PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT

HIGHWAY 23 UPGRADES AND INTERSECTION IMPROVEMENTS AT HIGHWAY 23 AND PERTH LINE 86, LISTOWEL

TRANSPORTATION ENVIRONMENTAL STUDY REPORT (TESR)

MUNICIPALITY OF NORTH PERTH

TRANSPORTATION ENVIRONMENTAL STUDY REPORT (TESR)

HIGHWAY 23 UPGRADES AND INTERSECTION IMPROVEMENTS AT HIGHWAY 23 AND PERTH LINE 86, LISTOWEL MUNICIPALITY OF NORTH PERTH

Class Environmental Assessment for Provincial Transportation Facilities "Group B" Project

FEBRUARY 2015

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TRANSPORTATION ENVIRONMENTAL STUDY REPORT (TESR)

HIGHWAY 23 UPGRADES AND INTERSECTION IMPROVEMENTS AT HIGHWAY 23 AND PERTH LINE 86, LISTOWEL (MUNICIPALITY OF NORTH PERTH)

Copies of this document have been forwarded to the Ontario Ministry of the Environment and Climate Change and the Ontario Ministry of Transportation to be placed on the public record:

Ministry of the Environment
London Regional Office
733 Exeter Road, 2nd Floor
London, Ontario

Ministry of Transportation
West Region, Front Lobby
659 Exeter Road
London, Ontario

The Transportation Environmental Study Report is also available for review during regular business hours at the following locations:

Municipality of North Perth
Administration Building
330 Wallace Ave. N.
Listowel, ON N4W 1L3

Listowel Public Library
260 Main Street West,
Listowel, ON
N4W 1A1

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Executive Summary

Highway 23, at the project study area location, is a two lane urban arterial undivided highway with a dedicated centre left turning lane and a posted speed limit of 50 km/hour. The intersection of Highway 23 and Perth Line 86 is a stop controlled three way intersection with a posted speed limit of 50 km/hour.

B.M. Ross & Associates Ltd. were retained by the Municipality of North Perth to complete a Detailed Design and Class Environmental Assessment (Class EA) for Provincial Transportation Facilities Study to identify the preferred alternative for improvements to the intersection of Highway No. 23 and Perth Line 86 and to Highway 23 south of the intersection.

The MTO Class EA process was completed in conjunction with an MEA Class EA being completed for the Municipality for proposed road extensions entering the intersection. The combined process was completed using an integrated EA approach. The initial agency and public consultation phases were combined as well as the completion of on-site assessments. The MEA Class EA process concluded on May 23, 2014 following issuance of the Notice of Study Completion and completion of the mandatory 30 day review period.

The Transportation Environmental Study Report (TESR) documents the planning and preliminary design process completed for the project, which was completed as a Group 'B' undertaking in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (2000).

The TESR contains a description of the project study area, including the existing natural, cultural, social and economic environments. An evaluation methodology is utilized to evaluate the various project alternatives that were considered and to reach a recommended alternative, including identification of anticipated impacts and the associated mitigation measures.

The selected design consists of:

- Reconstruction of the intersection of Highway 23 and Perth Line 86 and installation of a roundabout at the intersection with a new municipal entrance to the north (Haverkamp Avenue North);
- Construction of a north-bound left turn lane on Highway 23 at Kincaid St. with 15 m storage, 60 m parallel lane and 145 m taper length; and
- Construction of a south-bound left turn lane on Highway 23 at Kincaid St. with 30 m storage, 60 m parallel lane and 145 m taper length.
- Installation of sidewalks on Highway No. 23 between Perth Line 86 and Kincaid Street.

During completion of the integrated Class EA process, extensive consultation was completed with local citizens, affected property owners, aboriginal communities and Provincial and Federal review agencies. The Municipality hosted two Public Information Centres (PIC's) and met individually with property owners directly affected by the proposed intersection upgrades. Input from residents had a direct bearing on the selection of the preferred alternative.

Concerns expressed by residents following the second PIC, where the roundabout was presented as the preliminary preferred alternative, were primarily regarding impacts to truck traffic using the roundabout, concerns with property and unfamiliarity with the use of a roundabout. The design of the roundabout was modified by shifting it northwest to limit property impacts and adjusting the design width (the roundabout is a single-lane design with an inscribed circle diameter (ICD) of 44 metres. The diameter is comprised of a circulatory road width of 7 metres, a truck apron width of 3 metres, and a central island diameter of 24 metres) to better accommodate truck traffic. The Municipality has also committed to implementing an education program in the community on the proper method to negotiate a roundabout.

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File No. 11240

MUNICIPALITY OF NORTH PERTH

PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS

CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL TRANSPORTATION FACILITIES

(COMMUNITY OF LISTOWEL)

SCREENING REPORT

1.0 INTRODUCTION AND BACKGROUND

1.1 Purpose of Report

The Municipality of North Perth initiated a Municipal Engineers Association (MEA) Class Environmental Assessment in conjunction with a Ministry of Transportation (MTO) Class Environmental Assessment process in March 2012 to evaluate the potential impacts associated with planned improvements to the intersection of Provincial Highway No. 23 and Perth County Road 86 and the proposed extension of two municipal roadways, Haverkamp Avenue North and Binning Street West, to service future development lands located adjacent to the community of Listowel. The study process followed the procedures set out in the Municipal Class Environmental Assessment (Class EA) document, dated June 2000, as amended in 2007 & 2011 and the Class Environmental Assessment for Provincial Transportation Facilities (2000) Group 'B' process. B. M. Ross and Associates Limited (BMROSS) was engaged to conduct the MTO Class EA investigation on behalf of North Perth.

The purpose of this report is to document the MTO Class EA planning and design process followed for this project. The report includes the following major components:

- An overview of the general project study area.
- A summary of the transportation and infrastructure deficiencies associated with the project area.
- A description of the alternative solutions considered to resolve the identified problems.
- A synopsis of the decision-making process conducted to select a preferred alternative.
- A detailed description of the preferred alternative.

1.2 Class EA for Provincial Transportation Facilities

The Class Environmental Assessment process for Provincial Transportation Facilities is an approved planning document that defines groups of projects and activities associated with the provincial transportation network. The Class EA has been prepared by the Ministry of Transportation of Ontario (MTO) but can be utilized by other proponents seeking to carry out an undertaking affecting the provincial transportation network. The projects and activities conducted under the terms of this Class EA include the following:

- Provincial transportation facility projects involving provincial highways and freeways, provincial transitways, and provincial ferryboats;
- Service, maintenance, and operations facility projects to support provincial transportation facilities; and
- Operation, maintenance, administration, and miscellaneous activities for provincial transportation facilities.

These projects and activities are classified into "groups" under the Class EA as follows:

- Group A: projects which are new facilities.
- Group B: projects which are major improvements to existing facilities.
- Group C: projects which are minor improvements to existing facilities.
- Group D: activities which involve operation, maintenance, administration, and miscellaneous work for provincial transportation facilities.

During completion of the MTO Class Environmental Assessment process, Group A, B and C activities follow a study process which involves a basic series of study stages. Within each stage there may be a number of phases which will vary based upon the complexity of the proposed undertaking and the results identified during completion of each subsequent stage. The study stages are as follows:

- **Planning** – development of the transportation plan to the design concept level of detail.
- **Preliminary Design** – development of the transportation plan to the design criteria level of detail.
- **Detail Design** – development of the transportation plan to the design implementation level of detail.
- **Construction** – project implementation.

Study phases include the generation and assessment of alternatives, the evaluation and selection of the preferred alternative, and the development of the plan/design. Each of these phases may be repeated during completion of the study stages described above. Figure 1.1 illustrates the Class EA process for Group 'B' projects subject to the Provincial Transportation Facilities Class EA. This project will address the preliminary design phase and will include submission of a Transportation Environmental Study Report (TESR).

1.3 Purpose of the Transportation Environmental Study Report

The Transportation Environmental Study Report (TESR) documents the decision making process utilized by the proponent to select the preferred detailed design and any environmentally significant aspects of the planning, design and construction process associated with the proposed upgrades. The TESR includes:

- A description of the project and its purpose;
- A description of the natural, social, economic and cultural environmental factors;
- Documentation of the analysis and evaluation of alternatives that occurred through the Class EA process, anticipated environmental effects and associated mitigation measures;
- Documentation of the consultation program undertaken in order to engage project stakeholders, provincial and federal review agencies, Aboriginal Communities and members of the community;
- Commitments to monitoring, mitigation, consultation and future work associated with construction of the project.

