a tract of land from the Mississaugas in 1784, which he intended for the resettlement of Six Nations loyalists displaced by the war (Coyne 1895:29; Six Nations Council 2010:2). Approximately 950,000 acres were included in this so-called Haldimand Tract, which extended for 9.6 km on either side of the Grand River, from its source to its mouth (see Figure 12).

In what would become the first of a number of legal complications to the transfer, Haldimand left office before the grant was legally confirmed and before title for the lands was properly transferred to Brant and his people. As settlers began to move into Six Nations territory, the land quickly became unsuitable for hunting and Brant's people needed to find alternate means of support. In 1787, Brant began to sell some lands within the tract to raise investment income for Six Nations (Johnston 1964:xliii).

Figure 12: The Haldimand Tract (Left) and the Haldimand Proclamation (Right) (Six Nations Council 2010:2)

Four years later the face of what would become Ontario changed considerably, and the Constitutional Act of 1791 created the Provinces of Upper Canada and Lower Canada from the former Province of Quebec (Craig 1963:17). Colonel John Graves Simcoe was appointed the first Lieutenant Governor of Upper Canada, and he was responsible for governing the new province, directing its settlement and establishing a constitutional government modelled after that of Britain (Coyne 1895:33). In 1792, Upper Canadian legislature incorporated the Eastern, Midland, Home and Western Districts from the former Lunenburg, Mecklenburg, Nassau and Hesse Districts of the Province of Quebec (previously established by Lord Dorchester in 1788).

Simcoe initiated several schemes to populate and protect the newly-created province, and he employed a settlement strategy that relied on the creation of shoreline communities with effective transportation links. These communities, inevitably, would be composed of lands obtained from the First Nations, and many surrenders and purchases were arranged in the closing years of the 18th century and in the early 19th century. The Aboriginal lands that would later make up Wellington County were not exempt from Simcoe's grasp, despite the fact that it was not one of the nineteen counties that he initially laid out.

In 1793, Simcoe issued a patent confirming Six Nations' title to the Haldimand Tract, but at the same time he reduced the size of the grant by 275,000 acres (the 'Source Lands' of the Grand River), arguing that the Crown could not grant lands that they did not own (Historical Atlas Publishing Co. 1906:2). Simcoe further specified that Tract land could only be sold to the Crown, as he was concerned that 'land jobbers' (speculators) might take advantage of Six Nations.

Brant was in favour of the sales, and in 1796 he was granted Power of Attorney to surrender "In Trust" four large sections of the Haldimand Tract (Blocks 1-4) in exchange for yearly payments for the "perpetual care and maintenance" of Six Nations for 999 years (Six Nations Council 2010:3). In 1797, the Executive Council of Upper Canada appointed three trustees to act on behalf of Six Nations in negotiating the sale (Johnston 1964:xlvi-xlvii). In 1798, Brant surrendered Blocks 1-6 (352,707 acres) "In Trust" to the Crown, exceeding his Power of Attorney (Six Nations Council 2010:Insert 1).

Many of these lands would eventually be incorporated into Wellington County. The 'Source Lands', originally proclaimed by Haldimand but never transferred (Six Nations Council 2010:2), would eventually become part of the Townships of East and West Luther, Amaranth, East and West Garafraxa, Erin and Eramosa (Six Nations Council 2010:Insert 4-5). These lands of these future townships, as well as Luther and part of Arthur, were officially obtained by the Crown from the Mississaugas in 1818 as part of a purchase involving a total of 648,000 acres (Historical Atlas Publishing Co. 1906:2). Part of Haldimand Tract Block 3 would become Pilkington Township, and Block 4 would later be known as Nichol Township. The remaining lands that would make up Wellington County, including the future townships of Peel, Maryborough, Minto and the remainder of Arthur, were surrendered in 1827 by chiefs of the Chippewa Nation (Historical Atlas Publishing Co. 1906:2).

David William Smyth's *Map of the Province of Upper Canada* from 1800 illustrates the complex arrangements of lands that would become Wellington County (see Figure 13). The Six Nations' Lands of the Haldimand Track are clearly visible, of which part of Block 3 and all of Block 4 would eventually be incorporated. To the north are the 'Source Lands' that were never transferred to Brant, and instead were obtained from the Mississaugas by the Crown in 1818. To the northwest are Reserved Lands of the Chippewa Nation, which they surrendered in 1827. To the east are Church Lands, which were part of the 1/7th of all Crown lands designated for the clergy under the Constitutional Act of 1791. These lands were originally intended to be spread evenly throughout Upper Canada, but instead they were typically reserved in large blocks adjacent to the nearest established townships. Eventually a clergy corporation was created to make leases, but few settlers were interested in these comparably expensive lands. After some 60 years of issues and agitation by both clergy and colonists, these reserves were abolished in 1854 (Historical Atlas Publishing Co. 1906:2).

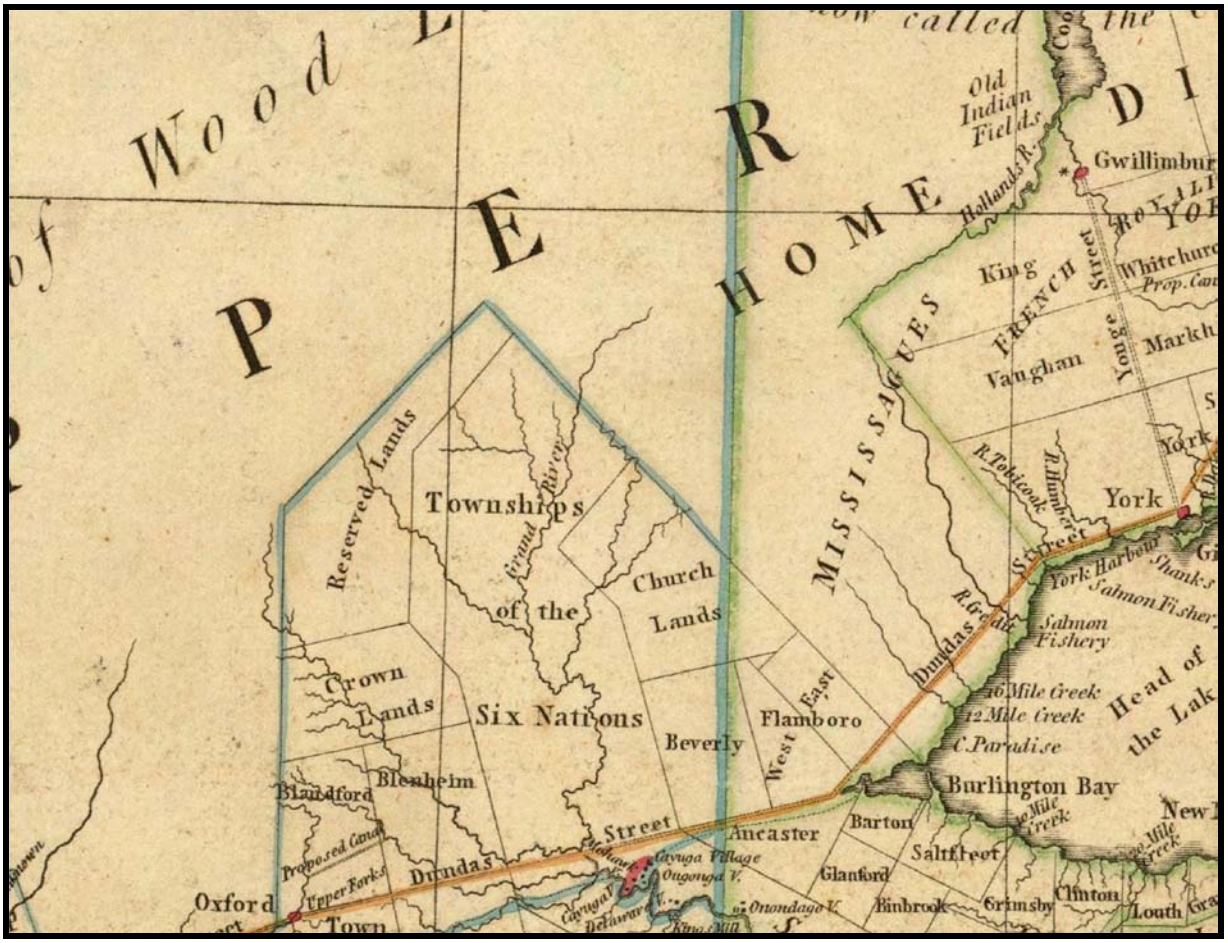

Figure 13: Detail of Smyth's *A Map of the Province of Upper Canada* (1800) (Cartography Associates 2009:David Rumsey Collection)

5.3.1 The County of Wellington

The large expanse of lands that would become the historic County of Wellington was obtained partly from Six Nations and partly from other treaties and surrenders with Anishinabeg peoples surrounding the Haldimand Tract. This area fell within several different political boundaries between the late 18th and 20th centuries, and the administrative history of the land is one of the most complex and rich in southern Ontario. By the second session of the second Parliament of Upper Canada in 1798, the Home and Western Districts were subdivided, and the Niagara and London Districts were created from each, respectively. What would become Wellington County remained, at that time, within the Home District, and the majority was initially administered as part of the West Riding of the expansive County of York (see Figure 14). The future townships in the northeastern part, however, fell within the boundaries of Simcoe County, while those in the northwest actually belonged to the sparsely settled London District.

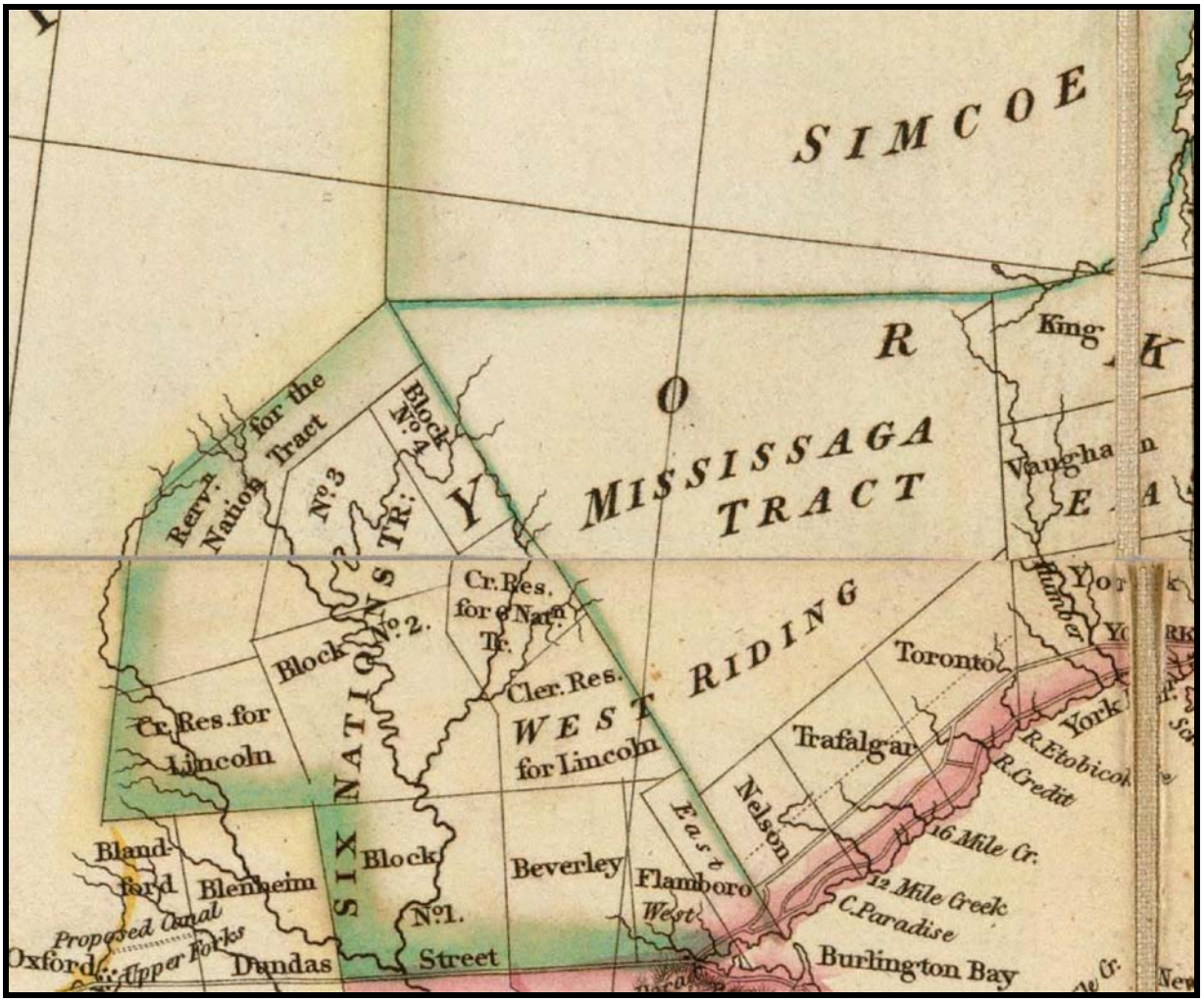

Figure 14: Detail from J. Purdy's *A Map of Cabotia* (1814) (Cartography Associates 2009:David Rumsey Collection)

At the turn of the 19th century, these Crown lands were freely granted to arriving settlers, provided that they met specific conditions of settlement. These pioneers were required to clear at least 5 acres of their lot and the adjacent road allowance, as well as build and shingle a house within 18 months. Once these requirements were met, the Crown Deed would have been issued (Historical Atlas Publishing Co. 1906:2).

Eventually, as smaller units of government became more desirable, York County and the Home District were further divided. Much of what would become Wellington County was incorporated into the newly formed Halton County in the Gore District in 1816, which had its capital at Hamilton (Historical Atlas Publishing Co. 1906:2). At that time the northernmost future Townships of Luther and Amaranth remained part of Simcoe County in the Home District, while those of Minto, Arthur and Maryborough continued to be part of the London District (see Figure 15). The southern townships of the Gore District were the best settled (Smith 1846:213).

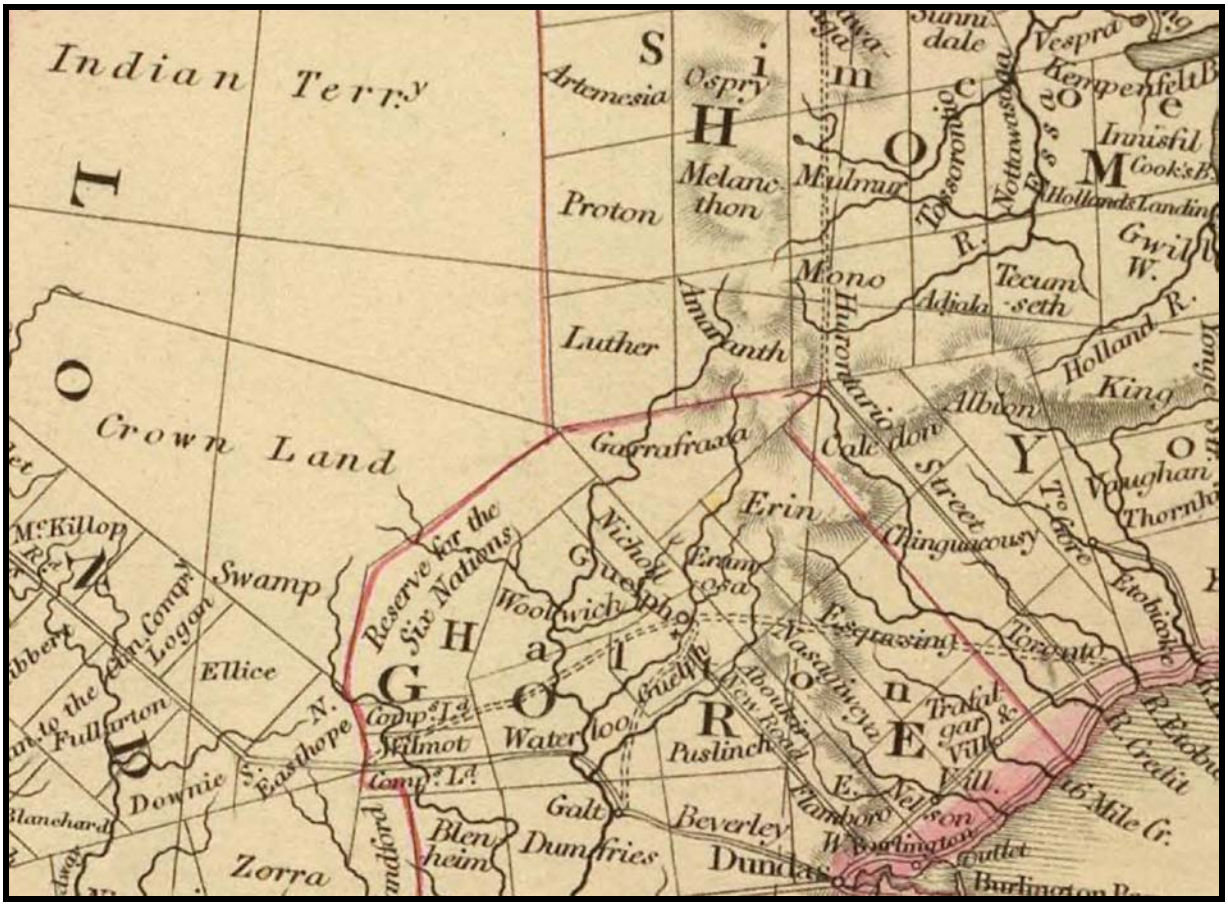

Figure 15: Detail from J. Arrowsmith's *Upper Canada* (1837)
(Cartography Associates 2009:David Rumsey Collection)

Settlement in the area was initially slow, but the vast majority of the settlers were either English, Irish or Scottish (Smith 1846:213). These people faced a difficult existence, clearing forests, building structures, bartering for much needed supplies, and dealing with the difficult winters of southern Ontario. In the early 19th century shanties and log cabins were the norm, which were subsequently followed by wood-framed or stone houses with large barns (Historical Atlas Publishing Co. 1906:2). Roads in the 1830's were dismal, according to early records, with the first settlers complaining of awful shaking, smashed bottles of whiskey, and an overall preference for walking unless grievously injured. Transportation via the extensive water systems remained preferable, for obvious reasons (Historical Atlas Publishing Co. 1906:2).

In 1838, further administrative changes were made, and the Wellington District was created from parts of the Gore, Home and London Districts (see Figure 16). This district housed the Counties of Wellington, Waterloo and Grey. Wellington County occupied an area of 652,578 acres and was very irregular in shape (see Figure 17), with numerous odd projections directly related to its diverse history of administrative and political change (Historical Atlas Publishing Co. 1906:1).

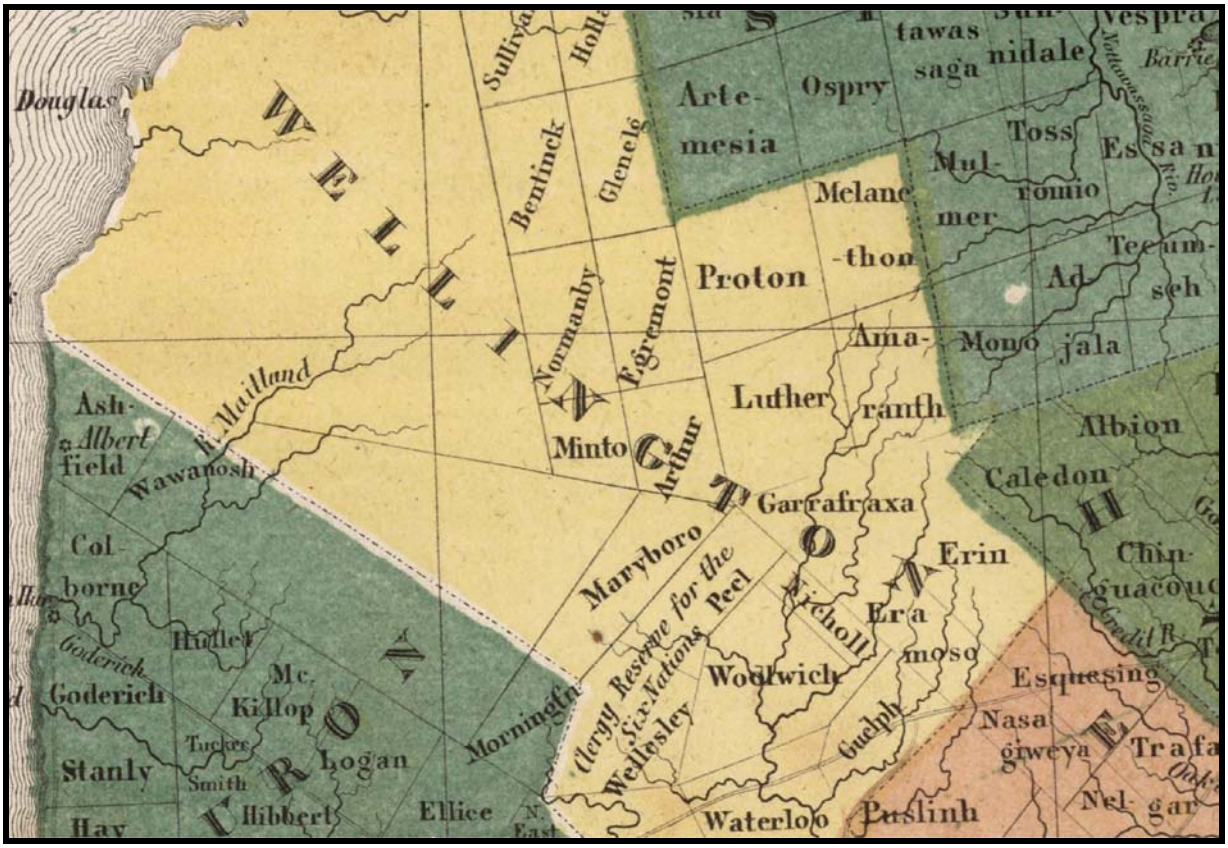

Figure 16: Detail from J. Calvin Smith's *Ontario, Canada* (1852)
(Cartography Associates 2009:David Rumsey Collection)

At that time Wellington County contained the Townships of Amaranth, Arthur (including Minto and Luther), Eramosa, Erin, Garafraxa, Guelph, Maryborough, Nichol, Peel, Pilkington and Puslinch. Guelph, Galt and Fergus were the primary contestants for the county seat, but it was Guelph that emerged as the leading city of the new polity. Arrangements were then made for the construction of the district's own Court House and Jail, and the contracts were awarded to William Allen and William Day, respectively. The first meeting of the District Council was held in the Court House on Feb 8, 1842, but numerous members were disqualified due to electoral irregularities and a special session had to be held again on April 14, 1842 (Historical Atlas Publishing Co. 1906:2).

With improved circumstances came an increase in settlement, and some 15,000 acres of land were brought under cultivation between 1842 and 1844 (Smith 1846:214). Eventually, the desire for gravelled roads led to the passing of a bylaw on Dec 16, 1847 geared towards improvements to Brock Road, from Dundas to Guelph. On June 14, 1851 another bylaw supported the development of the Elora and Saugeen Road. Other roads quickly followed suit, and the surrounding townships began to develop and expand their infrastructure, further adding to the attractiveness of settlement in Wellington County (Historical Atlas Publishing Co. 1906:2).

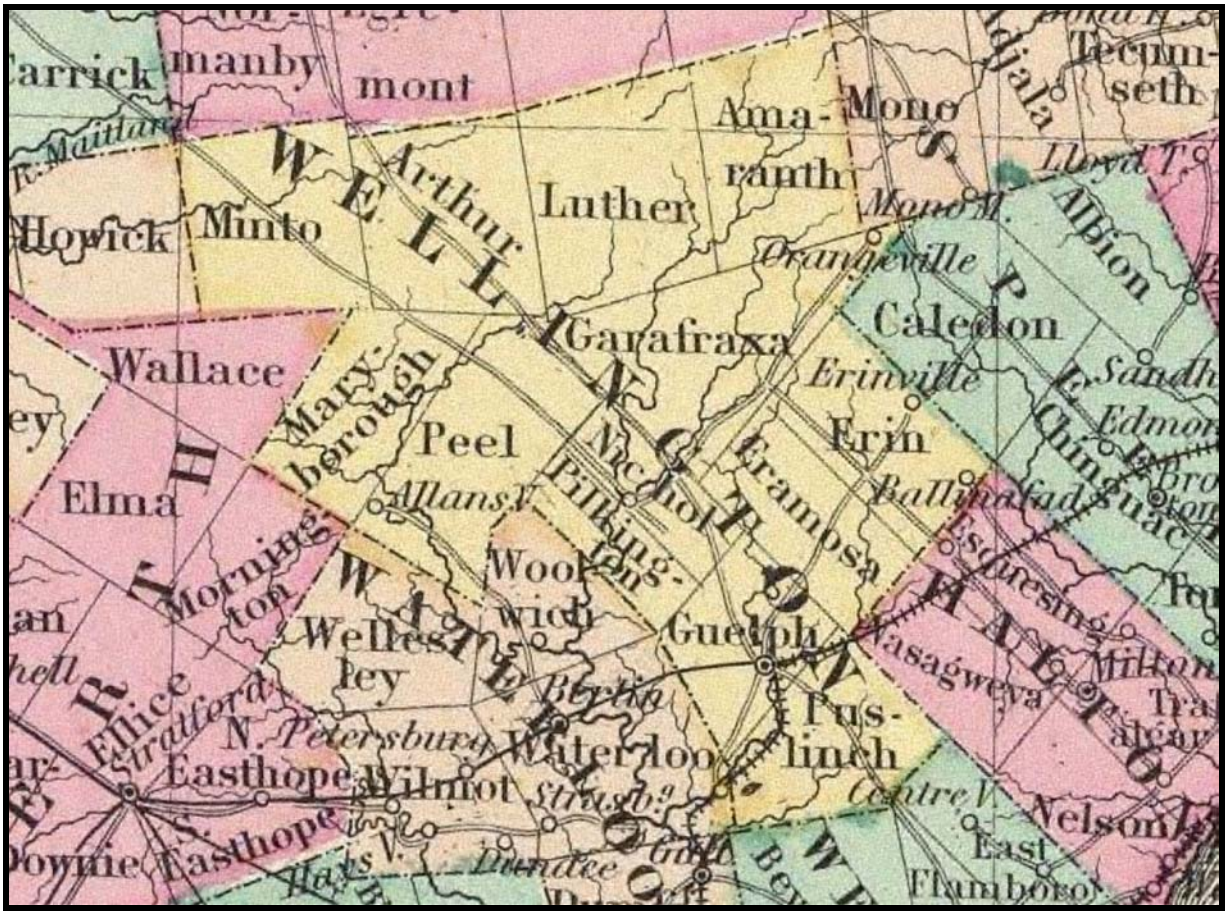

Figure 17: Detail from G.W. Colton's *Canada West* (1856) (Cartography Associates 2009: David Rumsey Collection)

The desire for a railway also began ca. 1851, and on Jan 20, 1852 the first train carrying visitors and dignitaries arrived at York Road Bridge, along the CN Railway's Toronto and Guelph line. This rail system ushered in a great era of prosperity for Guelph and Wellington County, and it accommodated a rush of immigrants seeking lands in the north. Additional lines were soon to follow, and by 1870 railways reached Fergus and Harriston, with further expansion to Southampton by 1872. The Wiarton and Owen Sound rail branches diverged at Harriston, while the Stratford and Lake Huron line passed through Palmerston, contributing to the growth of both communities. The Toronto, Grey and Bruce Railway opened in 1871, running trains to Mount Forest, and in 1880 the Credit Valley railway passing through Erin and Garafraxa was completed (Historical Atlas Publishing Co. 1906:2).

The northern Townships of Minto, Arthur, Luther and Amaranth were home to significant historic communities such as Harriston, Palmerston, Mount Forest, Arthur, Kenilworth, Luther and Laurel. In central Wellington County the Townships of Maryborough, Peel, Garafraxa and Erin had population centres at Rothsay, Drayton, Glenallan, Alma, Garafraxa, Erin and Hillsburg. The southern Townships of Pilkington, Nichol, Eramosa, Guelph and Puslinch housed communities such as Elora, Fergus, Eramosa, Eden Mills, Morriston and, of course, the Town of Guelph (see Figure 18). Fergus and Elora were both founded at mill sites on the Grand River, and Eden Mills, Rockwood and Everton had a similar history on the Eramosa River (Chapman and Putnam 1984:139).

Figure 18: Detail from A.J. Johnson's *Ontario, of the Dominion of Canada* (1874) (Cartography Associates 2009: David Rumsey Collection)

The Town of Guelph, founded in 1827 by John Galt on a block of land belonging to the Canada Company, gradually emerged as the cultural and commercial centre of the region (Smith 1846:213). Situated on a gravel terrace at the confluence of the Speed and Eramosa Rivers, the community of Guelph grew exponentially over the 19th century and quickly spread over the surrounding hills. Many of the prominent features of the town were situated on large drumlins, including the Roman Catholic cathedral at the end of Macdonald Street and the hospitals and cemeteries to the east of the Speed River. The educational hub of Guelph, including the Ontario Agricultural College and later the Macdonald Institute, the Ontario Veterinary College and University of Guelph, occupied additional drumlins to the south. The town's industry initially developed primarily on more level ground adjacent to the Eramosa River (southeast of the city core), but later spread to the northwest as the town developed into a city (Chapman and Putnam 1984:138-139).

Wellington County would eventually be reduced in size, as municipal rearrangements saw the removal of Amaranth and East Garafraxa to Dufferin County in 1881, and the further addition of East Luther to Dufferin County in 1883 (Historical Atlas Publishing Co. 1906:2). Census records from the late 19th century indicate that the population peak during the historic Euro-Canadian era took place in 1881, with a population of 64,641. Between 1881 and 1921 there was a general decline in population, down to 54,160 people, but from 1921 onwards the population steadily rose, reaching 59,453 in 1941 and 66,903 in 1951. As of 1956, the population was 75,791, 36% of which was rural but only 24% of which actually lived on farms (Hoffman et al. 1963:8). Guelph continued to be the most significant community, with its mix of old world architecture and modern suburbs and industry, widely known for its centres of higher education (Hoffman et al. 1963:7).

The Township of Centre Wellington itself was incorporated in 1999, consisting of the town of Fergus, the village of Elora and parts of the townships of West Garafraxa, Nichol, Pilkington and Eramosa.

5.3.2 Pilkington Township

The study area lies at the northern end of Pilkington Township, which was originally obtained by the Crown as part of Block 3 of the Haldimand Tract, sold by Brant and the Six Nations at the end of the 18th century. This land (86,078 acres) was first patented by the Crown to William Wallace, a carpenter from Old Niagara, on Feb 5, 1798. Wallace subsequently sold a substantial portion of Block 3 to raise revenue to cover his debts, consisting of a rectangular strip of land along its northeastern front (Smith 1846:224). The sale took place on May 10, 1799, and the purchaser was Lieutenant (later General) Robert Pilkington, who had accompanied Simcoe to Upper Canada. That land would eventually become Pilkington Township in Wellington County, bordered on the west by Woolwich Township, the north by Peel Township, the east by Nichol Township and the south by Guelph Township (Historical Atlas Publishing Co. 1906:7). These lands remained thinly settled for much of early 19th century (Smith 1846:224).

The land was first surveyed by Deputy Surveyor A. Jones in 1808, at the same time as Woolwich Township. These 'Pilkington Lands' consisted of 30,033 acres, laid out in six concessions of farm lots north of the Grand River and five concessions of lots to the south. These lots were uniformly arranged for the most part, aside from the central part of Pilkington where there were irregularly-shaped and broken front lots along the Grand River. Unfortunately for Lieutenant Pilkington, it would be over a decade after the initial survey before he could convince anyone to settle in his township (Historical Atlas Publishing Co. 1906:7).

The first documented settler was one William Wolcott (an American). Two French refugees are also known to have established a cabin in Pilkington Township. From 1819 to 1823, additional families were sent out by Pilkington himself. In 1819 Thomas Lepard (a magistrate) arrived, as did Robert Greenhalgh and his wife. The Greenhalghs were known to have operated a hand mill for grinding grain, servicing the local community (the closest true mill being at Preston). Other early settlers were George Reeve (1819), Thomas Robinson (1819), Thomas Smith (1821), Mr. Theopilus (1821), Henry Wilbee (1821) and his son, George Wilbee (1821) (Historical Atlas Publishing Co. 1906:7).

The first sawmill was founded in 1820, on the east bank of the Grand River on the Lepard farm. A dam was also commissioned, and the contract went to one Roswell Mathews. Unfortunately, poor foundations caused the dam to wash away in the spring floods of 1822, and Matthews had to build a new dam to replace it. A small grist mill was also founded at that time, operated by Mr. Davis. In a continued run of ill-luck, the new dam washed away again three years later, and the site was abandoned (Historical Atlas Publishing Co. 1906:7).

Roswell Matthews then salvaged much of the machinery from the original site and set up new mills on Frenchmen's Creek (near Inverhaugh post office), which were operated by Joshua Galloway. One Mr. Reynolds arrived in 1830, purchasing 100 acres, and in 1831 he was appointed as the local magistrate (Historical Atlas Publishing Co. 1906:7). Altogether, however, settlement in Pilkington Township was very slow, as the land was very highly priced (more than double that of Nichol Township). With the death of Pilkington in 1835, land sales effectively ceased. His affairs were in very poor shape, and his estate was subsequently put into chancery. As of 1841, the entire population of Woolwich Township, including the future Pilkington Township, was only 1009 (Smith 1846:224).

Progress was not made until 1842, at which time agents arranged for the opening of the land for sale once again. Additional lots west of the Grand River were surveyed by Mr. Rankin in 1845 (Concessions A, B and C), and early settlers here included Peter Hay and R. Cromar (Historical Atlas Publishing Co. 1906:7). Settlers began to arrive in greater numbers by the mid-19th century, and substantial communities grew up at Alma and Elora.