At the conclusion of the process, the TESR will be filed for a minimum 30 day review period. If concerns are raised during the 30 day review period that cannot be resolved in discussions with the Municipality, a person/party may request that the Municipality of North Perth voluntarily elevate the project to a higher level of environmental assessment. If the Municipality declines, or if it is believed that the concerns are not properly dealt with, any individual or organization has the right to request that the Minister of the Environment make an order for the project to comply with Part II of the Environmental Assessment Act which addresses individual environmental assessments. This request must be submitted to the Minister within 30 days of the publication of the Notice of Completion of the Class EA process.

Additional information about the project is also available by contacting the key project Team members involved in the project, as follows:

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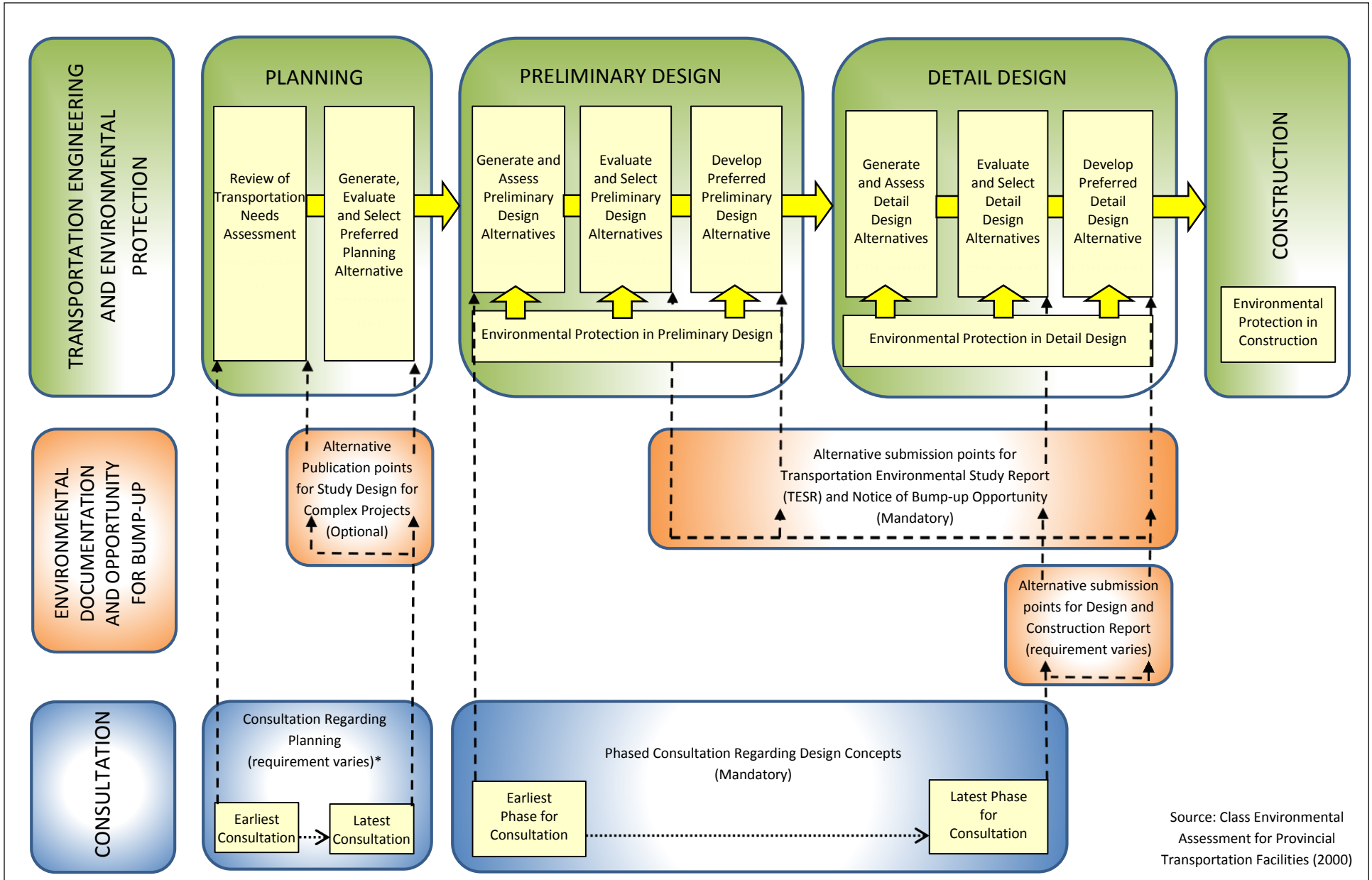


Source: Class Environmental Assessment for Provincial Transportation Facilities (2000)

*Mandatory if a Study Design is prepared

BMROSS engineering better communities

MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
CLASS EA PROCESS FOR PROVINCIAL TRANSPORTATION FACILITIES

DATE: NOV. 3, 2014

PROJECT No. 11240C

FIGURE No. 1.1

2.0 PROJECT SUMMARY

2.1 Description of the Project

a) Project Location

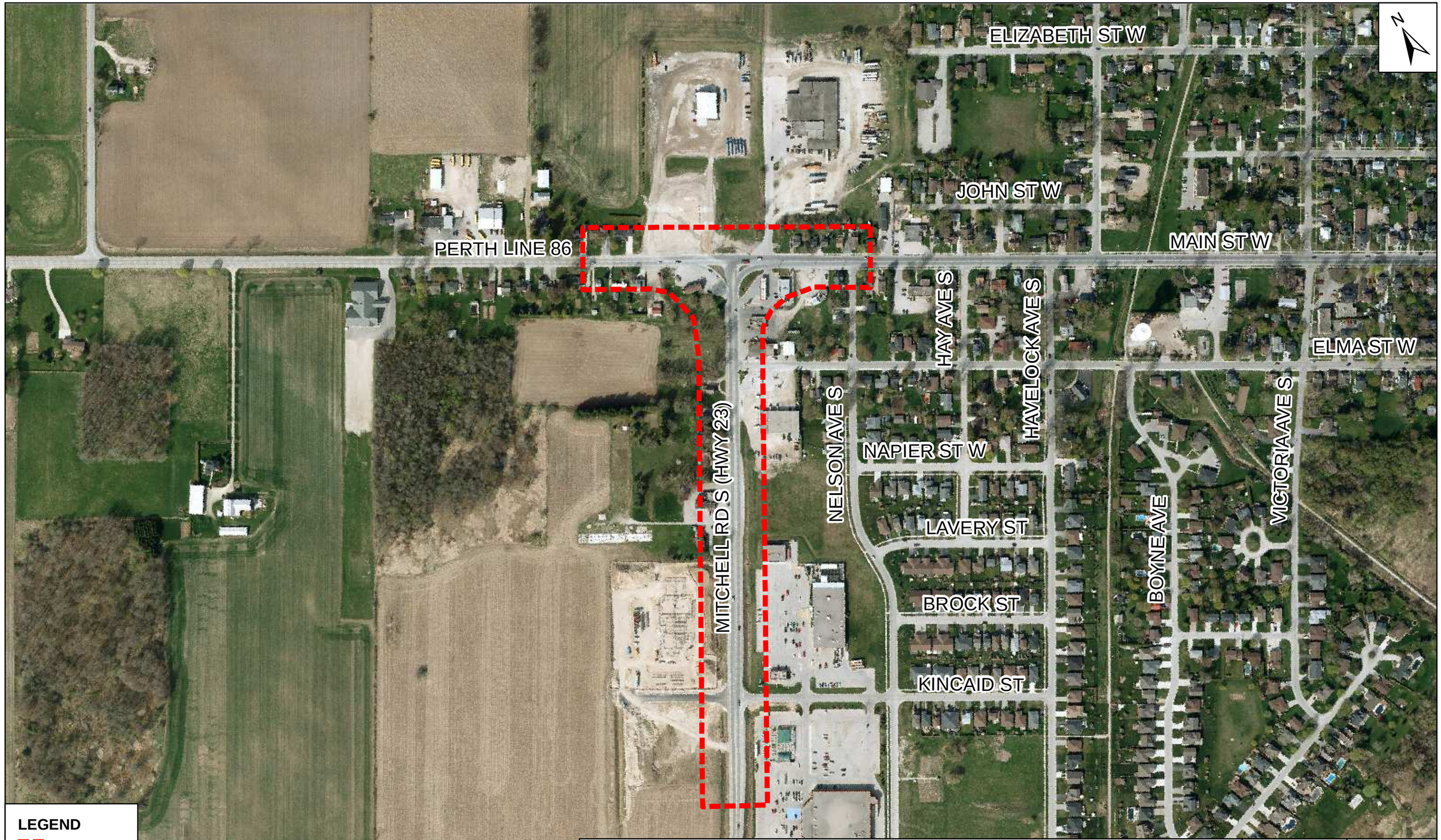
The project study area is located at the westerly extent of the Community of Listowel and includes the intersection of Provincial Highway No. 23 (Highway 23) and Perth County Road No. 86 (Perth Line 86), south to the intersection of Kincaid Street, a distance of approximately 500 metres. The study area limits include lands located west of the intersection to the existing limits of development, and northwest including the potential extension of Haverkamp Avenue North and Binning Street West required to service future development lands located along the westerly boundary of the community. The project study area is illustrated on Figure 2.1.

Highway 23 is a two lane highway corridor with a central turning lane which terminates south of Kincaid Street. The highway is generally bounded by highway commercial developments along the east and westerly extents within the study area. Perth Line 86 is a two lane corridor through the limits of the study area, merging with Highway 23 east of the intersection. Development along Perth Line 86 is predominantly residential in nature with some limited Highway Commercial activity within the limits of town.

Two commercial trucking operations are located immediately north of the intersection. Allan Johnston Limited is a dairy trucking operation which currently accesses Perth Line 86 from a private entrance located immediately west of the intersection. Following construction of the Haverkamp Avenue North extension, they will have direct access onto the new municipal roadway and will enter the highway via the upgraded intersection as well as maintaining their existing private access to Perth Line 86 located west of the intersection. The second trucking company, Mad Express Transportation Inc., currently enters the road corridor via a private driveway located immediately east of the intersection. This business will also access the highway via the proposed Haverkamp Avenue extension following completion of construction but will no longer have access to Main Street through the current laneway access.

A number of local municipal roadways access the Highway 23 corridor south of the intersection, including Elma Street West and Kincaid Street. A new Highway Commercial Plaza was recently developed near the southwest corner of the intersection, which includes a Tim Hortons restaurant and a 5 unit commercial plaza.

Figure 2.2 displays photos of the project study area.



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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
PROJECT STUDY AREA

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1:4,000	2.1

Figure 2.2: Study Area Photos

Highway 23 corridor looking north toward intersection with Perth Line 86 ▲

Intersection of Highway 23 & Perth Line 86 looking northwest ▲

2.2 Selected Design

a) Intersection of Perth Line 86 and Highway 23

The selected design consists of:

- Reconstruction of the intersection of Highway 23 and Perth Line 86 and installation of a roundabout at the intersection with a new municipal road entrance to the north (Haverkamp Avenue North);
- Construction of a north-bound left turn lane on Highway 23 at Kincaid St. with 15 m storage, 60 m parallel lane and 145 m taper length; and
- Construction of a south-bound left turn lane on Highway 23 at Kincaid St. with 30 m storage, 60 m parallel lane and 145 m taper length.
- Installation of sidewalks and revised entrances onto Highway 23 between Perth Line 86 and Kincaid Street.

Figure 2.3 displays the preferred design for the roundabout proposed for the intersection of Highway 23 and Perth Line 86. Figure 2.4 illustrates planned improvements for the Highway 23 corridor south of the intersection. The proposed upgrades will be implemented in 2015.

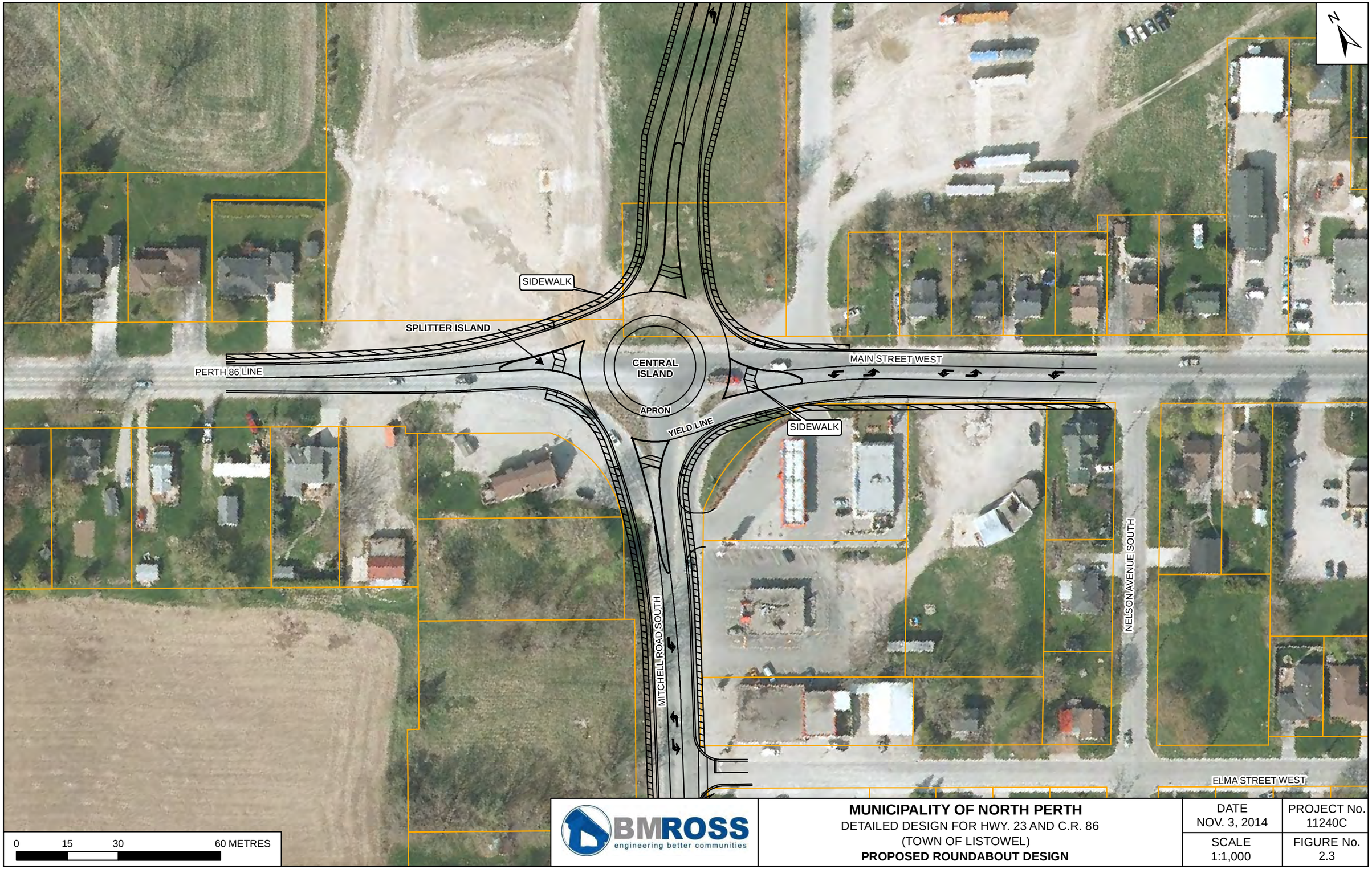
2.3 Related Studies

a) Traffic Studies

A number of individual traffic studies have been completed within or adjacent to the project study area which included recommendations being considered in conjunction with this Class EA. Two studies were completed by F.R. Berry and Associates for site-specific highway commercial activities proposed adjacent to the corridor. A third study was completed by Paradigm Transportation Solutions Ltd. which considered impacts associated directly with the planned upgrades.

b) MEA Class EA

A Municipal Class Environmental Assessment process was recently completed for planned municipal upgrades located adjacent to the study area. The MEA Class EA process was completed in conjunction with the MTO Class EA using an integrated EA approach. The initial agency and public consultation phases were combined as well as the completion of some on-site assessments (archaeological, traffic analysis). The MEA Class EA process concluded on May 23, 2014 following issuance of the Notice of Study Completion and completion of the mandatory 30 day review period.