Elora, although falling within Nichol Township, shared a border with Pilkington Township and was settled in 1832. By the mid-19th century the village had about 100 inhabitants, as well as two churches, a post office, a physician, a surgeon, a grist mill, an oatmeal mill, a saw mill, a cloth

factory, a store, a tavern and several other small businesses (Smith 1846:54). By 1915, Elora boasted some 1,200 residents, with a variety of successful business including F.J. Capell's 'Druggist and Optician', D.F. Stewart's 'Elora Textile Co.', H. Hastings' 'Iroquois Hotel' and H. Wissler's 'Barrister, Solicitor, Conveyancer, Etc.' (Henry Vernon & Son 1915:312-313).

Alma, situated northeast of the study area, straddled the Townships of Pilkington, Peel and Nichol (see Figure 19). By the turn of the 20th century it had a population of approximately 250 people, and local businesses included a hotel, a flax mill, a saw mill, and several stores and blacksmith shops (Historical Atlas Publishing Co. 1906:7). By 1916 it had 300 people, and the general stores were operated by Anthony Griffin and W.A. Curry, while the hotel was managed by S.J. Hammill (Henry Vernon & Son 1915:308).

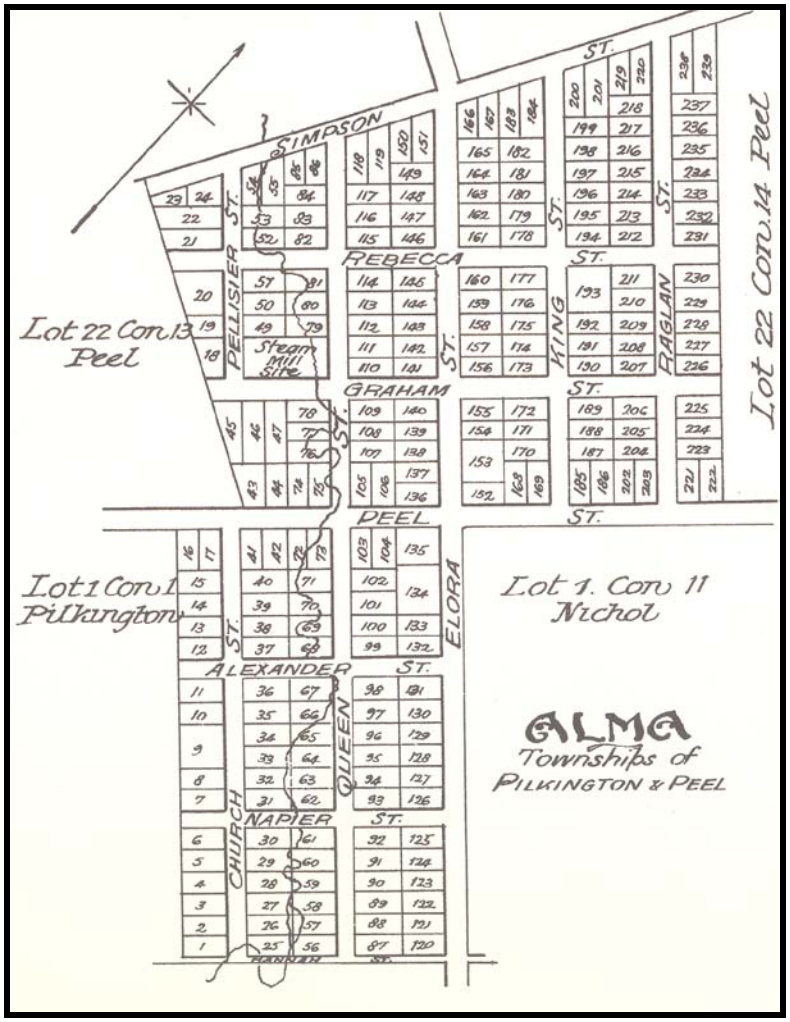

Figure 19: The Village of Alma at the Turn of the 20th Century (Historical Atlas Publishing Co. 1906:86)

Pilkington Township remained part of Woolwich until 1852, at which time it was became its own municipality (Historical Atlas Publishing Co. 1906:7).

5.3.3 The Study Area

The study area falls along a historically surveyed road allowance between Concession 3 and Concession 4, and therefore does not fall within any particular lot (see Figure 20). It is bordered on the east by Lot 3N, Concession 3 and on the west by Lot 3N, Concession 4. Walker & Miles *Illustrated Atlas of Wellington* (1877) indicates that Lot 3N, Concession 3 belonged to J.R. Hunter (100 acres), and that Lot 3N, Concession 4 had been parted between Edward Marshall (50 acres) and W. Howard (50 acres). The locations of their homesteads are not indicated on this particular historic map (McGill 2001:The Canadian County Atlas Digital Project).

Figure 20: Detail from Walker & Miles *Illustrated Atlas of Wellington* (1877), Showing the Study Area
(McGill 2001:The Canadian County Atlas Digital Project)

According to the Historical Atlas Publishing Co.'s *Historical Atlas of the County of Wellington* (1906), these lots had different owners by the turn of the 20th century (see Figure 21). Lot 3N, Concession 3 belonged to Mark Tolton, who was a major landholder owning Lots 3N, 4N and

5N of Concession 3 (300 acres). His homesteads are all indicated on Lot 4N, well outside of the study area. Lot 3N, Concession 4 had multiple owners, as 4 part lots had been established by that time. These included the lands of John Marshall (25 acres), Edward Marshall (12.5 acres) and Joseph Stickney (12.5 acres) in the southwest, and John A. Hill (50 acres) in the northeast. The Hill homestead is indicated as being well south of the study area (Historical Atlas Publishing Co. 1906:86).

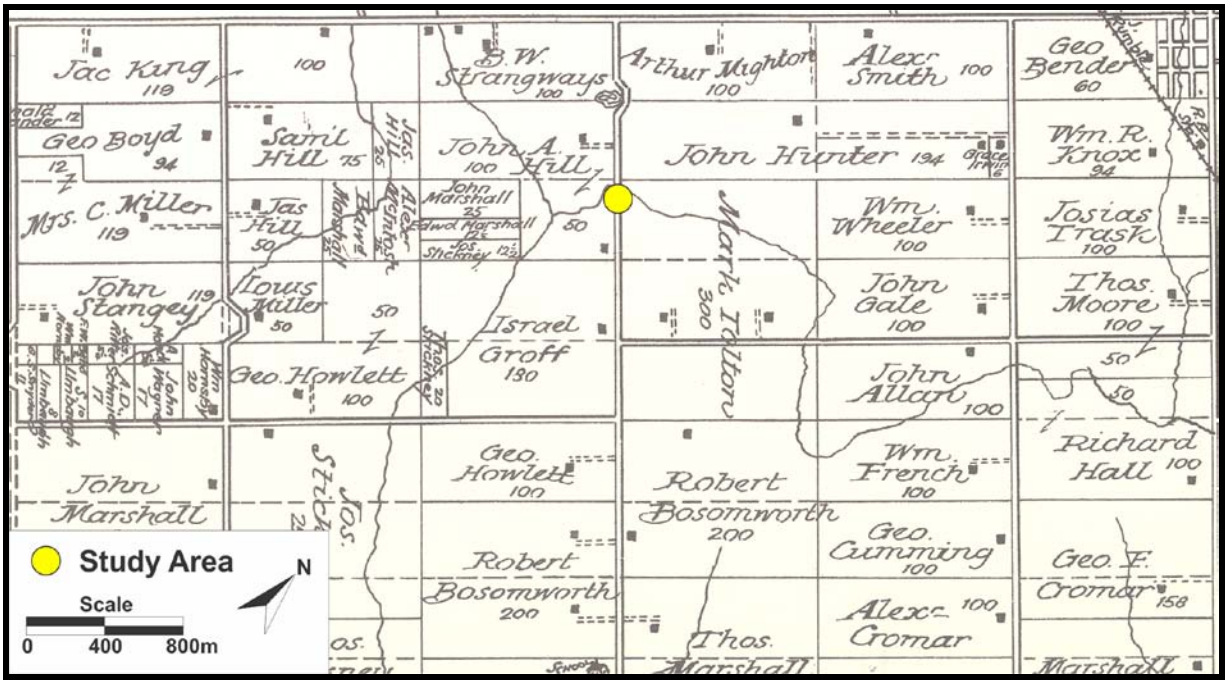

Figure 21: Detail from the Historical Atlas Publishing Co.'s *Historical Atlas of Wellington County* (1906), Showing the Study Area (Historical Atlas Publishing Co. 1906:86)

Henry Vernon & Son's *Vernon's Farmers and Business Directory for the Counties of Dufferin, Halton, Peel, Waterloo and Wellington* (1915) indicates that John A. Hill continued to be a freehold farmer on Lot 3N, Concession 4. New owners are attested on Lot 3N, Concession 3, however, and freehold farmers Drew Aitchison, Arthur Tutton, Jason Tutton and Mrs. M. Tutton appear to have purchased lands once belonging to Mark Tolton (Henry Vernon & Son 1915:297-300).

6.0 Archaeological Potential

In addition to the relevant historical sources and the results of past excavations and surveys, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as

considerations. Young et al. note that, "either the number of streams and/or stream order is always a significant factor in the positive prediction of site presence" (1995:23). They further note that certain types of landforms, such as moraines, seem to have been favoured by different groups throughout prehistory (Young et al. 1995:33). According to several researchers, such as Janusas (1988:1), "the location of early settlements tended to be dominated by the proximity to reliable and potable water resources." Site potential modeling studies (Peters 1986; Pihl 1986) have found that most prehistoric archaeological sites are located within 300 m of either extant water sources or former bodies of water, such as post-glacial lakes. The Ministry of Tourism and Culture (Ontario Ministry of Culture 2005:12-13) accordingly identifies high potential First Nation sites within 300 m of a primary water source and 200 m of a secondary water source.

While many of these studies do not go into detail as to the basis for this pattern, Young et al. (1995) suggest that the presence of streams is a significant attractor for a host of plant, game, and fish species which in turn encourage human settlement in an area. Additionally, lands in close proximity to streams and other water courses were valued as they offered access to transportation and communication routes. Other factors attracting prehistoric settlement include the presence of well-drained soils (for habitation and agriculture), elevated knolls and ridges, unique landforms (waterfalls, rocky outcrops, caverns) and valued natural resources (raw materials, concentrations of specific flora/fauna). Conversely, it must be understood that non-habitational sites (e.g. burials, lithic quarries, kill sites, etc.) may be located anywhere. Potential modeling appears to break down when it comes to these idiosyncratic sites, many of which have more significance than their habitational counterparts as a result of their relative rarity.

With the development of integrated 'complex' economies in the Historic (or Euro-Canadian) era, settlement tended to become less dependent upon local resource procurement/production and more tied to wider economic networks. As such, proximity to transportation routes (roads, canals, etc) became the most significant predictor of site location, especially for Euro-Canadian populations. In the early Historic era (pre-1850), when transport by water was the norm, sites tended to be situated along major rivers and creeks - the 'highways' of their day. With the opening of the interior of the Province of Ontario to settlement after about 1850, sites tended to be more commonly located along historically-surveyed roads. Positive potential for Historic archaeological materials can also be inferred by proximity to documented historic structures (churches, cemeteries, houses) and locations associated with historic events.

Based on the study area's location, drainage, topography and land-use, it seems clear that it would, in its pristine state, have a high potential for the presence of both Pre-Contact and Euro-Canadian era sites. The potential for Pre-Contact sites is high due to the presence of Carroll Creek, which traverses the study area. The potential for Historic sites is similarly high given that 3rd Line West was a historically-surveyed thoroughfare, and therefore a significant settlement attractor. The lack of development in the study area for residential or commercial purposes has preserved this high archaeological potential. In sum, the study area has the potential to yield sites which span Ontario's entire archaeological history.

7.0 Field Methods

Given that the study area was comprised of lands not under cultivation, it was necessary to utilize the test pitting survey method to complete the assessment (sometimes referred to as shovel-testing). In this strategy, small regular 'test' pits, 30 cm in diameter, were hand-excavated down into the first 5 cm of subsoil at prescribed intervals across the study area (see Plates 1-2). The Ministry of Tourism and Culture's *Draft Standards and Guidelines for Consultant Archaeologists* (Ontario Ministry of Culture 2009:13) require that lands in southern Ontario be assessed according to the following standards:

- Test pitting is to be carried out at 5 m intervals for all lands within 300 m of any features with archaeological potential;
- Test pitting is to be carried out at 10 m intervals for all lands more than 300 m from any features with archaeological potential.

The Ministry of Tourism and Culture (Ontario Ministry of Culture 2009:5-6) identifies features indicating archaeological potential as follows:

- Previously-identified archaeological sites;
- Natural water sources;
- Elevated topography (e.g. drumlins, eskers, moraines, etc.);
- Pockets of well-drained sandy soils;
- Distinctive landforms that may have been attractive as spiritual sites (e.g. waterfalls, rock outcrops, caverns, mounds, etc.);
- Resource collection areas (e.g. raw material sources, migratory routes, prairie lands);
- Historic transportation routes;
- Historic settlements;
- Properties designated under the *Ontario Heritage Act*;
- Locations identified as archaeological sites by the local knowledgebase, oral history, etc.

Survey is not required on lands with no or low archaeological potential (Ontario Ministry of Culture 2009:10), including lands that:

- Are permanently wet;
- Are steeply sloped (greater than 20º);
- Consist of nothing but exposed bedrock.

All lands exhibiting archaeological potential were assessed according to these standards (see Figure 3). Soil from each test pit was screened through 6 mm mesh and examined for archaeological remains (see Plate 3). If cultural materials were encountered in the course of the

survey, each positive test pit would be documented. Clustered test pits at a transect interval of 1 m may be excavated in areas of high artifact concentrations to further delimit the site. All artifacts recovered from test pits are collected for analysis, and all test pits are backfilled upon completion.

Artifacts that may indicate the presence of significant cultural deposits include bone, charcoal, lithics (stone tools and refuse generated by their production and use), ceramics, glass, and metal. Archaeological features such as pits, foundations, and other non-portable remains may also be detected during a Stage 2 survey. Any archaeological materials encountered are flagged, mapped, photographed and collected for further analysis. Artifact locations are recorded on topographic maps, in field notes and at +/- 5 m accuracy on a Garmin eTrex Legend, WAAS-enabled, GPS (using the **WGS-84** coordinate system). As part of the Stage 2 assessment, all field data was removed, with permission from the land owner. Any artifacts recovered are sent to the ARA office at 97 Gatewood Road in Kitchener, Ontario for processing, cataloguing, analysis and curation. All project photographs, mapping materials, and field notes are stored at the same facility.

Plate 1: View of Crewmembers Test Pitting at 5 m Intervals

Plate 2: View of a Typical Test Pit, Excavated into Subsoil

Plate 3: View of Crewmember Screening through 6 mm Mesh

8.0 Results

The Stage 2 archaeological assessment of lands with the potential to be impacted by the proposed reconstruction of the 3rd Line Bridge was conducted on October 21st of 2010. Legal *Permission to Enter* (PTE) and recover artifacts on project lands was granted by the landowner. Key personnel involved during the assessment were P.J. Racher, Project Director; A.J. Wong, Field Director; and 3 additional crewmembers. Field conditions were excellent, with partly cloudy skies and dry soil for screening.

The test pit survey of the study area yielded no finds with significant cultural heritage value or interest (see Figure 3). A substantial part of the study area (30%) was found to have been disturbed by earlier construction activities, including lands on either side of 3rd Line West northwest of the bridge (see Plate 4). Approximately 55% of the study area was not fully surveyed due to the presence of lands that were permanently wet (5%) and lands sloped greater than 20º (50%) (see Figure 3). These areas were test pitted where possible. Wet areas were confined to the banks of Carroll Creek in the central part of the study area. Lands sloped greater than 20º were identified adjacent to the wet areas (see Plates 5-6), and throughout most of the southeastern part of the study area (see Plate 7-9).

Plate 4: View of Disturbed Gravel Shoulders Northwest of Bridge (Facing Southeast)

Plate 5: View of Lands Sloped > 20º on East Side of Bridge (Facing Southeast)

Plate 6: View of Lands Sloped > 20º on West Side of Bridge (Facing Southeast)

Plate 7: View of Lands Sloped > 20º, Southeast of Bridge (Facing Southeast)

Plate 8: View of Lands Sloped > 20º, West Side of 3rd Line West (Facing Northwest)

Plate 9: View of Lands Sloped > 20º, East Side of 3rd Line West (Facing Southeast)

9.0 Recommendations and Advice on Legislative Compliance

Over the course of the Stage 2 archaeological assessment, no cultural materials were recovered. Accordingly, **Archaeological Research Associates Ltd.** feels that no further archaeological study of the area would be productive. It is recommended that the project be released from further heritage concerns. A **Letter of Concurrence** with these recommendations is requested.

This report is filed with the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report will be reviewed to ensure that the licenced consultant archaeologist has met the terms and conditions of their archaeological licence, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licenced consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*. This condition provides for the potential for deeply buried or enigmatic local site areas not typically identified in evaluations of potential.

The Cemeteries Act requires that any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Small Business and Consumer Services. All work in the vicinity of the discovery will be suspended immediately. Other government staff may be contacted as appropriate; however, media contact should not be made in regard to the discovery.