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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
PROPOSED ROUNDABOUT DESIGN

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1:1,000	2.3

ELMA STREET WEST

NAPIER STREET WEST

SIDEWALK

SIDEWALK

HIGHWAY 23

DESIGNATED LEFT TURN LANE

KINCAID STREET

DESIGNATED LEFT TURN LANE

MITCHELL ROAD SOUTH

NELSON AVENUE SOUTH

0 20 40 80 METRES

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MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN FOR HWY. 23 AND C.R. 86

PROPOSED HIGHWAY NO. 23 UPGRADES

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1 : 1,500	2.4

3.0 EXISTING CONDITIONS

3.1 Natural Environment

A Natural Heritage Assessment of the project study area was undertaken by Natural Resource Solutions Inc. (NRSI) to assess the potential presence of sensitive or significant species or habitats within or immediately adjacent to the Highway 23 corridor. A copy of the final report is included within Appendix 'A'

a) Physiography

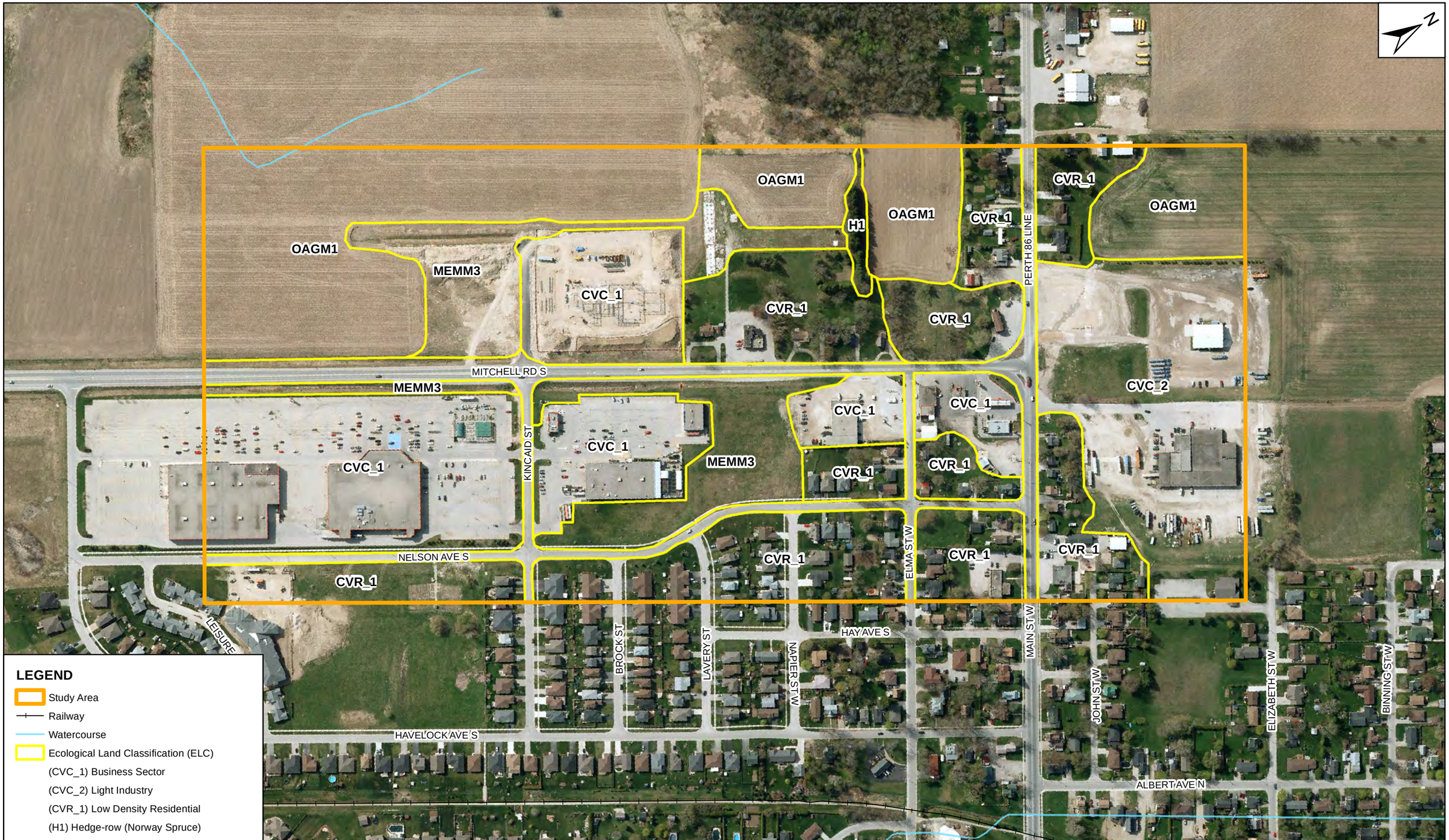
The community of Listowel is located just north of the boundary between two physiographic regions, these being the Dundalk and Stratford Till Plains. The soils which typify these regions are silt and clay loams and other medium-textured materials. The topography of the area changes from an area of relatively flat undulating plains in the southeast to one of rolling hills in the northwest. The Middle Maitland River transects the municipality from east to west providing additional breaks in the topography. Two municipal drains are located within the northern limits of the project study area, which provide drainage relief for low lying areas in the northwest. Portions of a closed municipal drain pass along the south portion of the study area, just north of Perth Line 86, eventually discharging further south into the Maitland River.

b) Fisheries and Aquatic Habitat

The Middle Maitland River, which is located south of the project study area, is part of the Maitland River watershed administered by the Maitland Valley Conservation Authority (MVCA). The main channel of the river passes through downtown Listowel then winds its way through the southeast portion of Listowel before continuing south into Huron County. There are few natural habitat features located within the study area limits other than those associated with the agricultural drains in the north part of the study area and two small woodlots also found in the north quadrant. There are no open watercourses located within the project study area however a branch of the Nichol Drain is located in the northwest portion of the study area. The drain branch is located north of Perth Line 86 and drains agricultural and highway commercial lands north and west of the intersection of Highway 23 and Perth Line 86.

c) Vegetation Communities

Mapping of vegetation communities located adjacent to the project study area was completed using aerial photography in conjunction with an on-site assessment. The ecological land classification system (Lee 2008) was used to characterize vegetation communities within 120 m of the intersection and road corridor. All of the communities that were mapped have been altered by human contact. The identified communities include MEMM3: Dry-Fresh Mixed Meadow Ecosite, H1: Hedge-row (Norway Spruce), CVR1: Low Density Residential, CVC1: Business Sector, CVC2: Light Industry, and OAGM1: Annual Row Crops. Figure 3.1 illustrates the locations of the various vegetation communities mapped using the ELC system. None of the mapped communities represents a sensitive environmental feature.


OAGM1
MEMM3
CVC_1
H1
CVR_1
CVC_2
PERTH 86 LINE
MITCHELL RD S
KINCAID ST
NELSON AVE S
ELMA ST W
HAY AVE S
LEISURE
BROCK ST
LAVERY ST
NAPIER ST W
MAIN ST W
JOHN ST W
ELIZABETH ST W
BINNING ST W
HAVELOCK AVE S
ALBERT AVE N
LEGEND
Study Area
Railway
Watercourse
Ecological Land Classification (ELC)
(CVC_1) Business Sector
(CVC_2) Light Industry
(CVR_1) Low Density Residential
(H1) Hedge-row (Norway Spruce)
(MEMM3) Dry-Fresh Mixed Meadow Ecosite
(OAGM1) Annual Row Crops
0
75
150
300 Metres
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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
ELC COMMUNITIES
DATE
NOV. 3, 2014
PROJECT No.
11240C
SCALE
1:3,500
FIGURE No.
3.1

d) Tree Inventory

A tree survey was completed of all trees located within the project study area. A total of 26 trees consisting of 9 different species were inventoried. Three trees will need to be removed to complete the proposed road improvements. None of these are considered to be significant.

e) Wildlife

The habitat present within the project study area has been significantly altered by human influences with essentially no natural habitat being present. The wildlife observed during site visits to the area in conjunction with the assessment revealed typical urban wildlife species such as eastern cottontail (Sylvilagus floridanus) and eastern gray squirrel (Sciurus carolinensis).

Fourteen bird species were observed during the August 8th and September 19th site visits. None have been identified as species of concern or species at risk. A total of 75 bird species could potentially be present within the project study area, based on a background review of various sources. Five of these are Species at Risk and three are Species of Conservation Concern. Based upon a review of available habitat within the study area, and anticipated impacts associated with the proposed road upgrades, none of these sensitive species would be impacted by the proposed project.

A number of other sensitive or threatened species were identified as potentially being present based upon background reviews. This list includes Common Snapping Turtle (Chelydra serpentine), Little Brown Bat (Myotis lucifugus) and Monarch Butterfly (Danaus plexippus). Of these, only the Monarch Butterfly had habitat present within the project study area which would be suitable for the species.

f) Recommendations

A number of site specific recommendations were made to address potential impacts to the habitat identified within the affected road corridor. These recommendations are as follows:

- Implementation of tree protection measures as per OPSS 801. It is also recommended that planting of new trees be incorporated into the proposed design in order to compensate for tree loss.

- Avoid tree and vegetation removal during the peak migratory bird nesting season (outside of April 1 to August 31). If trees or vegetation are to be removed during the peak season, a nest search should be conducted within 2 days of removal by a qualified professional to confirm the absence of nests.

- Erosion and sediment control measures should be incorporated during construction to prevent sediment from escaping and impacting natural features located off-site.

3.2 Socio-Economic Environment

a) Project Location

The project study area is located within the Municipality of North Perth abutting the west limit of the settlement boundary defining the community of Listowel. The Highway 23 corridor, south from the intersection of Perth Line 86, is controlled and managed by the MTO. Perth Line 86, west from the intersection of Highway 23, is controlled and managed by the County of Perth. Highway 23 and Perth Line 86 are combined east of the intersection and are known locally as Main Street. This section of roadway is controlled and managed by the Municipality of North Perth through a connecting link agreement with the MTO. Figure 3.2 illustrates the various jurisdictions in place over the affected sections of roadway within the project study area.