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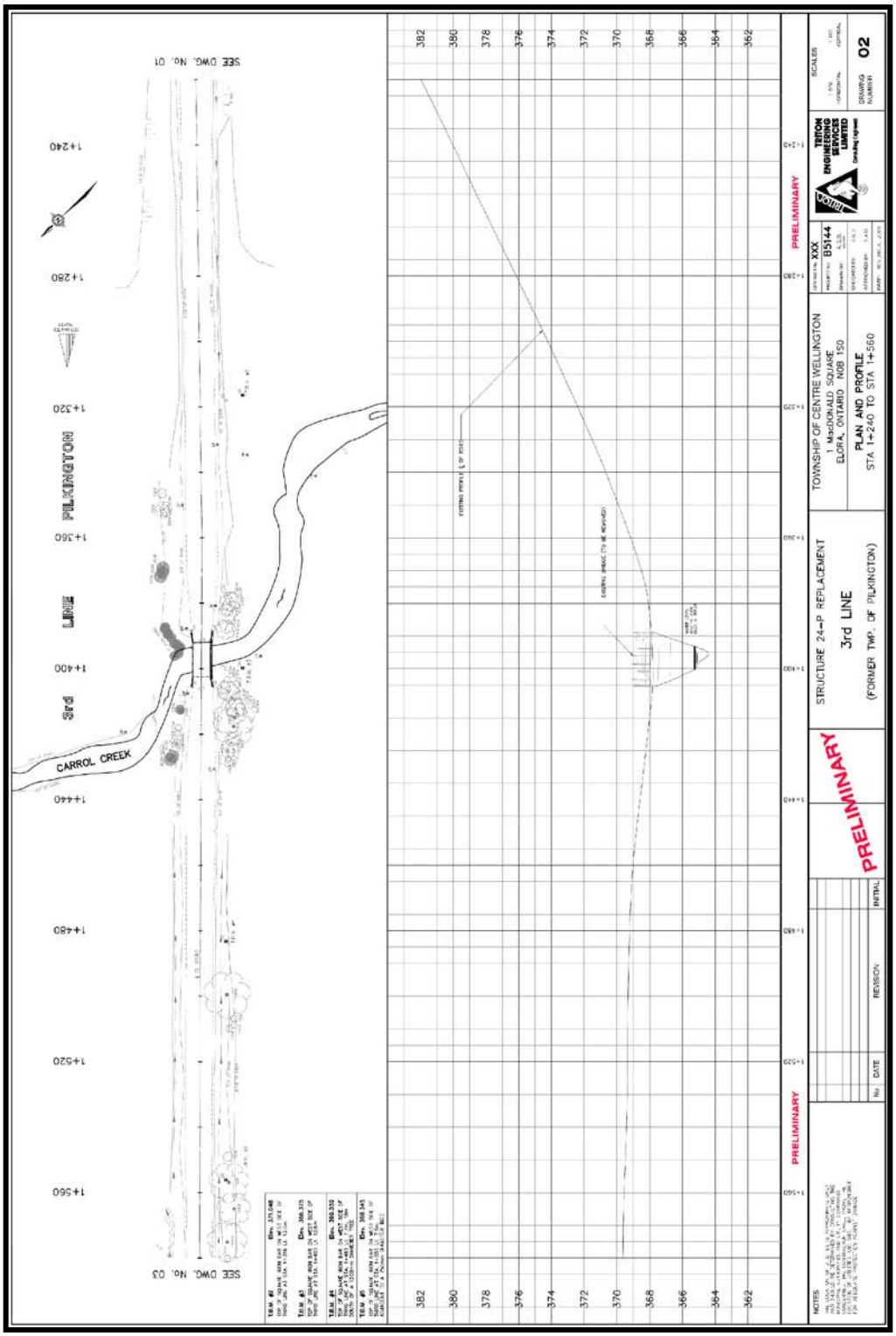
Appendix: Project Mapping Provided by Triton Engineering Services Limited



Notice of Completion
and
Circulation List

Centre Wellington

THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON

CLASS ENVIRONMENTAL ASSESSMENT
RECONSTRUCTION OF STRUCTURE 24-P
3RD LINE WEST AT CARROLL CREEK
LOT 3, CONCESSIONS 3 & 4
FORMER TOWNSHIP OF PILKINGTON
MTO SITE NO. 35-188

The Township of Centre Wellington is proceeding with a Class Environmental Assessment for Structure 24-P, Third Line West at Carroll Creek, which will address the advanced state of deterioration of the structure and its substandard width.

Structure 24-P is a 10.2 m span T-Beam Structure located on Third Line West approximately 0.70 km north of Sideroad No. 5 (former Township of Pilkington) in the Township of Centre Wellington.

As part of this process a Public Notice has been placed in the Fergus Elora New Express, Wellington Advertiser and the Township of Centre Wellington website – www.centrewellington.ca (See Attached).

This notice has been sent to approval agencies and residents in the vicinity of the noted structure. If you have any questions, or concerns, and/or you wish to be removed from our mailing list, please don't hesitate to contact the undersigned.

We trust this is satisfactory.

Sincerely,

Denis A. Hollands, C.E.T.
Triton Engineering Services Limited
(519) 843-3920 Ext. 225 (Phone)
(519) 843-1943 (Fax)
dhollands@tritoneng.on.ca

Centre Wellington

THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON

CLASS ENVIRONMENTAL ASSESSMENT
RECONSTRUCTION OF STRUCTURE 24-P
3RD LINE WEST AT CARROLL CREEK
LOT 3, CONCESSIONS 3 & 4
FORMER TOWNSHIP OF PILKINGTON
MTO SITE NO. 35-188

PUBLIC COMMENT INVITED

The Township of Centre Wellington is planning the reconstruction of Structure 24-P located on 3rd Line West at Carroll Creek, Lot 3, Concession 3 & 4, former Township of Pilkington. The project is being planned as a Schedule 'B' undertaking following the requirements of the Municipal Class Environmental Assessment process. For further information on the planning process, or to inspect a copy of the Municipal Class Environmental Assessment, please contact Mr. Ken Elder, Director of Public Works at:

Township of Centre Wellington
7444 Wellington Road 21
Elora, Ontario, N0B 1S0

Phone: (519) 846-9801
Fax: (519) 846-9858
E-mail: **kelder@centrewellington.ca**

Public input and comment are invited for inclusion into the planning and design of the project and will be received until April 18th, 2011. Subject to comments received and the receipt of necessary approvals, the Township of Centre Wellington intends to proceed with the planning, design and construction of this project.

This Notice first issued the 18th day of March 2011.

Marion Morris,
Municipal Clerk
Township of Centre Wellington
1 MacDonald Square, Box 10
ELORA, Ontario N0B 1S0

March 2011
B5144A

Township of Centre Wellington
3rd Line West (24-P)
Class Environmental Assessment
Contact List

AGENCY	CONTACT	TELEPHONE
Canadian Environmental Assessment Agency (CEAA) 55 St. Clair Avenue, East Room 907 **TORONTO**, Ontario M4T 1M2	Louise Knox Director, Ontario Region louise.knox@ceaa.gc.ca	
Natural Resources Canada Office of Environmental Affairs 3rd Floor, Section C2 580 Booth Street **OTTAWA**, Ontario K1A 0E4	Micheline Turpin Environmental Assessment Information Manager Micheline.turpin@nrcan-ncan.gc.ca	
Ministry of Environment Hamilton Regional Office 12th Floor 119 King St. W. **HAMILTON**, Ontario L8P 4Y7	Barbara Slattery EA & Planning Co-ordinator Technical Support Section West Central Region Mark Smithson Supervisor West Central Region	
Ministry of Environment Guelph District Office 1 Stone Road W. **GUELPH**, Ontario N1G 4Y2	Cameron Hall Environmental Officer	(519) 826-4255
Ministry of Environment Environmental Assessment and Approval Branch 2 St. Clair Avenue, Floor 12A **TORONTO**, Ontario M4V 1L5	Manager Class EA's and Declarations Section	
Wellington County 74 Woolwich St. **GUELPH**, Ontario N1H 3T9	Gary Cousins Director of Planning Gord Ough, P.Eng County Engineer	

AGENCY	CONTACT	TELEPHONE
Environment Canada 867 Lakeshore Road P.O. Box. 5050 **BURLINGTON,** Ontario L7R 4A6	Rob Dobos - Head Assessment	
Ministry of Natural Resources 1 Stone Road West **GUELPH**, Ontario N1G 4Y2	Mike Stone - District Planner	(519) 826-4955
Grand River Conservation Authority 400 Clyde Road Box 729 **CAMBRIDGE**, Ontario N1R 5W6	John Brum - Planner Jamie Ferguson – Resource Planner	
Ministry of Municipal Affairs and Housing **Western Municipal Services Office** 2nd Floor 659 Exeter Road **LONDON**, Ontario N6E 1L3	Bruce Curtis - Manager	1-800-265-4736
Ministry of Culture Cultural Programs Branch Archaeological and Heritage Planning 900 Highbury Avenue **LONDON**, Ontario N5Y 1A4	Mr. John MacDonald Archaeologist/Heritage Planner, Southwestern Ontario Region	
Ministry of Culture Heritage Operations Branch 400 University Avenue, 4th Floor **TORONTO**, Ontario M7A 2R9	Marilyn Miller Conservation Advisor	
Ministry of Community and Social Services Central West Region 6733 Mississauga Road, Suite 200 **MISSISSAUGA**, Ontario L5N 6J5	Honorable Madeleine Meilleur Minister of Community and Social Services	
Ministry of Economic Development and Trade 8th Floor, Hearst Block 900 Bay Street **TORONTO**, Ontario M7A 2E1	Sandra Pupatello Minister of Economic Development and Trade	
Ministry of Public Infrastructure and Renewal 6th Floor Mowatt Block 900 Bay Street **TORONTO**, Ontario M7A 1L2	Honorable David Caplan Minister of Public Infrastructure Renewal	

AGENCY	CONTACT	TELEPHONE
Ministry of the Attorney General 720 Bay Street, 8th Floor **TORONTO**, Ontario M5G 2K1	Mr. Grant Wedge, Council Crown Law Office-Civil	
Canadian Transportation Agency 15 Eddie Street Jules Leger Building 19th Floor **GATINEAU**, Quebec K1A 0M9	Bill Aird Senior Environmental Officer	
Department of Fisheries and Oceans Canada Burlington District Office 3027 Harvester Road Unit 304 **BURLINGTON**, Ontario L7R 4K3	Shelly Dunn Fish Habitat Biologist Paul Savoie Regional Environmental Assessment Analyst Impact Assessment Biologist	
Transport Canada – Navigable Waters Protection Office Canadian Coast Guard 201 Front Street North **SARNIA**, Ontario M7T 8B1	Barry Putt Supervisor, Inspections NWP	
Ministry of Transportation Southwestern Region Planning and Design Section 659 Exeter Road, 3rd Floor **LONDON**, Ontario N6E 1L3	Head – Planning & Design	
Heritage Centre Wellington 1 MacDonald Square, Box 10 **ELORA**, Ontario N0B 1S0	c/o Linda Lonsdale Office Manager	
Wellington Catholic District School Board 75 Woolwich Street P.O. Box 1298 **GUELPH**, Ontario N1H 6N6	Don Drone Director of Education	
Upper Grand District School Board 500 Victoria Road North **GUELPH**, Ontario N1E 6K2	Greg Sequin Manager of Transportation	
Bell Aliant 109 Scott Street **WALKERTON**, Ontario N0G 2V0	Bryan Halls	
Cogeco Cable Inc. 695 Lawrence Road **HAMILTON**, Ontario L8K 6P1	Jen McLean Project Planner	

AGENCY	CONTACT	TELEPHONE
Union Gas Limited 50 Keil Drive North, P.O. Box 2001 **CHATHAM**, Ontario N7M 5M1	Greg Payne Team Leader – EHS Services	
Hydro One Networks Inc. 483 Bay Street 15th Floor, North tower **TORONTO**, Ontario M5G 2P5	Tony Ierullo Senior Network Management Engineer/Officer	
Ministry of Aboriginal Affairs 720 Bay Street, 4th Floor **TORONTO**, Ontario M5G 2K1	Mr. Alan Kary, Deputy Director Policy and Relationships Branch Copy all correspondence to: Mr. Surinder Singh Gill, Policy Advisor, Policy and Relationships Branch	Fax: 416-326-4017 Email: Alan.Kary@ontario.ca Surinder.singh.gill@ontario.ca
7284 Sideroad 5 R.R. #1, **ELORA**, Ontario N0B 1S0	Earl and Elaine Martin	
7351 Wellington Road 17 R.R. #2, **ALMA**, Ontario N0B 1A0	Harold Kleingeld	
6922 3rd Line West R.R. #1, **ELORA**, Ontario N0B 1S0	Stewart and Luncille Martin	
6926 3rd Line West P.O. Box 1244, **ELORA**, Ontario N0B 1S0	William Troubridge	
6978 3rd Line West R.R. #1, **ELORA**, Ontario N0B 1S0	Lyle and Beth Spies	
6986 3rd Line West R.R. #1, **ELORA**, Ontario N0B 1S0	Lyle and Beth Spies	
7000 3rd Line West R.R. #1, **ELORA**, Ontario N0B 1S0	Karl and Kathleen Fleck	

Correspondence and Design Information

Transport Canada **Transports Canada**
Marine **Maritime**

Navigable Waters Protection Program
Programme de protection des eaux navigables
100 Front Street South
Sarnia, Ontario N7T 2M4

Your File Votre référence
B5143A / B5144A
Our File Notre référence
8200-2010-400382
8200-2010-400383

July 20, 2010

Township of Centre Wellington
C/o Triton Engineering Services Limited
105 Queen Street West, Unit 14
Fergus, ON
N1M 1S6

Attention: David G. Donaldson, P.Eng.

Dear Sir:

Re.: Application under the *Navigable Waters Protection Act* by Township of Centre Wellington for Approval of the Bridges located at Unknown waterways, in the Province of Ontario

Receipt is acknowledged of your correspondence in connection with the above-noted work.

Please note that our Department is responsible for the administration of the *Navigable Waters Protection Act*, which prohibits the construction or placement of any "works" in navigable waters without first obtaining approval from this office.

The following information is required for both locations before we can continue to process your application:

- Map or chart to show location of project OR
- Geographic coordinates (latitude, longitude and datum)
- Waterway name

You are advised that no construction shall take place without approval under the *Navigable Waters Protection Act.*

Should you have any questions, please do not hesitate to contact our office at 1-866-821-6631 or by facsimile transmission at 519-383-1989 or by e-mail at NWPontario-PENontario@tc.gc.ca.

Sincerely,

Kelly Thompson
Navigable Waters Protection Officer
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

KT/jd

Canada

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

105 Queen Street West, Unit 14
Fergus
Ontario N1M 1S6
Tel: (519) 843-3920
Fax: (519) 843-1943
e-mail: info@tritoneng.on.ca

ORANGEVILLE • FERGUS • GRAVENHURST

July 28, 2010

Navigable Waters Protection Program
100 Front Street South
Sarnia, Ontario
N7T 2M4

Attention: Kelly Thompson,
Navigable Waters Protection Officer
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

RE: TOWNSHIP OF CENTRE WELLINGTON
RECONSTRUCTION OF 3rd LINE BRIDGE,
(FORMER TOWNSHIP OF PILKINGTON)
OUR FILE: B5144A

Dear Kelly:

As per the additional requirements specified in your letter dated July 20, 2010 we have provided the following information:

- General location plan.
- The site is located at 43.704247° N latitude, 80.52051° W longitude.
- The waterway name is the "Carrol Creek Watershed".

We trust that this information is satisfactory for your present requirements and should you require any additional information, please contact the writer.