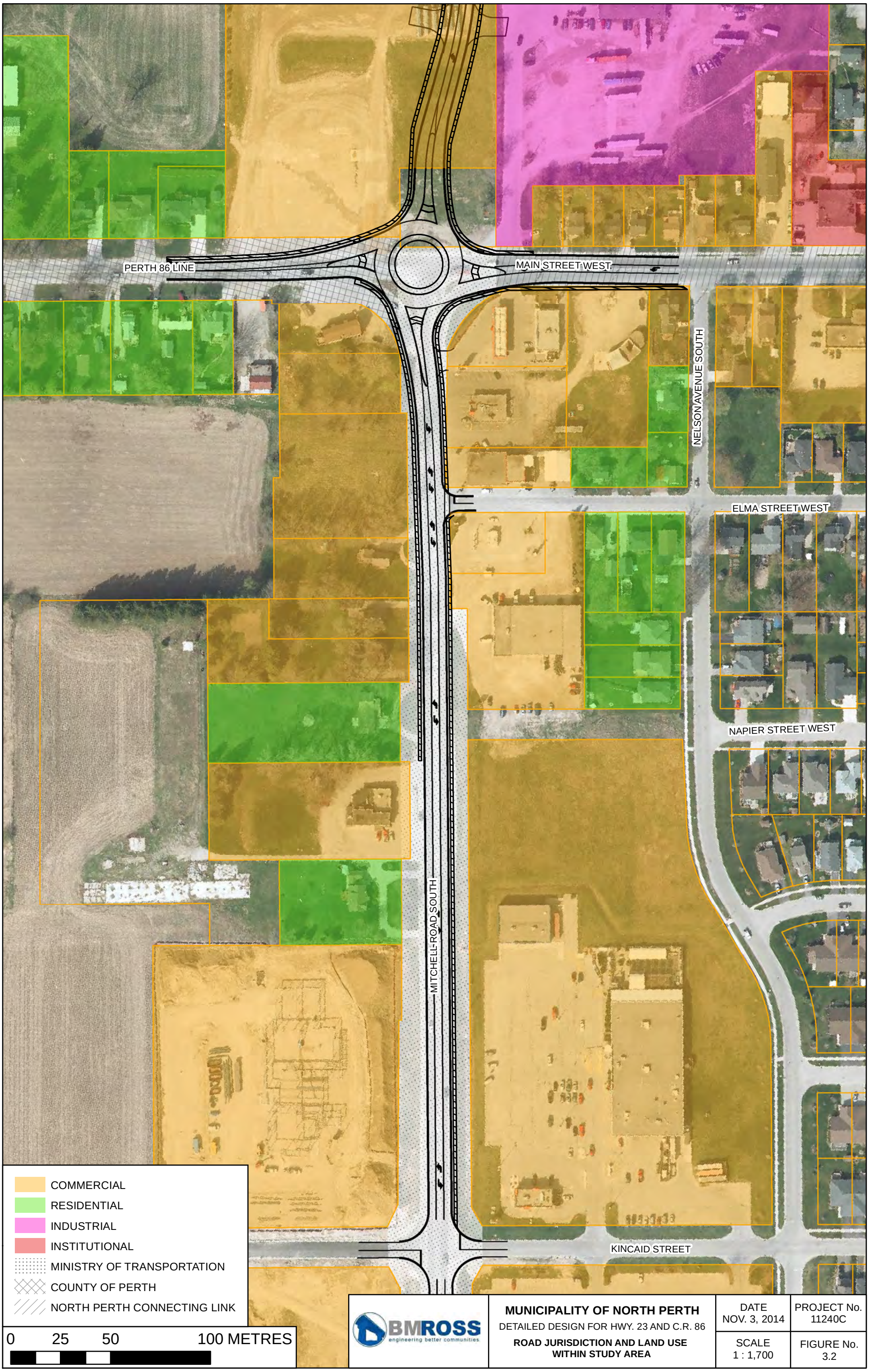
b) Adjacent Land Uses

Adjacent land uses along the Highway 23 corridor are primarily Highway Commercial uses with a few remnant rural residential and agricultural land uses remaining. The east side of the highway corridor, adjacent to Kincaid Street, contains large commercial plazas with typical big-box store activities including a Zehrs grocery store, a Canadian Tire Store, a Walmart and a Mark's Work Warehouse. The west side of the corridor at Kincaid was recently developed and contains a large commercial business.

Further north along the corridor are additional highway commercial developments such as a Tire Store, a Diary Queen, two gas stations, a restaurant and a Speedy Auto Glass. A new commercial plaza was recently developed adjacent to the southwest corner of the intersection. The plaza contains a Tim Hortons Restaurant, Subway, Pet Valu, a Credit Union and a fitness facility. The primary access to the plaza is located on Highway 23 approximately 100 metres south of the intersection. A secondary access to the plaza was also constructed off of Perth Line 86 approximately 85 metres west of the intersection.

Uses located adjacent to the Perth Line 86 corridor west of the intersection are primarily rural residential in nature, although a bus depot and an auto repair business are located along the north side of the corridor. Two trucking operations, one a dairy transport business and the second a general transport business, are located immediately north of the intersection. Both currently enter the intersection via private driveways located west and east of the intersection respectively. Following construction of the proposed roundabout, both will enter the intersection from the newly proposed municipal road extension, Haverkamp Avenue North, which is planned for construction in conjunction with the roundabout. The dairy trucking operation will also maintain its existing access to Perth Line 86 located west of the intersection. The Haverkamp Avenue extension was approved in conjunction with the MEA Class EA process. However the new road entrance into the intersection will be approved in conjunction with the MTO Class EA process.

A Petro Canada gas station and a Variety Store are located at the southeast and south west corners of the existing intersection. The variety store, in particular, currently maintains unrestricted street access to the property.



BMROSS engineering better communities

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN FOR HWY. 23 AND C.R. 86

ROAD JURISDICTION AND LAND USE WITHIN STUDY AREA

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1 : 1,700	3.2

East of the intersection along Main Street a majority of the properties fronting the corridor are designated for Highway Commercial uses, although many appear to be in residential uses at present. No significant impacts to these existing uses are anticipated as a result of the proposed upgrades. Upgrades planned for Highway 23 south of the intersection will not require an expansion of the existing right of way, therefore no significant impacts to abutting properties are anticipated.

The design of the proposed roundabout was shifted slightly to the northwest onto vacant lands currently abutting the intersection. This adjustment reduced the requirement for additional lands to the south, resulting in fewer impacts to existing developed properties abutting the intersection to the south. Lands to the north were already being purchased from an adjacent property owner to accommodate the proposed Haverkamp Avenue extension. Additional mitigation measures are being negotiated with the property owners to compensate for the land requirements associated with construction of the roundabout and planned road extension. Figure 3.2 illustrates existing land uses located adjacent to the study area.

c) Cultural Heritage Features

A stage 1 & 2 Archaeological Assessment was completed by Golder Associates in July 2012. The Stage 1 archaeological assessment determined that areas retaining archaeological integrity were present on the property and that a Stage 2 field assessment should be conducted. The stage 2 archaeological assessment did not result in the identification of any archaeological sites and no further assessment was recommended. A copy of the report is within Appendix 'B'.

d) Property Contamination

A review of potential sources of contamination adjacent to the project study area revealed several areas with the potential for soil or groundwater contamination based upon current or historic land uses. Existing land uses posing a low threat of contamination include the Petro Canada Gas Station located at the southeast corner of Highway 23 and Perth Line 86 and a Petro Line gas station located on the east side of Highway 23, immediately south of Elma Street. Although both sites are located immediately adjacent to the project study area, proposed road upgrades will be restricted to the limits of the highway right of way and will not encroach onto private property. Other than the installation of new sidewalks, which will require excavation of no more than 30 cm (12") in order to excavate native material, installation of a granular base and then concrete for the sidewalk, no additional encroachment or excavation is required.

Meulensteen Tire is located immediately south of the Petro Line site. The site is also deemed to be low risk as no encroachment outside of the existing right of way is proposed along this stretch of Highway 23 other than the installation of sidewalks as described above.

Two historic land use sites, which are located northwest of the intersection of Highway 23 and Perth Line 86, have been identified as a low to moderate level of risk due to historical activities and their proximity to the proposed roundabout construction.

The first site located at 905 Main Street West (Perth Line 86) is currently vacant but was previously the location of a machine & welding shop, restaurant, gas bar, and a body shop. The proposed roundabout will be constructed partly on this property. In 2010, a Phase 1 & 2 ESA was conducted for the site. Remediation activities to remove the metal debris and any impacted soils were completed in accordance with and to the applicable MOE Guidelines. The findings at this location did not require TSSA or MOE notification. Several monitoring wells remain on the property.

The second site which is located at 915 Main Street West (Perth Line 86) is currently the site of a milk transport company. The proposed roundabout will be constructed adjacent to the southeast boundary of this site. Between 2006 and 2011 this property underwent remediation activities to remove a garage building, 3 underground petroleum products storage tanks, a diesel pump island, and associated impacted soils located near the front of the property. Remediation activities were completed in accordance with and to the applicable MOE Guidelines as determined by subsoil and groundwater analysis, and were completed under TSSA and/or MOE oversight. Several monitoring wells remain on the property and there is a functioning septic system which will be decommissioned following connection to the Municipal sanitary collection system in conjunction with the project.

e) Highway and Construction Noise

The Highway 23 corridor contains few noise sensitive areas. However, several existing residential properties remain adjacent to the corridor and a number of commercial/industrial businesses have frontage on the highway. There are no residential subdivision developments or apartment buildings located within the project study area. The project work area is controlled by Municipal By-Laws which restrict or prohibit unnecessary noise, require that construction equipment be maintained, and limit the timeframe when construction activities can occur.

3.3 Transportation Study

a) Work Program

A Transportation Study was completed by Paradigm Transportation Solutions in conjunction with the Class Environmental Assessment process. The work program which was devised for the study consisted of four primary components which are summarized below. Figure 3.3 illustrates the location of traffic collection devices utilized in the traffic counting program.

- Traffic Counting Program
  - Data collected at 5 existing intersections for 7 days
  - 8 hour traffic volume counts and 8 hour turning movement counts
- Inventory of Existing Conditions
  - Inventory and analysis of walking, cycling and major roadway facilities
- Future Travel Demand Forecasts
  - A travel forecasting methodology to assist in forecasting future travel needs.

- Signal Warrant Analysis
  - Signal warrant analyses completed for intersections adjacent to the study area.

b) Traffic Forecast

A traffic volume forecast was compiled for the ten year (2022) horizon. The forecast utilized generalized traffic growth, traffic associated with a proposed development located adjacent to the southwest corner of Highway 23 and Perth Line 86 (Tim Hortons Plaza), and traffic volumes associated with future development lands located northwest of the intersection. Traffic growth rates were based on population growth rates for the Listowel settlement area outlined within the North Perth Master Growth Plan, completed in 2010. A memo, summarizing the results of the forecast, is included within Appendix 'C'.

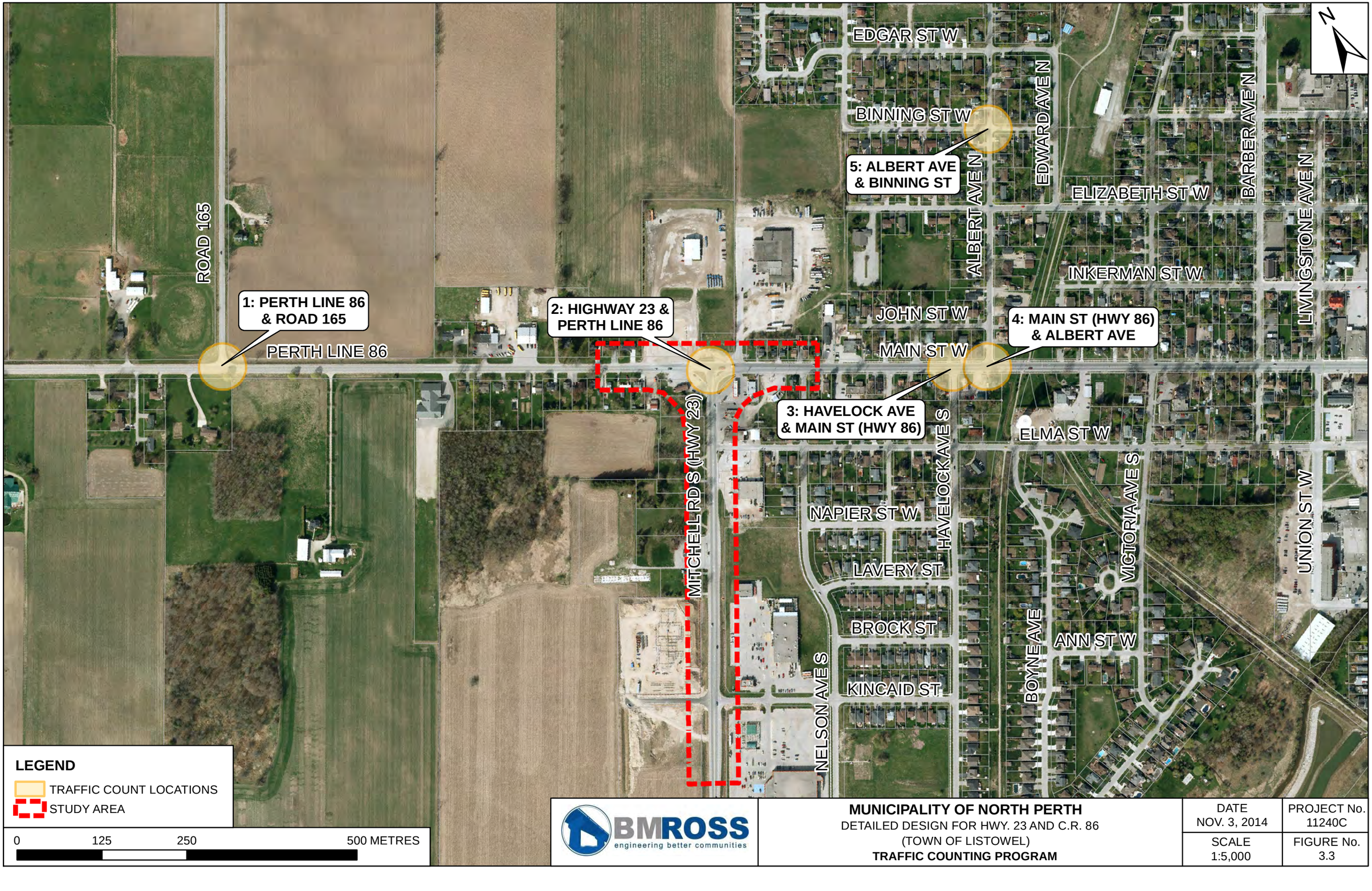
c) Conclusions

- All intersections within the study area generally operate well under current conditions, with the exception of west bound left turning movements on Kincaid Street at Mitchell Road S.
- A traffic control signal is not warranted at the intersection of Highway 23 and Perth Line 86 for forecasted 2022 traffic volumes.
- A single lane roundabout or traffic control signal would operate well at the intersection at the 2022 horizon. The roundabout would result in fewer delays.
- Traffic control signals are not warranted at the intersection of Albert Ave. and Highway 23 (Main Street West) or at the intersection of Kincaid Street and Mitchell Road S., at the 2022 horizon.

d) Recommendations

- That a westbound right turn lane be painted on Kincaid Street at Mitchell Road S. to allow westbound right turn traffic an opportunity to avoid delays.
- That the Municipality undertake the necessary steps to obtain land adjacent to the intersection of Highway 23 and Perth Line 86, to facilitate the future construction of a roundabout or signalized intersection.
- That the Municipality of North Perth monitor and assess, on a bi-annual basis, the traffic conditions at the intersection of Highway 23 and Perth Line 86.
- That the Binning Street and Haverkamp Avenue extension be designed to accommodate all modes of transportation including pedestrians and cyclists and that a comprehensive review of cycling and pedestrian networks be undertaken in the northwest portion of the Municipality;
- That traffic calming measures be incorporated into the design of the Binning Street and Haverkamp Avenue North extensions.

A copy of the Transportation Study is included within Appendix 'C'.



BMROSS engineering better communities

MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
TRAFFIC COUNTING PROGRAM

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1:5,000	3.3

3.4 Transportation Needs and Opportunities

a) General

As discussed, Listowel is bisected by Highway 23 and Perth Line 86. The two traffic corridors intersect near the west boundary of the community at the north limit of the project study area. During peak travel periods, traffic becomes congested in the vicinity of the intersection, with north bound traffic unable to turn left onto Perth Line 86. In order to address traffic congestion at the intersection, and to provide access to future development lands located northwest of the intersection, the Municipality of North Perth proposes to reconstruct the intersection and construct a new municipal road north from the intersection (Haverkamp Avenue North). A second municipal roadway (Binning Street West) is also being extended west to Road 165 to service the area.