Yours very truly,

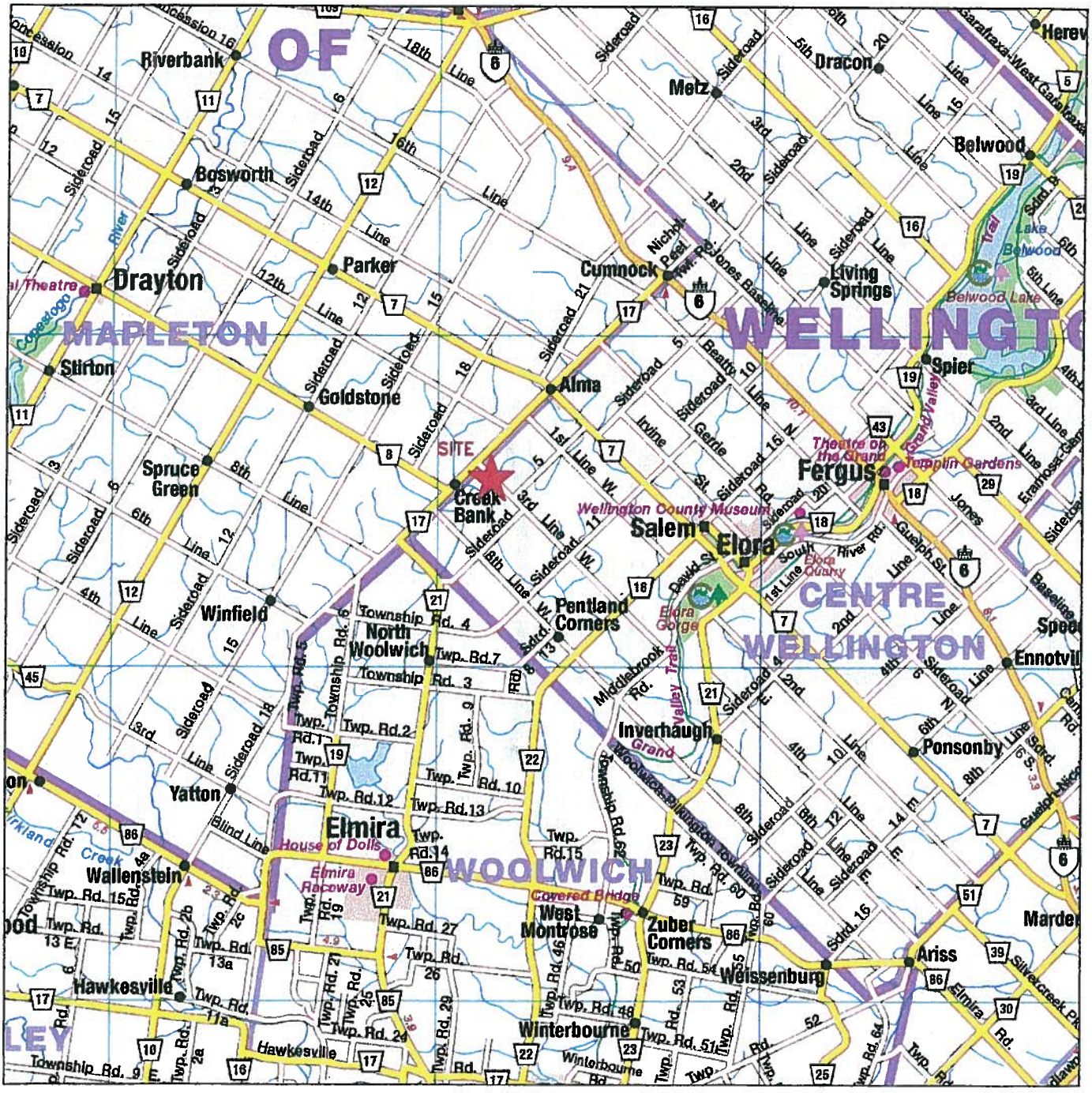
TRITON ENGINEERING SERVICES LIMITED

David G. Donaldson, P. Eng

DGD/ec

No.	Revisions	Date
0	Report Issued	Sep 2002
1		
2		
3		

NORTH



Drawing Reference: Base drawing taken from page 22 of MapArt's Ontario Road Atlas

Proposed Bridge Reconstruction
3rd Line West between
County Road 17 and Sideroad 5
Centre Wellington, Ontario

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

LOCATION PLAN

Date	Scale	Job No.	Drawing No.
Sep 2002	1:15000	4350G1	1

F:\435\...\4350G1.dwg
August 2002

Structural Data

Dave Donaldson

From: Dave Donaldson

Sent: Tuesday, October 12, 2010 11:06 AM

To: 'Morin, Bode'

Cc: 'candreae@golder.com'; Paul Ziegler

Subject: MTO Inspection Forms - Township of Centre Wellington

Attachments: b5144_mto_insp (1988).pdf; b5144_mto_insp (1977).pdf; b5144_mto_insp (1979).pdf; b5144_mto_insp (1981).pdf

RE: TOWNSHIP OF CENTRE WELLINGTON
RECONSTRUCTION OF STRUCTURE 24-P, THIRD LINE AT CARROL CREEK
(FORMER TOWNSHIP OF PILKINGTON)
OUR FILE: B5144A

Bode,

Attached are various MTO inspection sheets for the above referenced project. Also a copy of the original bridge drawings will be forwarded to Chris Andreae under separate cover. (along with drawings of various other projects within the Township for previous projects completed by Chris) Should you have any questions, please do not hesitate to contact this office.

Dave

David G. Donaldson, P.Eng • Triton Engineering Services Limited
105 Queen St. West, Unit 14 • Fergus, Ontario N1M 1S6
(519) 843-3920 p • (519) 843-1943 f • www.tritoneng.on.ca

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

DOCUMENT TRANSMITTAL

105 QUEEN STREET, WEST, UNIT 14,
FERGUS, ONTARIO, N1M 1S6
519-843-3920(Phone) 519-843-1943(Fax)

SENT PUROLATOR

Golder Associates Ltd.
309 Exeter Road, Unit #1
LONDON, Ontario
N6L 1C1

ATTENTION: Christopher Andreae

DATE: October 13, 2010

YOUR FILE:

OUR FILES: B5141A

PAGE: 1 of 1

PROJECTS: RECONSTRUCTION OF BRIDGE NO. 25-WG, JONES BASELINE

The following are enclosed	☐	Preliminary	✓	Drawings	☐ Shop Drawings
	☐	Final	☐	Specifications	☐ Geotechnical Investigation Reports
These are	☐	For your approval			✓ As you requested
	☐	For your information			☐ Approved as noted

Please find attached copies of the original drawings for the Jones Baseline Bridge (Atkinson) and Third Line Bridge (Hill)

REMARKS:

c.c.

TRITON ENGINEERING SERVICES LIMITED

Paul F. Ziegler, C.E.T.

(3)

12 UPDATE CODE

MUNICIPAL STRUCTURE – APPRAISAL SHEET

CONTROL 88602

IDENTIFICATION

1. MUNIC. TWP. OF PILKINGTON 6362
2. ROAD DESCRIP/ST. NAME ROAD ALLOWANCE CON. 3 & 4, W.O.G.R. 3. STRUCTURE NO. 00003
4. LOCATION LOT 3, CON. 3 & 4, W.O.G.R. 5. ROAD SECTION NO. 00003
6. STRUCT. NAME
7. ROADSIDE ENVIRON. RURAL (1) SEMI-URBAN/URBAN (2) 1
8. RAILWAY LEVEL CROSSING NO.
9. BOUNDARY STRUCT. YES INT.____ YES EXT.____ NO ✓ 0
10. ADJAC. MUNIC. 'A'
ADJAC. MUNIC. 'B'
ADJAC. MUNIC. 'C'
11. PRESENT JURIS. MTC (1) CO. (2) NON-CO. (3) LOC (4) RWY. (5) FED. (6) 4
12. DES. JURIS. CO. (1) LOC. (2) OTHER (3) 2
13. SPARE
14. PRES. DESIG. SUB. RD. (1) MTC C.L. (2) CO. C. L. (3) 0
15. SUB. COMM. NAME 00
16. MTC SITE NO. 035-0188

EXISTING CONDITIONS & ADEQUACY RATINGS

17. STRUCTURE: EXISTING (1) PROPOSED (2) 1
18. YEAR CONSTRUCTED ABOUT 1930
19. SPAN OR DIAMETER 0104 m
20. SKEW 0 °
21. TYPE OF CROSSING: OVER WATER (1) UNDER ROAD (2) OVER ROAD (3) UNDER RWY (4) OVER RWY. (5) 1
22. DECK: LENGTH 11.1 m WIDTH 5.6 m
23. No. OF SPANS 1 @ 10.4 m
24. EXISTING POSTING 09 t
25. SPARE
26. EXIST. ROAD CLASS 200 - 400 03
27. 1987 TRAFFIC: DHV ____ % ____ VPH DIRECT.SPLIT ____ TRUCKS ____ % AADT 00325
28. CAPACITY (LEVEL 'E' VOLUME)
29. 10 YEAR GROWTH FACTOR
30. 1997 TRAFFIC: DHV ____ % ____ VPH DIRECT.SPLIT ____ TRUCKS ____ % AADT 00325
31. RAILWAY CROSSING 19____
EXPOSURE INDEX 19____

POINT RATINGS AND DEFICIENCIES

			EXIST COND.	MIN. TOL.	NOT DEF.	DEFICIENT NOW	DEFICIENT 1–5	DEFICIENT 6–10	
32.	SAFE LOADING	OUT OF 40	tonnes 09	10 t		✓			1
33.	ROADWAY WIDTH	OUT OF 20	metres 05.6	3.7	✓				0
34.	VERT. CLEARANCE	OUT OF 5	4/L	3.7 m	✓				0
35.	AVGE. SAFE SPEED	OUT OF 20	80						0
36.	LEVEL OF SERVICE	OUT OF 15		E	✓				0
37.	SIDEWALKS	OUT OF 5			✓				0
38.	OPENING ADEQUACY	OUT OF 15			✓				0
39.	CONDITION RATING ≤ 045	OUT OF 100							

40. ACCOMPLISHMENT CODE (MTC) 91

TYPE, COST & TIME OF IMPROVEMENT

41. TYPE OF IMPROVEMENT 5
A. CARRY OVER (1)
B. SPOT (2)
C. WIDEN (3)
D. RECONDITION (4)
E. REPLACE – SAME LOCATION (5) ✓
F. REPLACE – NEW LOCATION (6)
G. NEW BRIDGE (7)

42. PROPOSED STRUCTURE: SINGLE SPAN ✓ MULTI SPAN ____ CULVERT ____

43. FOUNDATION CONDITION: GOOD ____ FAIR ✓ POOR ____

44. DECK: LENGTH 12.2 m WIDTH 9.2 m
45. DECK AREA 112.2 m²
46. COST PER SQ. METRE $ 990

COSTS

		COSTS IN $ THOUSANDS
47.	RIGHT OF WAY	0006
48.	APPROACHES	0010
49.	STRUCTURE	0111
50.	OTHER	0000
51.	TOTAL COST	0121
52.	NON-SUBSIDIZABLE COST	0000
53.	SUBSIDIZABLE COST	0121
54.	CTC SHARE OF COST	0000
55.	RWY SHARE OF COST	0000
56.	MUNIC. PERCENT OF SUB COST 100 %	00121
57.	DESIRABLE JURISDICTION ____ %	

58. TIME: NOW (1) 1 to 5 yr. (2) 6 to 10 yr. (3) 1
60. PRIORITY RATING

59. REMARKS
1988 - BY LAW APPROVED UNTIL 8906 - #640-87

61. DATE 88/09/12 62. BY J.D. C. & S. 63. OSIS No. 100004

7. RURAL ✓ SEMI-URBAN/URBAN

3. STRUCTURE No. 00093

OD-MB-176M 78-07

TWP. OF PILKINGTON DIST. #3

M.T.O. SITE #35-0188
STR. # 00003

memorandum

S[illegible]URAL OFFICE 4th FLOOR
3501 DUFFERIN STREET – DOWNSVIEW, ONTARIO
M3K 1N6
Ontario

To: Mr. C.R. Preyra
Legal Services Assistant
Office of Legal Services
Main Floor, East Bldg.
Downsview

Date: June 22, 1987

Telephone: 235-4960

Re: **By-law Nos. 640-87 to 651-87 inclusive**
M.T.C. Site No. See below
Township of Pilkington

Further to your memo of 87.05.25, I recommend approval of the by-laws restricting the gross load as noted on the following bridges for a period of two years.

By-Law No.	Str. No.	Site No.	Location-Name	Gross Load Tonnes
641-87	0001	35-186	Lot 4/5, Conc. 1 WOGR	11
640-87	0003	35-188	Lot 3, Conc. 3/4 WOGR	9
642-87	0004	35-189	Lot 5/6, Conc. 5 WOGR	3
643-87	0005	35-253	Lot 10/11, Conc. 5 WOGR	17
644-87	0007	35-381	Lot 13/14, Conc. 6 WOGR	10
645-87	0008	35-380	Lot 13/14, Conc. 6 WOGR	13
646-87	0012	35-267	Lot 5, Conc. 2/3 EOGR	8
647-87	0015	35-264	Lot 1/8, Conc. C EOGR	16
648-87	0016	35-262	Lot 12, Conc. B Woolwich Twp.	8
649-87	0022	35-274	Lot 11, Conc. 3/4 EOGR	13
650-87	0024	35-306	Lot 11/12, Conc. 4 EOGR	8
651-87	0027	33 35-065	Lot 11, Conc. 5 EOGR Woolwich-Pilkington TL	14

K.L. Kleinsteiber
Head,
Approvals Section

KLK/at

cc: R. Van Veen

Ontario

Ministry of
Transportation and
Communications

Office of Legal Services
1201 Wilson Avenue
East Building
Downsview, Ontario
M3M 1J8
2 S 5 87

Mr. K. L. Kleinsteiber
Municipal Structural Engineer
Structural Office - 4th Floor
3501 Dufferin Street
Downsview, Ontario

Re: By-law #s 640/87 & 651/87
The Twp. of Pelham

Enclosed herewith is a copy of the above-mentioned by-law requesting a restriction on the weight of vehicles over the bridges referred to therein.

Will you please have these structures examined and favor me with your comments.

Thank you.

C.R. Preyra
Legal Assistant
Office of Legal Services

Enc:

memorandum

Ontario

To: C. R. Preyra
By-Law Officer
Legal Services
M.T.C., Downsview

Date: 1987 05 21

From: P. A. Hansen
Senior Municipal Supervisor
District #3, Stratford

Re: Township of Pilkington
County of Wellington
Restriction of Weight of Vehicles passing over Bridges

Please find enclosed duplicate copies of twelve (12) By-Laws passed by the corporation of Pilkington Townhsip limiting the weight of vehicles over certain structures.

I have listed these By-Laws for easy reference.

Twp. Bridge No.	M.T.C. Site No.	Restricting Weight	By-Law
1 0001	35-186	11 tonnes	641-87
2 0003	35-188	9 tonnes	640-87
3 0004	35-189	3 tonnes	642-87
4 0005	35-253	17 tonnes	643-87
5 0007	35-381	10 tonnes	644-87
6 0008	35-380	13 tonnes	645-87
7 0012	35-267	8 tonnes	646-87
8 0015	35-264	16 tonnes	647-87
9 0016	35-262	8 tonnes	648-87
10 0022	35-274	13 tonnes	649-87
11 0024	35-306	8 tonnes	650-87
12 0027	33-065	14 tonnes	651-87

Please note the attached evaluation report attached to By-Law #624-87.

These by-Laws are submitted for your consideration & approval.

P. A. Hansen
Senior Municipal Supervisor
For:
R. van Veen
District Municipal Engineer

PAH/mr

Encl.

TOWNSHIP OF PILKINGTON

BY-LAW NUMBER 640-87

Being a By-law to limit the weight of vehicles passing over a bridge.

WHEREAS:

(a) Under the provision of the Highway Traffic Act RSO 1980, Chap. 198 Sec.104 (13) the municipality having jurisdiction over a bridge may by by-law approved by the Ministry limit the gross vehicle weight of any vehicle or any class thereof passing over such bridge, and the requirements of subsection (12) with respect to the posting up of notice apply thereto.

(b) The Council deems it expedient to limit weight passing over a bridge.

NOW THEREFORE: the Council of the Corporation of The Township of Pilkington enacts as follows;

1. No vehicle or combination of vehicles or any class thereof, whether empty or loaded, shall be operated over the bridge known as Bridge No.0003 at Lots 3, Con 3 & 4 WOGR on Road Allowance in Pilkington Township with a weight in excess of 9 Tonnes.

2. The penalties provided in subsection 14 of section 104 of The Highway Traffic Act shall apply to offences against this By-law.

3. This by-law shall become effective upon being approved by the Ministry of Transportation and Communications and upon a notice of the limit of the weight permitted, legibly printed, being posted up in a conspicuous place at each end of the bridge.

THIS By-law shall recind By-law 454-82.

Read a first, second and third time and passed this 5th day in May 1987.

Reeve

Clerk

Certified to be a true copy of By-law 640-87 passed by the Council of the Township of Pilkington this 5th day of May 1987.