The two proposed road extensions will provide direct road access to two existing businesses which currently enter the road network immediately adjacent to the existing intersection. The Municipality also proposes to improve traffic flow in the area by upgrading the existing intersection through the installation of either traffic signals within the intersection or construction of a roundabout.

b) Municipal Servicing

Municipal water and sanitary services currently terminate in the vicinity of the Highway No. 23 intersection with Perth Line 86. Residential properties fronting on Perth Line 86 west of the intersection are serviced by private well supplies and septic systems. The Municipality is planning to extend municipal water and sanitary servicing through the intersection in conjunction with this project to service these properties.

c) Highway 23 Letter of Undertaking

In July 2009, the Municipality of North Perth entered into a Letter of Undertaking with the Ministry of Transportation for upgrades to Provincial Highway No. 23 in the vicinity of Kincaid Street. The letter of undertaking set out upgrades needed to the highway to address potential traffic concerns associated with the extension of Kincaid Street west of the highway corridor and the development of an office building on Part of Lot 30, Concession 1. These proposed upgrades are being reviewed in conjunction with the current MTO Class EA process. A copy of the Letter of Undertaking is included within Appendix ‘D’.

4.0 CONSULTATION PROGRAM

4.1 General

Public consultation is an integral component of the Class EA process. Public consultation allows for an exchange of information, which assists the proponent in making informed decisions during the evaluation of alternative solutions. During Phases 1 and 2 of the study process, consultation was undertaken to obtain input from the general public, stakeholders and review agencies that might have an interest in the project.

The components of the public consultation program employed during the initial Class EA study are summarized in this section of the Screening Report and documented in Appendix 'E'. Comments received from the program and related correspondence are also discussed below and documented in the appendix.

4.2 Initial Public Notice

Contents:	Combined MEA Class EA and MTO Class EA Notice including a general study description, summary of proposed works, key plan.
Issued:	March 7, 2012
Placed In:	Listowel Banner (March 7, 2012 & March 14, 2012)
Direct Mailed To:	111 Affected Property Owners

Comments received as a result of the initial round of public consultation are summarized within Table 4.1.

Table 4.1
Summary of Public Comments: Initial Consultation Phase

Individual	Comments/Concerns	Action Taken/Future Action
Resident of Listowel March 14, 2012 (via phone)	- Lives on Perth Line 86 west of the intersection. - Wondered if the temporary access to Tim Hortons would become a permanent access. - Said that traffic issues at the intersection have been a problem for a long time. Friday afternoons and long weekends are the worst. - There is a lot of traffic heading to the lakeshore area from Kitchener/Waterloo.	- Forwarded his comments to the project engineer. - Indicated that I was unaware of the status of the Tim Hortons access.
Resident of Listowel March 17, 2012 (via email)	- Wanted to be added to mailing list for project. - Is particularly interested in the proposed servicing extensions along Perth Line 86	- Added their name to the mailing list.
Resident of Listowel March 20, 2012 (via email)	- Resident affected by the proposed project. - Want to be advised of any updates in regards to the project as it moves forward.	- Advised that notices and updates would be mailed. - More information would be available at public meeting.

Individual	Comments/Concerns	Action Taken/Future Action
Sprinrite March 20, 2012 (via email)	- Wanted to be added to mailing list for project. - Their drivers use the affected route on a daily basis and want to be kept informed on the project to keep their drivers up to date.	- Added contact information to the mailing list.
Listowel Canadian Tire March 20, 2012 (via email)	- Concerned with potential impacts to their property from the proposed road and servicing upgrades. - Want to be kept informed of any decisions regarding the project as it moves forward.	- Added name to the mailing list
Resident of Listowel March 23, 2012 (via phone)	- Lives 2 km west of Listowel next to Farrish Construction - Wondered if the Municipality would need a place to dump fill during construction.	- Said project had just begun and was unsure whether a disposal site was needed. - Advised project manager.
Listowel Business Owner March 27, 2012 (via phone)	- Part owner of Dairy Transport Co. - Interested in the timing of the Mitchell Ave. extension and completion of Traffic Study. - Noted that buildings had been removed near the front of their property in 2008-09. - Asked about timing for completion of EA. - Noted that they had their own traffic consultant retained who would review information pertaining to their property.	- Explained Class EA process and associated timelines. - Forwarded comments to the Municipality and Project Manager.
Resident of Listowel April 2, 2012 (via phone)	- Asked if there would be a public meeting held for this project. - Asked if a roundabout was being considered as one of the road improvement alternatives.	- Explained that two public meetings would be held for the project. - Advised that A roundabout would be considered.
Resident April 14, 2012 (via email)	- Asked to be added to the mailing list. - Indicated that contact via email was ok.	- Contact information added to the mailing list.
Local Business Owner May 22, 2012 (via email)	- Part owner of business located on Highway 23 south of the intersection. - Has an interest in the project. Owns vacant parcel fronting on the Highway with no current access and would like to eventually develop the property. - Need access to the Hwy. to accomplish this.	- Explained Class EA process and associated timelines. - Forwarded comments to the Municipality and Project Manager.
Listowel Business Owner May 24, 2012 (via phone)	- Owner of business located on Highway 23 south of the intersection. - Want to purchase property located south of their business but have no access to Highway 23 from this property. - Has discussed access issues with David Secord from MTO and he had indicated that access is not available. - Wondered if it would be possible to extend the connecting link section. - Please add to the mailing list for the project.	- Discussed comments with the project manager. - Ensured that his business was included in the Class EA mailing list.

4.3 Review Agency Circulation

Contents: Background information, location plan, site photos
Circulated: March 15, 2012
Distributed To: 12 review agencies
Input Period: Concluded April 17, 2012

Table 4.2
Summary of Agency Comments

Review Agency	Comments	Action Taken
County of Perth County Engineer Feb 23, 2012 (via phone)	- Called County Engineer to advise him of the Project. - He indicated that he was aware of the project - Explained that BMROSS was completing the MEA and MTO Class EA processes - He said that he didn't need to be directly involved as the intersection was controlled by MTO – didn't need to review draft Notice before finalizing for publication - I indicated that I would keep him informed of progress associated with the EA.	- Sent a copy of the Notice of Study Initiation
County of Perth Engineer March 22, 2012 (via phone)	- Had received a copy of the Notice of Study Initiation. - Questioned whether the MEA Class EA component was a Schedule B or C. - He asked if a roundabout would be considered as part of the assessment of alternatives component of the Class EA.	- Indicated we would need to confirm the Class EA Schedule for road extensions. - I noted that the alternatives being considered had yet to be selected.
Huron Perth Catholic District School Board March 27, 2012 (via mail)	- Indicated that they had no concerns regarding the proposed road improvements.	- Information noted and filed.
Allan Rothwell Perth County Planner August 1, 2012	- Had reviewed population growth memo prepared by Paradigm in conjunction with traffic study. - Discussed the North Perth Growth Plan and historic growth in Listowel. - Was concerned that historic growth rate of 1.38%, used in memo, may be a bit high for current conditions in the Municipality.	- Discussed with project manager. - Forwarded information to traffic consultants for consideration.

4.4 First Nations Consultation

As directed by the MOE in their correspondence dated December 5, 2006, a number of federal and provincial agencies were contacted at the start of the Class EA process to determine if there was an Aboriginal interest in the project study area. A response was received from one branch of Indian and Northern Affairs Canada (INAC) recommending that several First Nations communities located in the vicinity of the project study area, be circulated additional project information. As a result, project details were forwarded to the following Aboriginal Communities:

- Chippewas of the Saugeen First Nation
- Chippewas of Nawash Unceded First Nation
- Grey Bruce Peninsula Métis Council
- Métis Nation of Ontario
- Historic Saugeen Métis
- Six Nations of the Grand First Nation
- Haudenosaunee Confederacy

Responses were received from two Aboriginal Communities, the Saugeen Ojibway Nation (SON) and the Historic Saugeen Métis. Table 4.3 summarizes the results of this consultation. Copies of all correspondence received or sent is included within Appendix 'F'.

Table 4.3
Summary of First Nations Comments

Review Agency	Comments	Action Taken
Saugeen Ojibway Nation (SON) May 14, 2012 (via phone)	- Had received a copy of the Notice and would be interested in received a copy of the archaeological report when it was completed.	- Forwarded a copy of the Stage 1 & 2 Report on July 13, 2012
Ministry of Aboriginal Affairs June 11, 2012 (via mail)	- Received Notice of Study Initiation. - Advised that the Six Nations of the Grand River and the Haudenosaunee Confederacy should be circulated project information. - Advised of contact information for Aboriginal Affairs and Northern Development (AANDC).	- Forwarded project information to the additional First Nations contacts.
Historic Saugeen Métis July 11, 2012 (via email)	- Advised that they have an interest in the project and would like to receive any information associated with archaeology or potential environmental impacts.	- Information noted and filed.
Historic Saugeen Métis November 20, 2012	- Received correspondence regarding the public meeting. - Interested in receiving copies of display material associated with the PIC	- Forwarded Stage 1 & 2 Arch Report and presentation material from the PIC.
Saugeen Ojibway Nation Jan 4, 2013	- Called regarding a number of projects from our firm that he is reviewing. - No specific concerns with the Listowel project.	- Comments noted and filed.