Len Day
Clerk-Treasurer

1 UPDATE CODE

MUNICIPAL STRUCTURE – APPRAISAL SHEET

CONTROL 02

IDENTIFICATION

1. MUNIC. TWP. OF PILKINGTON 0035
2. ROAD DESCRIP/ST. NAME CONC 3/4 N.G.R. 3. STRUCTURE NO. 00003
4. LOCATION CONC 3/4 LOT 3 5. ROAD SECTION NO.
6. STRUCT. NAME
7. ROADSIDE ENVIRON. RURAL (1) SEMI-URBAN/URBAN (2) 1
8. RAILWAY LEVEL CROSSING NO.
9. BOUNDARY STRUCT. YES INT.____YES EXT.____NO ✓
10. ADJAC. MUNIC. 'A'
ADJAC. MUNIC. 'B'
ADJAC. MUNIC. 'C'
11. PRESENT JURIS. MTC (1) CO. (2) NON-CO. (3) LOC (4) RWY. (5) FED. (6) 4
12. DES. JURIS. CO. (1) LOC. (2) OTHER (3) 2
13. SPARE
14. PRES. DESIG. SUB. RD. (1) MTC C.L. (2) CO. C. L. (3)
15. SUB. COMM. NAME
16. MTC SITE NO. 035 – 0188

EXISTING CONDITIONS & ADEQUACY RATINGS

17. STRUCTURE: EXISTING (1) PROPOSED (2) 1
18. YEAR CONSTRUCTED 1935 ±
19. SPAN OR DIAMETER 0104 m
20. SKEW 0 °
21. TYPE OF CROSSING: OVER WATER (1) UNDER ROAD (2) OVER ROAD (3) UNDER RWY (4) OVER RWY. (5) 1
22. DECK: LENGTH 11.1 m WIDTH 5.6 m
23. No. OF SPANS 1
24. EXISTING POSTING 08 t
25. SPARE
26. EXIST. ROAD CLASS 200-400
27. 19____TRAFFIC: DHV____%____VPH DIRECT. SPLIT____TRUCKS____% AADT 00300
28. CAPACITY (LEVEL 'E' VOLUME)
29. 10 YEAR GROWTH FACTOR
30. 19____TRAFFIC: DHV____%____VPH DIRECT. SPLIT____TRUCKS____% AADT
31. RAILWAY CROSSING 19____
EXPOSURE INDEX 19____

POINT RATINGS AND DEFICIENCIES

			EXIST COND.	MIN. TOL.	NOT DEF.	DEFICIENT NOW	DEFICIENT 1–5	DEFICIENT 6–10
32.	SAFE LOADING	OUT OF 40	08 tonnes	10t	•	✓		
33.	ROADWAY WIDTH	OUT OF 20	05.1 metres	3.7	✓			
34.	VERT. CLEARANCE	OUT OF 5	4/4	3.7 m	✓			
35.	AVGE. SAFE SPEED	OUT OF 20	50					
36.	LEVEL OF SERVICE	OUT OF 15		E	✓			
37.	SIDEWALKS	OUT OF 5			✓			
38.	OPENING ADEQUACY	OUT OF 15			✓			
39.	CONDITION RATING	OUT OF 100						

40. ACCOMPLISHMENT CODE (MTC) 0

TYPE, COST & TIME OF IMPROVEMENT

CHAGE T 20 TO 78 JAN. 9 -82 JA

41. TYPE OF IMPROVEMENT
A. CARRY OVER (1)
B. SPOT (2)
C. WIDEN (3)
D. RECONDITION (4)
E. REPLACE – SAME LOCATION (5)
F. REPLACE – NEW LOCATION (6)
G. NEW BRIDGE (7)

42. PROPOSED STRUCTURE: SINGLE SPAN ____ MULTI SPAN ____ CULVERT ____

43. FOUNDATION CONDITION GOOD ____ FAIR ____ POOR ____

44. DECK LENGTH____ m WIDTH____ m
45. DECK AREA____ m^2
46. COST PER SQ. METRE $____

COSTS (COSTS IN $ THOUSANDS)

47. RIGHT OF WAY
48. APPROACHES
49. STRUCTURE
50. OTHER
51. TOTAL COST
52. NON-SUBSIDIZABLE COST
53. SUBSIDIZABLE COST
54. CTC SHARE OF COST
55. RWY SHARE OF COST
56. MUNIC. PERCENT OF SUB COST____ %
57. DESIRABLE JURISDICTION____ %
58. TIME: NOW (1) 1 to 5 yr. (2) 6 to 10 yr. (3)
60. PRIORITY RATING

59. REMARKS CURB AND RAILINGS REPAIRED 1980

61. DATE 81/03/03 62. BY [illegible] 63. OSIS No.

7 RURAL ✓ SEMI-URBAN/URBAN

3. STRUCTURE No. 00003

Mr. L. E. Authier
District Municipal Engineer
District #3, Stratford

79 08 21

From: Structural Office
West Building
Downsview, Ontario

Re: Structure Inspections

We are enclosing two copies of the inspection report for the following structures:

1. Guelph Township
Lot 10, Div. 'B'
Waterloo Township
Lot 96 Weasleys Upper Block
M.T.C. Site 35-342

We are recommending repairs to the spalled concrete at abutments, wingwalls, curbs and south exterior beams.

This structure can be repaired and brought up to highway loading.

2. Township of Pilkington
Lot 3, Conc. III/IV
M.T.C. Site 35-188

We are recommending minor repairs to curbs and railing to bring this structure up to highway loading.

3. Township of Arthur
Lot 22, Conc. VIII/IX
M.T.C. Site 35-72

The new steel superstructure and timber deck are rated for 14 tonnes. The asphalt wearing surface is cracked and breaking up indicating excessive movements in the laminated timber deck.

RSR/jl
Encl.

Ranjit Reel
Evaluation Engineer
Approvals Section

Ministry of Transportation and Communications
Ontario

Memorandum

To: K. L. Kleinsteiber,
Municipal Structural Engineer,
M.T.C.,
DOWNSVIEW.

From: District #3, Stratford

Attention:

Date: 79 07 17

Our File Ref.

In Reply to

Subject:

Pilkington Township in the County of Wellington have requested a bridge inspection for M.T.C. Site # 35-188, Lot 3, Con. 3 & 4 W.G.R.

The municipality is concerned in regards to repairing or replacement if necessary.

If possible, an early inspection would be appreciated.

R. C. Workman,
District Municipal Superv.,
FOR:
L. E. Authier,
District Municipal Engineer.

RCW:is

STRUCTURE INSPECTION REPORT - APPROVAL SECTION

Inspected by Ranjit Reel Date 79 08 16

County Wellington Site 35-188

Jurisdiction Twp. of Pilkington Lot - Conc. 3 - III/IV

Structure Name _____ District No. _____

Spans 34' Posted Load 9 tonnes

Roadway Width 16' Age of Structure 1930

Skew _____ Crossing Stream

Sidewalks _____ Clearance to W.L. _____

Type of Structure Reinforced concrete beams and slabs

Foundation - Good

Abutments - Concrete, good, minor spalling at S.W. corner

Wingwalls - Concrete, fair. Concrete in the curbs & the wingwalls spalled
S.W. and N.E. wingwalls protected by random rip-rap placed recently in front of them.

Ballast Walls -

Piers -

Bearings -

Girders, ~~Trusses or Ribs~~ - 2 concrete beams, good

Floor Beams -

Stringers	-	
Deck	-	Soffit, good between the main beams. Soffit under the curbs spalling.
Wearing Surface	-	Gravel, fair. About 1 foot of gravel over the structure.
Expansion Joints	-	
Railings	-	Concrete post and rails, fair. Some of the posts are loose since the curb is severely spalled from around them. Post and rails over N.E. and N.W. wingwalls broken.
Curbs and/or Sidewalks	-	Concrete, extensive spalling along full length of curbs.
Drainage	-	
Approaches and/or Approach Slabs	-	Gravel, fair
Additional Observations	-	Stream has about 45° skew to the bridge. Bridge sitting square.

Permissible Load - at time of inspection 9 tonnes

- if renovated as below Highway loading

Recommendations - Repair curbs and set parapet posts securely.
Reduce amount of gravel over the structure.

MUNICIPAL STRUCTURE – APPRAISAL SHEET – RURAL

CONTROL [ ][ ][ ][ ][2]

IDENTIFICATION

1. STUDY MUNICIPALITY TWP OF PILKINGTON [ ][ ][ ][ ] 2. STRUCTURE NO. [0][0][0][3]
3. STUDY MUNICIPALITY ROAD SECTION (IN WHICH STRUCTURE IS LOCATED) NO. . . . . [ ][ ][ ]
4. PRESENT JURIS.: MTC ____ COUNTY (CO. RD.) ____ COUNTY (NON-CO. RD.) ____ LOCAL ✓ OTHER (SPECIFY) ____ [ ]
5. PRESENT DESIG.: SUBURBAN ROAD ____ M.T.C. CONNECTING LINK ____ CTY. CONN. LINK [ ]
6. COUNTY ROAD NO. ____ 7. SUBURBAN COMMISSION NAME ____ [ ][ ]
8. ROAD DESCRIPTION/STREET NAME ROAD ALLOWANCE CON. 3 & 4, N.G.R.
9. LOCAL NAME FOR STRUCTURE ____ MTC STRUCTURE NO. 35-188
10. LOCATION LOT 3, CON. 3 & 4, N.G.R.

11. BOUNDARY STRUCTURE:
YES: INT. ____ YES: EXT. ____ NO. ✓ [ ]

12. ADJ. MUNC. 'A' ____ STRUCTURE NO. [ ][ ][ ][ ]
ADJ. MUNC. 'B' ____ STRUCTURE NO. [ ][ ][ ][ ]
ADJ. MUNC. 'C' ____ STRUCTURE NO. [ ][ ][ ][ ]

EXISTING CONDITIONS AND ADEQUACY RATINGS

13. EXISTING STRUCTURE: BRIDGE ✓ CULVERT ____
14. (A) SPAN OR DIAMETER 34 FT. (B) SKEW 0 °
15. TYPE OF CROSSING: OVER WATER ✓ OVER R. R. ____ UNDER R. R. ____ OVER ROAD ____ UNDER ROAD ____
16. EXISTING TRAFFIC: DHV ____ % ____ VPH DIR. SPLIT ____ 19 77 AADT [0][0][3][0][0]
17. EXISTING CLASS 100 - 400 V.P.D. [ ][1] 18. SERVICE RATING FOR ROAD SECTION [0][0][3][0][0]
19. FUTURE TRAFFIC: 10 YR. GROWTH F 1.2 19 87 AADT 360
10 YR. DHV ____ % ____ VPH DIR. SPLIT ____
20. CAPACITY (LEVEL OF SERVICE 'E' VOLUME) ____ VPH

DEFICIENCIES	EXIST. COND.	MIN. TOL.	CRITICAL DEFICIENCY: NOW	CRITICAL DEFICIENCY: FUTURE (YEAR)	CRITICAL DEFICIENCY: NONE	CODING BOXES	POINT RATING	
21. SAFE LOADING	9	10	X				[0][0]	OUT OF 40
22. ROADWAY WIDTH	16'7"	12			✓		[0][8]	OUT OF 20
23. VERTICAL CLEARANCE	U.L.	12			✓		[0][5]	OUT OF 5
24. AVGE. SAFE SPEED	50					0	[2][0]	OUT OF 20
25. LEVEL OF SERVICE		E			✓		[0][0]	
26. SPARE					✓	0	[0][0]	
27. OPENING ADEQUACY					✓		[1][2]	OUT OF 15

28. CONDITION RATING ≤ [0][4][5] OUT OF 100

29. PRIORITY RATING [0][4][7]

TYPE, COST AND TIME OF IMPROVEMENTS

30. TYPE OF IMPROVEMENT [ ]
REPLACE SAME LOCATION ✓ SPOT IMPROVEMENT . . . . . ____
REPLACE NEW LOCATION . ____ WIDEN . . . . . ____
REBUILD OR RECONDITION ____ NEW STRUCTURE (IMPROVE SERV.) . . . ____
NEW STRUCTURE (EXPAND SERV.) . . . . . ____

31. PROPOSED STRUCTURE: SINGLE SPAN ✓ MULTIPLE SPAN ____
PIPE CULVERT ____
FOUNDATION CONDITIONS: GOOD ____ FAIR ✓ POOR ____
33. DECK LENGTH 40 FT. 34. DECK WIDTH 30 FT.
35. DECK AREA 1200 SQ. FT. 36. COST PER SQ. FT. $ 48.

43. TIME: NOW ✓ 1-5 YRS ____ 6-10 YRS ____ [ ]

COSTS	COSTS IN $ THOUSANDS
37. RIGHT OF WAY	[0][0][0][0]
38. APPROACHES	[0][0][0][7]
39. STRUCTURE	[0][0][5][8]
40. TOTAL COST	[0][0,][0][6][5]
41. NON-SUB. COSTS	[0][0][0][0]
42. SUBSIDIZABLE COST	[0][0,][0][6][5]

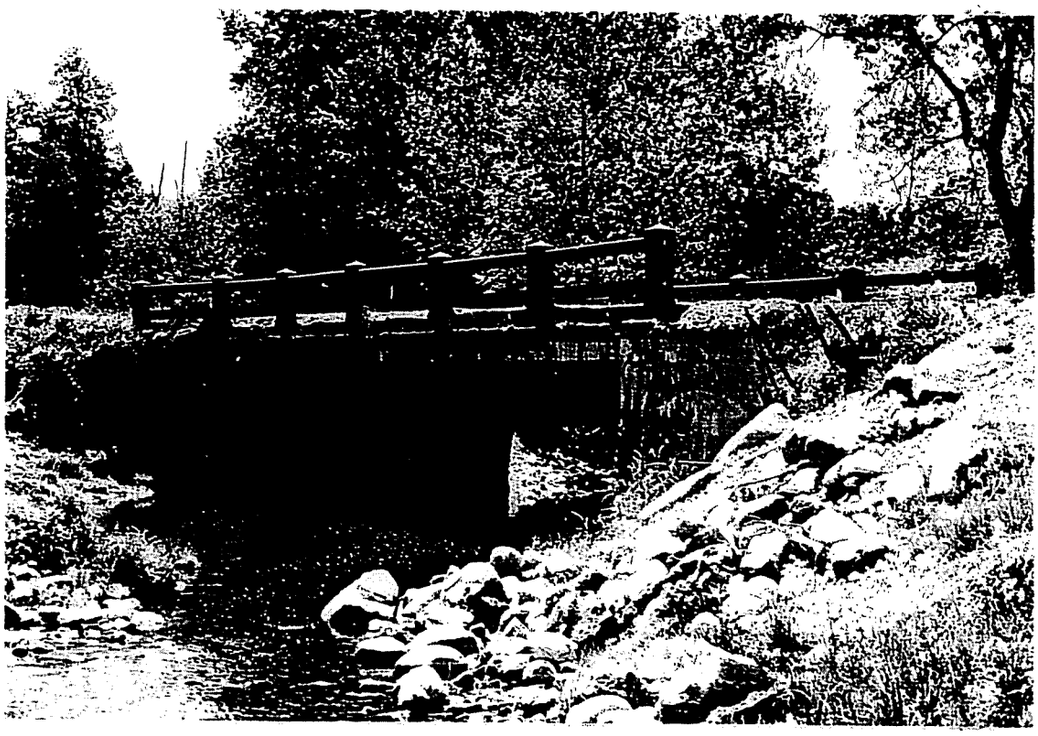
44. PRESENT JURIS./DESIG.: STUDY MUNC. PERCENTAGE SHARE OF SUB. COST 100 % COST $ [0][0,][0][6][5] ,000
45. DESIRABLE JURIS. COUNTY ____ LOCAL ✓ OTHER (SPECIFY IN REMARKS) ____
46. DESIRABLE DESIG.: SUBURBAN ROAD ____
47. IF DESIRABLE SUB. RD. GIVE SUBURBAN COMMISSION NAME ____
48. DESIRABLE JURIS./DESIG.: STUDY MUNC. PERCENTAGE SHARE OF SUB. COST ____ %. COST $ [ ][ ],[ ][ ][ ] ,000

49. REMARKS SOUTH CURB BADLY DETERIORATED. - 1.5' ± GRAVEL ON DECK, WASHOUT AT SOUTHEAST CORNER. SOUTH EDGE OF DECK BADLY DETERIORATED. REINFORCING STEEL EXPOSED & BADLY RUSTED. TEE BEAMS & ABUTMENTS ARE IN FAIR CONDITION - REDUCTION IN LOAD CARRYING CAPACITY DUE TO POOR DECK. OBSERVE STRUCTURE FOR FURTHER DETERIORATION.

50. DATE JUNE 10/77 51. BY WER EMC 52. ACCOMP. CODE [ ][ ][ ][ ][ ][ ][ ]

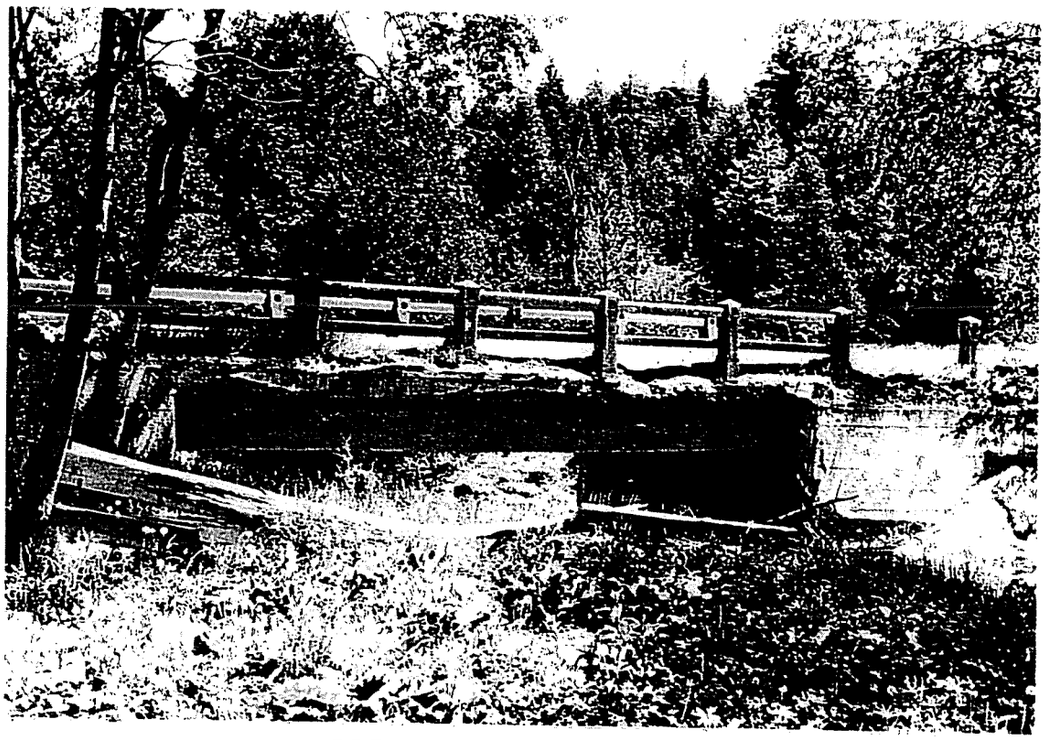
OD-MB-178 7-75

FLIP



BRIDGE NO. 0003

(VIEW LOOKING DOWNSTREAM)



BRIDGE NO. 0003

VIEW OF SOUTH SIDE OF STRUCTURE

NOTE: DETERIORATION OF THE CONCRETE CURBS, RAILING AND DECK

BRIDGE NO. 0003

VIEW SHOWING DETERIORATION OF CURB, RAILING AND DECK

BRIDGE NO. 0003

VIEW SHOWING SPALLING AND DETERIORATION OF CONCRETE DECK AND CURB SHOWING REINFORCING STEEL EXPOSED

FORM MH-114
APRIL 1958

DEPARTMENT OF HIGHWAYS

RURAL MUNICIPAL BRIDGE WORK SHEET

CARD CONTROL [0]

A. IDENTIFICATION

1. Township of [illegible]
County or District of [illegible]
3. Lot 3 Con. [illegible]

Local Name
2. Bridge No. [illegible]

4. Land Use: Rural ☐ Built Up ☐

CODE BLOCKS: 1 ☐☐☐ 2-4; 2 ☐☐☐ 5-7

B. TYPE OF CROSSING

5. Stream ☑ Grade Separation: Railway Under ☐ Railway Over ☐

CODE BLOCKS: 5 ☐ 8

C. BRIDGE DATA

6. Approaches:

	Width		Grade	
N or E Side	16	Ft.	1	% Up/Dn.
S or W Side	16	Ft.	2	% Up/Dn.

Surface Type:
Asphalt ☑ Gravel ☐
Earth ☐ Other ☐

7. Sidewalks: None ☑ N S E W
Width

8. Length of Spans
9. Roadway Width 7 Ft.
10. Overall Handrail Length Ft.
11. Vertical Clearance Centre Side
12. Skew
13. Year Built 1923
14. Estimated Life 20
15. Safe Loading 26 Tons

16. Material of Structure:

	Substructure	Superstructure	Deck
Wood			
Stone			
Steel			
Concrete			

17. Type of Structure:

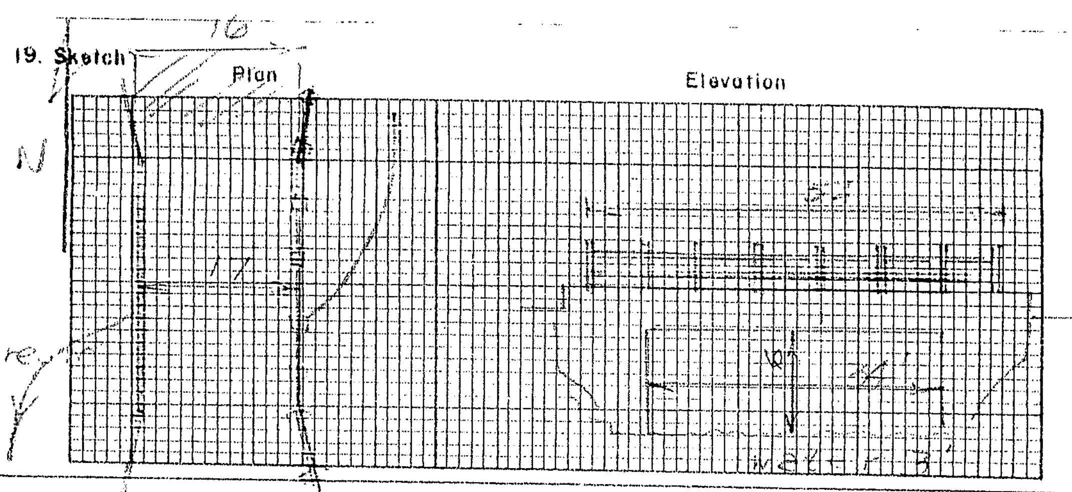
	Arch Spandrel	Arch Right	Truss Through	Truss Deck	Truss Low	Beam	Beam & Girder	Rigid Frame	Pre-Stressed
Stone			X	X	X	X	X	X	X
Timber	X	X					X	X	X
Steel	X	X							X
Concrete				X	X	X			

CODE BLOCKS: 6 ☐ 9; 7 ☐ 10; 8 ☐☐☐ 11-13; 9 ☐☐ 14-15; 10 ☐☐☐ 16-18; 11 ☐☐ 19-20; 12 ☐☐ 20-21; 13 ☐☐ 23-24; 14 ☐☐ 25-26; 15 ☐☐ 27-28; 16 ☐☐☐ 29-31; 17 ☐☐ 32-33

18. Character of Deficiencies *(Describe)*
[illegible]

13893

19. Sketch Plan Elevation



D. SUGGESTED IMPROVEMENT

20. Type of Work:
Recondition Existing Structure ☐ Replace, New Location ☐
Replace, Same Location ☐ Abandon ☐

Date [illegible] 4/58 By [illegible]

CODE BLOCKS: 20 ☐ 34

E. ESTIMATE *(Field Staff: Do Not Complete)*

21. Estimated Traffic
22. Estimated Replacement Date
23. Recommended Type of Structure
24. Deck Width x Deck Length ______ x ______ = ______ Sq. Ft.
25. Area Cost / Sq. Ft. $ ______ 26. Estimated Cost $ ______

Date ______ By ______

CODE BLOCKS: 21 ☐☐ 35-36; 22 ☐☐ 37-38; 23 ☐☐ 39-40; 24 ☐☐☐☐ 41-44; 25 ☐☐☐ 45-47; 26 ☐☐☐☐ 48-51

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

105 Queen Street West, Unit 14
Fergus
Ontario N1M 1S6
Tel: (519) 843-3920
Fax: (519) 843-1943
e-mail: info@tritoneng.on.ca

ORANGEVILLE • FERGUS • GRAVENHURST

FILE

November 11, 2008

Union Gas Limited,
P.O Box 340,
603 Kumpf Drive,
WATERLOO, Ontario
N2V 1K3

Attention: Mr. Kevin Schimus
Drafting Team Lead

RE: TOWNSHIP OF CENTRE WELLINGTON
RECONSTRUCTION OF 3rd LINE BRIDGE,
(FORMER TOWNSHIP OF PILKINGTON)
OUR FILE: B5144A

Dear Sir:

We have enclosed for your information a copy of our preliminary base plan for the proposed reconstruction at the above referenced location in the former Township of Pilkington and we would appreciate it if you would provide the following:

1. Location of existing services.
2. Proposed improvements or expansion of your services that maybe planned.
3. Road crossings where duct can be installed during road reconstruction for future use by your utility.

We trust that this information is satisfactory for your present requirements and should you require any additional information, please contact the writer.

Yours very truly,

TRITON ENGINEERING SERVICES LIMITED

Andrew S. Bateman

ASB/asb
cc: Shawn Artt, Utility Services Manager
K. Elder, Director of Public Works, Township of Centre Wellington

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ORANGEVILLE • FERGUS • GRAVENHURST

November 11, 2008

Bell Canada Access Network
21 First Avenue
Orangeville, Ontario
L9W 1H7

Attention: Mr. Bryan Halls
Engineer

RE: TOWNSHIP OF CENTRE WELLINGTON
RECONSTRUCTION OF 3rd LINE BRIDGE,
(FORMER TOWNSHIP OF PILKINGTON)
OUR FILE: B5144A

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Yours very truly,

TRITON ENGINEERING SERVICES LIMITED

A. BA

Andrew S. Bateman

ASB/asb

cc: K. Elder, Director of Public Works, Township of Centre Wellington

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

105 Queen Street West, Unit 14
Fergus
Ontario N1M 1S6
Tel: (519) 843-3920
Fax: (519) 843-1943
e-mail: info@tritoneng.on.ca

ORANGEVILLE • FERGUS • GRAVENHURST
November 11, 2008

Cogeco Cable Inc.,
695 Lawrence Road,
HAMILTON, Ontario
L8J 6P1

Attention: Ms. Mandie Patterson
Project Planner

RE: TOWNSHIP OF CENTRE WELLINGTON
RECONSTRUCTION OF 3rd LINE BRIDGE,
(FORMER TOWNSHIP OF PILKINGTON)
OUR FILE: B5144A

Dear Madam:

We have enclosed for your information a copy of our preliminary base plan for the proposed reconstruction at the above referenced location in the former Township of Pilkington and we would appreciate it if you would provide the following:

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2. Proposed improvements or expansion of your services that maybe planned.
3. Road crossings where duct can be installed during road reconstruction for future use by your utility.

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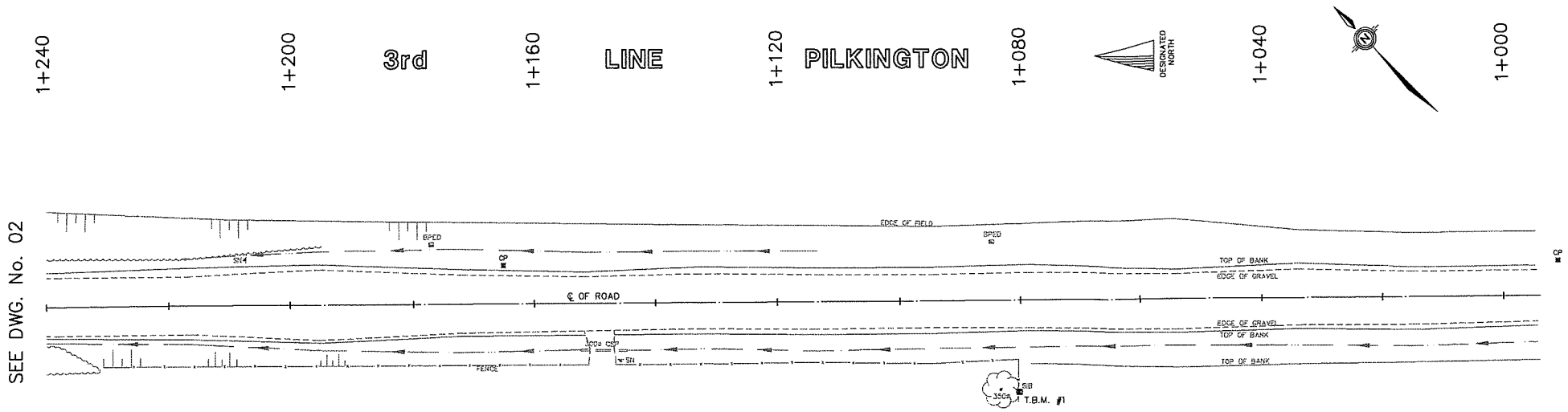
Yours very truly,

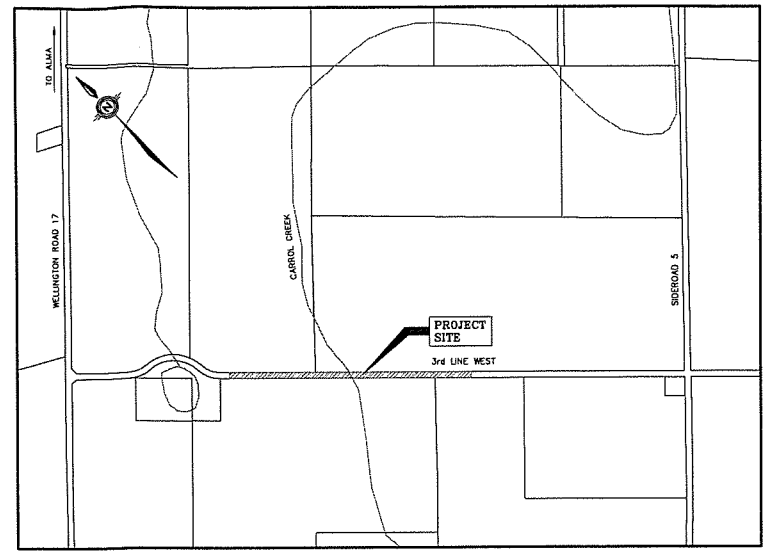
TRITON ENGINEERING SERVICES LIMITED

Andrew S. Bateman

ASB/asb

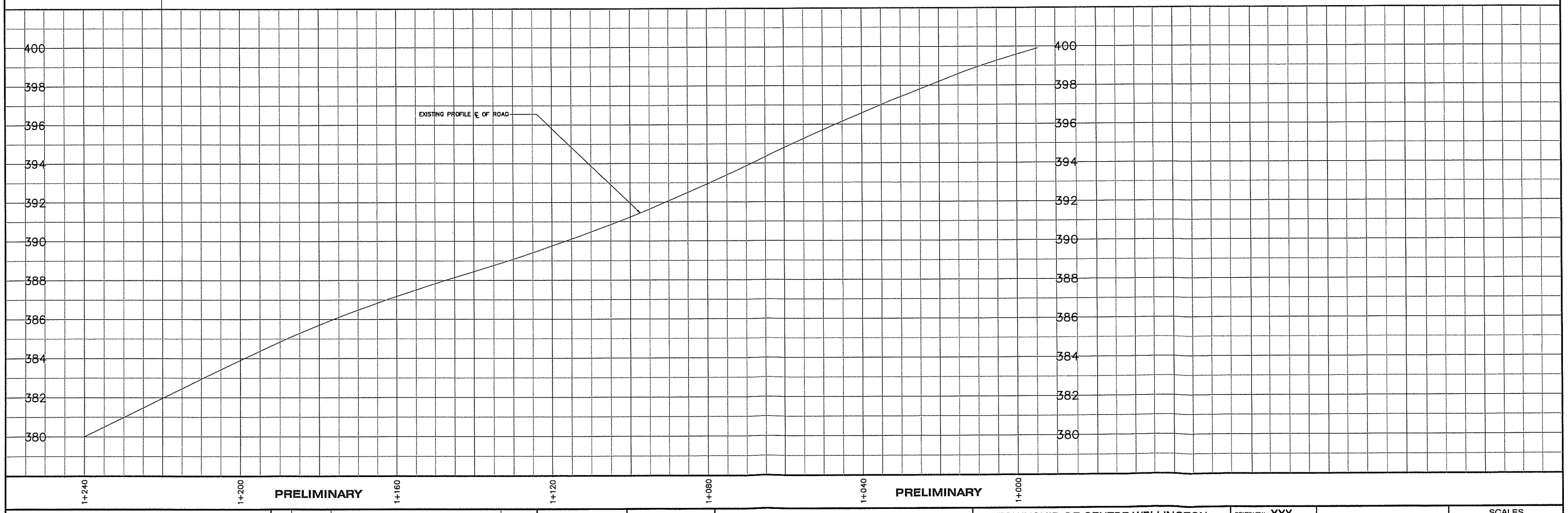
cc: K. Elder, Director of Public Works, Township of Centre Wellington





KEY PLAN – N.T.S.

T.B.M. #1 Elev. 393.566
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+080 Lt. 15.0m



NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL

PRELIMINARY

LICENSED PROFESSIONAL ENGINEER D. G. DONALDSON PROVINCE OF ONTARIO

STRUCTURE 24–P REPLACEMENT

3rd LINE

(FORMER TWP. OF PILKINGTON)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

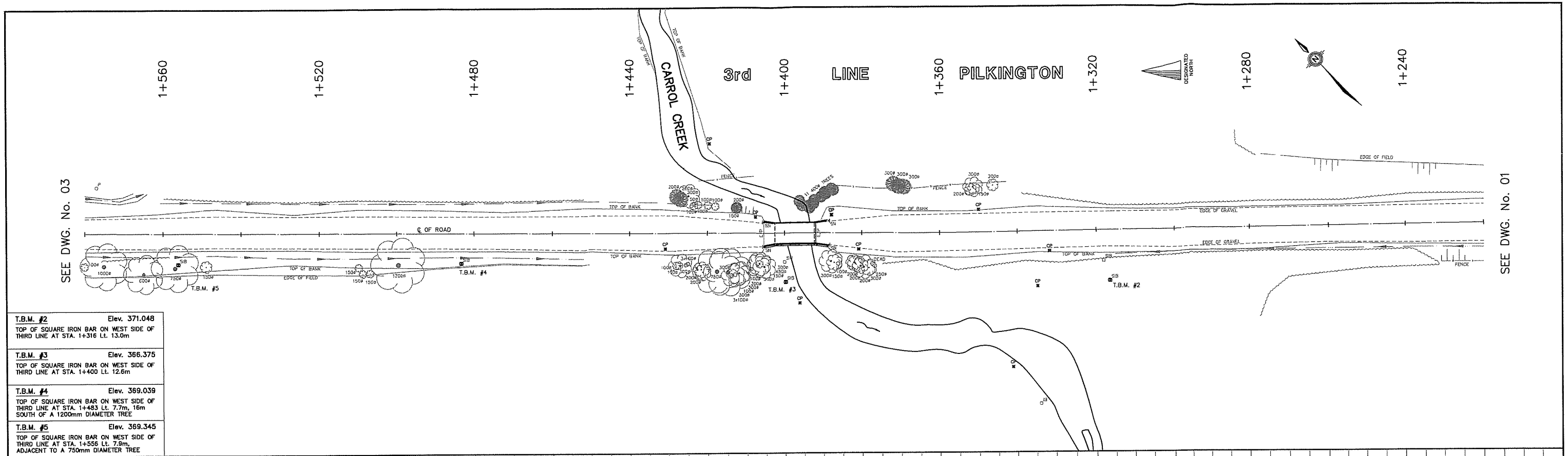
PLAN AND PROFILE
STA 1+000 TO STA 1+240

CONTRACT No:	XXX
PROJECT No:	B5144
DRAWN BY:	A.S.B. (AUTOCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.A.H.
DATE:	NOVEMBER, 2008

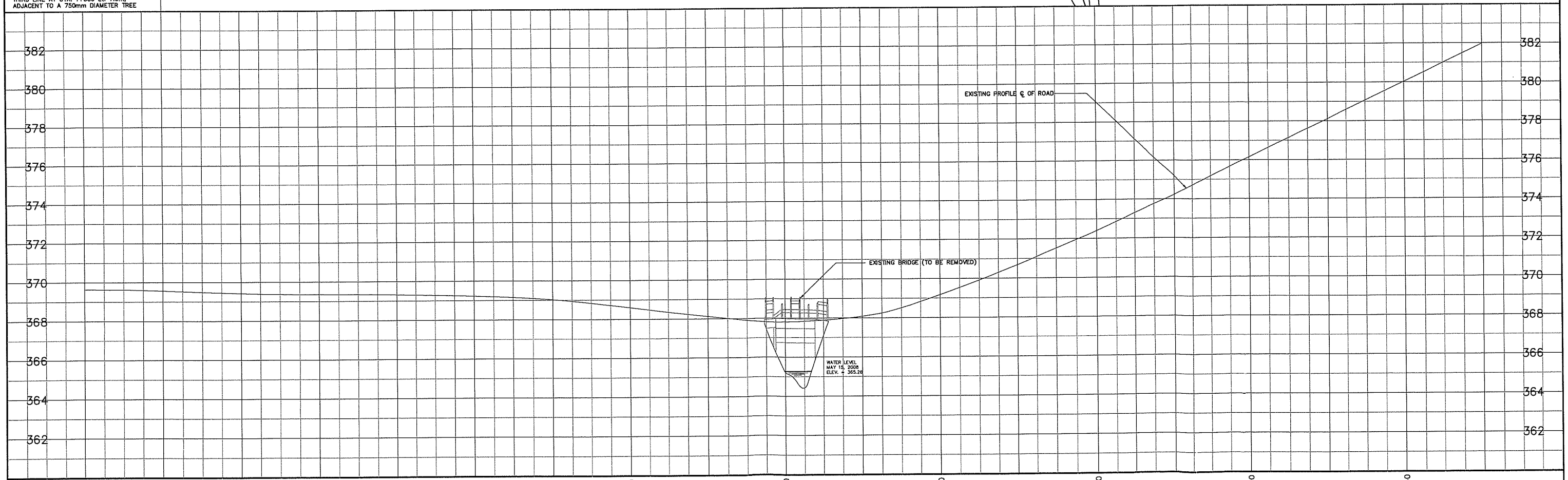
TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER **01**



T.B.M. #2	**Elev. 371.048**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+316 Lt. 13.0m	
T.B.M. #3	**Elev. 366.375**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+400 Lt. 12.6m	
T.B.M. #4	**Elev. 369.039**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+483 Lt. 7.7m, 16m SOUTH OF A 1200mm DIAMETER TREE	
T.B.M. #5	**Elev. 369.345**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+556 Lt. 7.9m, ADJACENT TO A 750mm DIAMETER TREE	



PRELIMINARY

PRELIMINARY

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No	DATE	REVISION	INITIAL

PRELIMINARY

GLENN DONALDSON — PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

STRUCTURE 24–P REPLACEMENT

3rd LINE

(FORMER TWP. OF PILKINGTON)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
STA 1+240 TO STA 1+560

CONTRACT No:	XXX
PROJECT No:	B5144
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.A.H.
DATE:	NOVEMBER, 2008

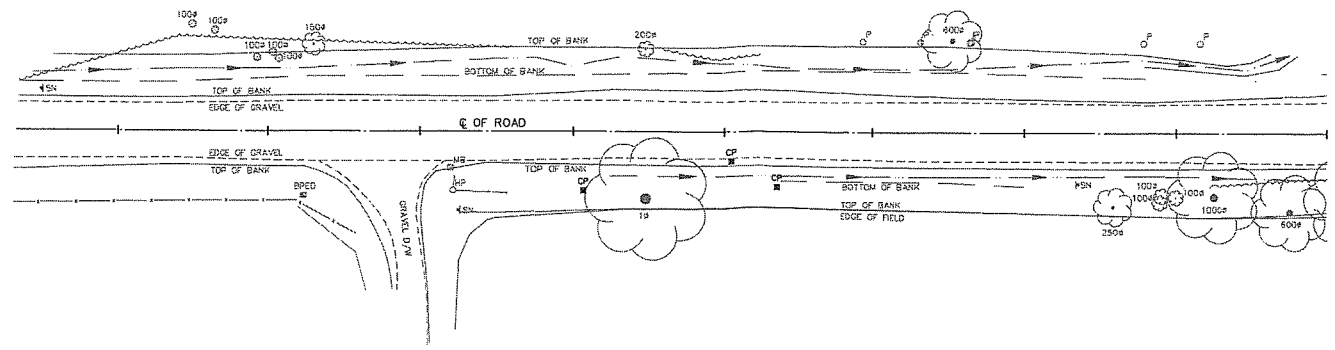
TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES

1:500 HORIZONTAL	1:100 VERTICAL

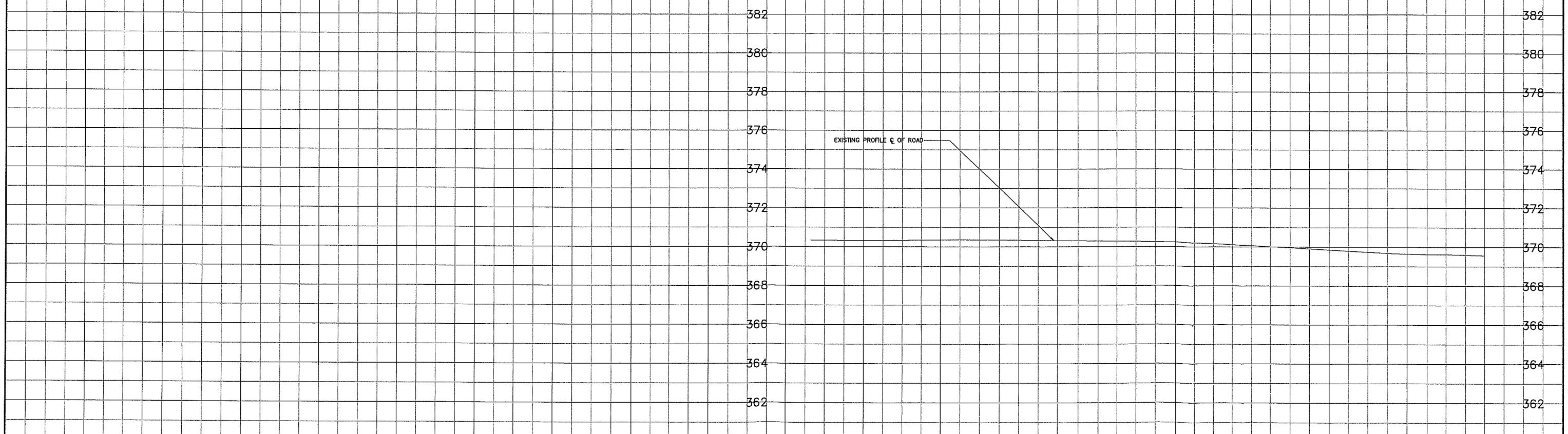
DRAWING NUMBER **02**

3rd 1+720 LINE 1+680 PILKINGTON 1+640 1+600 1+560



SEE DWG. No. 02

T.B.M. #5 Elev. 369.345
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+556 Lt. 7.9m, ADJACENT TO A 750mm DIAMETER TREE



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No	DATE	REVISION	INITIAL

PRELIMINARY

STRUCTURE 24–P REPLACEMENT

3rd LINE

(FORMER TWP. OF PILKINGTON)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
STA 1+560 TO STA 1+720

CONTRACT No:	XXX
PROJECT No:	B5144
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.A.H.
DATE:	NOVEMBER, 2008

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER 03

B5144A Agl.

Access Network
21 First Ave
Orangeville, ONT
L9W 1H7

November 21, 2008

Triton Engineering Services Limited
105 Queen St West Unit 14
Fergus ONT
N1M 1S6

Attn: Andrew Bateman

RE: 3rd Line Pilkington Bridge

In response to your request for locations of Bell underground cables, we have marked the approximate locations of our facilities on the enclosed plans using data that we have on file.

It must be noted that **these locations are not exact** and are to be used for planning purposes only. Bell Canada cannot guarantee the accuracy of these plans.

Before any digging can begin, you will require actual locates to verify exact horizontal location and/or test pits to determine the exact depth of plant.

If you have any questions please contact me at the number below.

Sincerely,

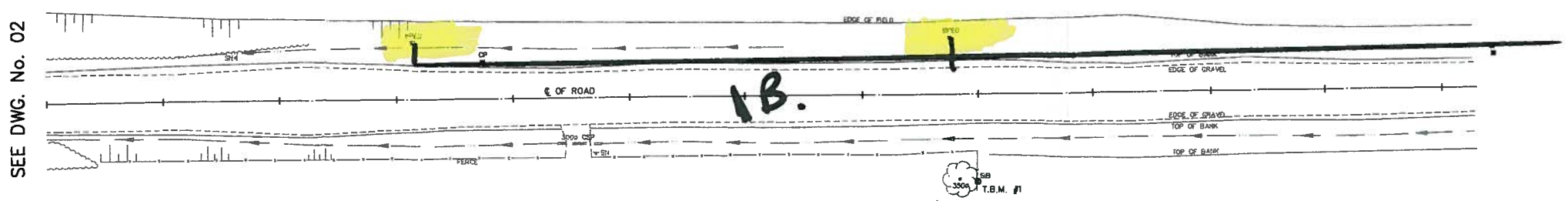
Bryan Halls
Access Network Project Manager

Telephone: (519) 941-8590
Fax: (519) 942-4210
E-mail: bryan.halls@bell.ca

1+240 1+200 3rd 1+160 LINE 1+120 PILKINGTON 1+080 1+040 1+000

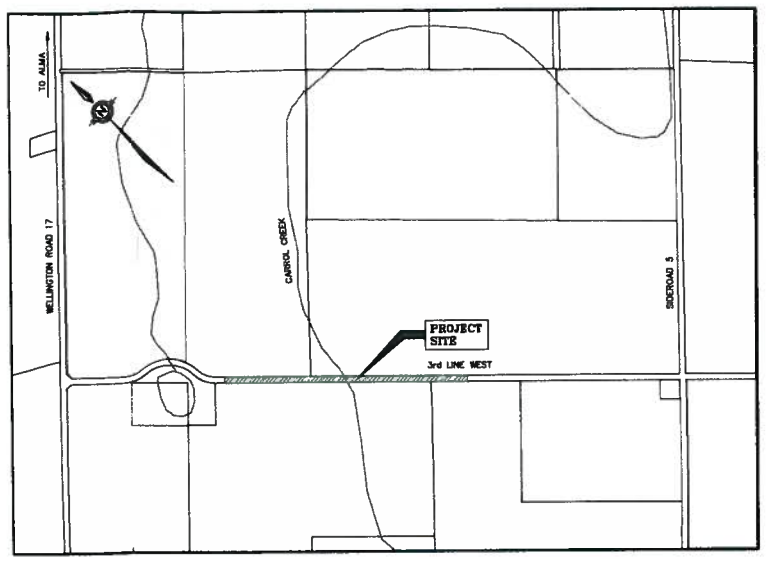
DESIGNATED NORTH

SEE DWG. No. 02



1B.

RECORDS SHOW CABLE .7 OFF EDGE OF G.



KEY PLAN – N.T.S.

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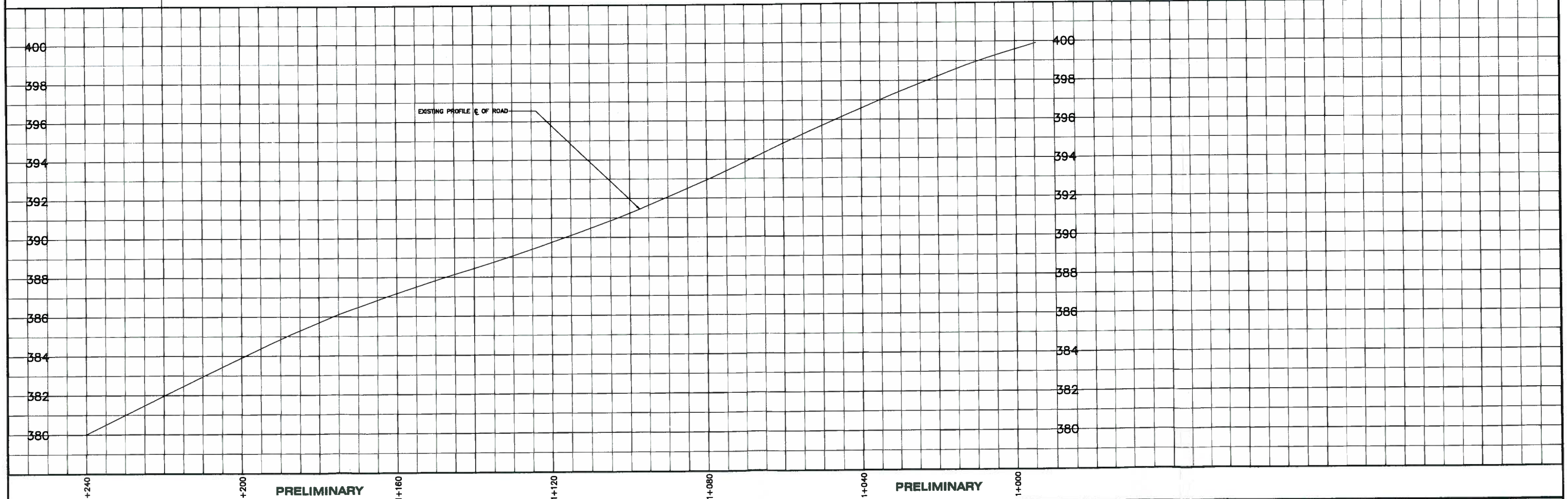

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No	DATE	REVISION	INITIAL

PRELIMINARY

D. DONALDSON

STRUCTURE 24–P REPLACEMENT

3rd LINE

(FORMER TWP. OF PILKINGTON)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
STA 1+000 TO STA 1+240

CONTRACT No:	XXX
PROJECT No:	B5144
DRAWN BY:	A.S.B. (MMM)
CHECKED BY:	D.G.D.
APPROVED BY:	D.A.H.
DATE:	NOVEMBER, 2008

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER 01

SEE DWG. No. 03

SEE DWG. No. 01

1+560 1+520 1+480 1+440 1+400 1+360 1+320 1+280 1+240

CARROL CREEK

3rd LINE

PILKINGTON

DENOTES ASSUMED NORTH

TOP OF BANK

TOP OF HIGH BANK

FENCE

EDGE OF FIELD

EDGE OF GRAVEL

℄ OF ROAD

CP

DEAD

SN

T.B.M. #5

T.B.M. #4

T.B.M. #3

T.B.M. #2

NO CABLE.

T.B.M. #2	**Elev. 371.048**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+316 Lt. 13.0m	
T.B.M. #3	**Elev. 368.375**
TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+400 Lt. 12.6m	
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TOP OF SQUARE IRON BAR ON WEST SIDE OF THIRD LINE AT STA. 1+556 Lt. 7.9m, ADJACENT TO A 750mm DIAMETER TREE	

382 380 378 376 374 372 370 368 366 364 362

EXISTING PROFILE ℄ OF ROAD

EXISTING BRIDGE (TO BE REMOVED)

WATER LEVEL MAY 15, 2008 ELEV. = 365.28

1+560 1+520 1+480 1+440 1+400 1+360 1+320 1+280 1+240

PRELIMINARY

PRELIMINARY

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No	DATE	REVISION	INITIAL

PRELIMINARY

D. DONALDSON — PROVINCE OF ONTARIO

STRUCTURE 24-P REPLACEMENT

3rd LINE

(FORMER TWP. OF PILKINGTON)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
STA 1+240 TO STA 1+560

CONTRACT No:	XXX
PROJECT No:	B5144
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.A.H.
DATE:	NOVEMBER, 2008

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES

1:500 HORIZONTAL — 1:100 VERTICAL

DRAWING NUMBER 02