4.5 November 15, 2012 Public Information Centre

A public information centre was held to advise the public of project details and to provide alternatives associated with the proposed road extensions and intersection upgrades for review and comment. The meeting was held November 15, 2012 at the Municipal Administration Centre located in Listowel. A number of display boards were arranged around the room explaining the MEA Class EA and MTO Class EA processes. Boards also displayed the proposed alignment of the two road extensions as well as possible road profiles. A rendition of a signalized intersection as well as a roundabout, were also presented for planned upgrades at the Perth Line 86 and Highway 23 intersection.

The general purpose of the meeting was to provide audience members with the following:

- A summary of the MEA Class EA process.
- A summary of the MTO Class EA process.
- A description of the road and intersection alternatives being considered by the Technical Steering Committee and Municipality, as well as other servicing upgrades being considered;
- A brief summary of future actions needed to complete the process.

Approximately 40 residents and stakeholders attended the meeting. Notes can be found in Appendix 'E' along with a copy of the presentation material. Tables 4.4 and 4.5 present a summary of comments received as a result of the public meeting and additional agency consultation undertaken as part of the Class EA process.

Table 4.4
Summary of Public Comments:
First Public Information Centre

Agency/Individual	Comments/ Concerns	Response/Action Taken
Canadian Tire Representative November 8, 2012 (via phone)	- Received meeting notice and wanted to know status of the project. - Provided an update and asked if there were specific concerns related to their store. - Advised that traffic congestion at Kincaid is the biggest concern. Thought a traffic signal at Kincaid would be a good idea.	- Comments noted and filed.
Listowel Resident Nov. 15, 2012 (Comment Sheet)	- Very much in favour of a roundabout at intersection of Highway 23 & Perth Line 86. - If facilities for pedestrians are also addressed, a roundabout would move traffic in all directions with maximum efficiency.	- Comments noted and filed.

Agency/Individual	Comments/ Concerns	Response/Action Taken
Local Business Owner November 17, 2012	- Owns business and property on the east side of Highway 23 south of the intersection. - Owns vacant lot fronting on Highway 23 with no highway access. - Would like to develop property and would need highway access.	- Comments noted and filed.
Local Business Owner December 21, 2012 (via mail)	- Requested additional details on anticipated traffic volumes of proposed Mitchell Road extension. - Can't understand how the traffic study found that signals not warranted at intersection of Highway 23 & Perth Line 86 given history of problems. - Had additional questions about the methodology and results of the traffic study. - Concerned with the proposed roundabout option and impacts on their property and truck traffic. - Wanted information on new entrances to the Mitchell Road extension – how they will be designed. - Recommended that a separate bike lane be constructed in conjunction with the proposed road extensions.	- Comments forwarded to traffic consult for a response to specific questions related to the traffic study. - Meeting arranged to discuss comments.
Local Business Owner March 7, 2013 (via phone)	- Asked for information on the location of existing roundabouts in the area so that they could review their operation. - Provided details on roundabout located near Woodstock which would be of a similar size to that proposed for Listowel, except that it is in a rural setting rather than an urban area. - Explained that they would have an opportunity to review the final design of the roundabout if that is selected as the preliminary preferred alternative by Council. - Discussed timing of next public information meeting. - Advised that we will need MTO approval before moving forward with the preferred alternative because the intersection is their jurisdiction.	- Comments noted and filed.
Local Business Owner March 18, 2013 (via mail)	- Is opposed to the construction of a roundabout at the intersection. - Concerned that a roundabout will have a negative impact on the community since the corner serves as a hub for industry and a gateway for weekend destinations. - Traffic volumes have increased with recent commercial developments and will increase more with school and arena construction anticipated in the future. - Concerned about truck manoeuvrability and wear and tear on truck tires from using apron on the roundabout. - Wants to be involved in ongoing discussions before a final decision is made.	- Forwarded comments to Transportation consultant for a formal response to transportation related concerns.

Agency/Individual	Comments/ Concerns	Response/Action Taken
Listowel Resident May 15, 2013 (via phone)	- Wanted additional details on the proposed roundabout design. - Was considering the purchase of a business abutting the intersection. - Wondered about access to properties following construction of roundabout.	- Said 2nd public meeting was planned. Additional details on the roundabout design would be presented at the meeting.

4.6 Review Agency Circulation – First Public Information Centre

Contents: Update on study progress, advised of upcoming PIC
Circulated: November 2, 2012
Distributed To: 12 review agencies/organizations
Input Period: Concluded December 21, 2012

Comments received as a result of the initial mail out are summarized in Table 4.5.

Table 4.5
Summary of Agency Comments:
First Public Information Centre

Review Agency	Comments/ Concerns	Action Taken/ Future Action
Allan Rothwell Perth County Planner November 2, 2012	- Responded to my email requesting information on North Perth Accessibility and Streetscaping Standards. - Advised that only standards were for the downtown area not residential areas like Binning and Mitchell Road North. - Lots of residential land supply in Listowel, it will be many years before an expansion is needed. - Intersection of Highway 23 and Perth Line 86 is a known problem. Thinks traffic count could be low because people avoid the intersection and go around it.	- Information noted and filed.
Ministry of Tourism, Culture and Sport November 13, 2012 (via mail)	- Confirmed receipt of the Stage 1 & 2 Archaeological Report submitted by Golder Associates for the project.	- Information noted and filed.

Review Agency	Comments/ Concerns	Action Taken/ Future Action
MVCA December 21, 2012 (via mail)	- Have completed a preliminary review of the proposed road extensions and highway upgrades. - The lands are not located within an area regulated by the MVCA. - However they would like to review stormwater management details associated with the project.	- Comments noted and filed. - Stormwater management report will be forwarded upon completion.
Bob Aggerholm MOE January 14, 2013 (via email)	- Had received the November 2, 2012 correspondence. - Would like to review both the MEA Class EA and MTO Class EA reports when completed. - Wants to ensure that the Planning Act approvals associated with the undertaken are well documented.	- Comments noted and filed.
Chris Dixon MTO February 11, 2013	- Advised that they have not yet reviewed the draft transportation study completed by Paradigm Traffic Consultants. - Indicated that MTO encourages the investigation of the appropriateness of a roundabout wherever a traffic signal is warranted. - Roundabouts should always be the first choice because of safety, fuel saving and pollution reduction benefits.	- Information forwarded to project manager
MVCA July 4, 2013 (via email)	- Confirmed that MVCA has an interest in the stormwater management component of the project because the facilities will discharge to drains regulated by the CA.	- Confirmed that reports will be forwarded for review upon completion.
Chris Dixon MTO April 2, 2013	- Provided comments on the draft Transportation Study completed by Paradigm. - Provided specific comments on certain aspects of the study including traffic recommendations.	- Comments forwarded to Paradigm for incorporation.

4.7 Stakeholder Meetings

During the initial round of public consultation undertaken in conjunction with the Class EA process, a number of local stakeholders were identified as having very specific concerns related to the proposed intersection improvements. Business owners abutting the intersection and planned road upgrades will be impacted by the proposed changes. Accordingly, prior to the second public information centre, which was scheduled for June 4, 2013, staff met individually with the business owners to discuss the proposed intersection and road upgrades.

The meetings included a review of the proposed roundabout design as well as proposed Highway 23 upgrades, a description of the proposed construction methods and timeframe, preliminary design of the proposed access points for the intersection and a description of proposed mitigation measures. A summary of the feedback which resulted from these meetings is included within Table 4.6.

Table 4.6
Summary of Stakeholder Meetings

Stakeholder	Comments/ Concerns
Local Business Owner May 30, 2013 via Stakeholder Meeting	- Reviewed preliminary design of roundabout and Mitchell Road extension adjacent to their business. - Questioned whether the curve of Mitchell Road, where it exits the roundabout, can be shifted to the east. - Asked where an additional entrance could be constructed off of Mitchell Ave. accessing the property south of their business fronting on Perth Line 86. - Questioned whether a separate truck entrance could be provide off of Perth Line 86. - Reviewed curb and sidewalk detail along Perth Line 86 frontage. Current unrestricted access is a concern, as trucks park there and walk to Tim Hortons or the Variety Store and limit accessibility for their trucks. They want this option removed when intersection is reconstructed. - Asked whether there would be a driver education program implemented in conjunction with the roundabout construction. - Indicated that an education program would be implemented. - Asked if trucks would always need to drive on the apron to negotiate the roundabout. - Indicated that it was dependent on speed and length of truck. It would be possible to avoid the apron if using a reduced speed.
Local Business Owner May 30, 2013 via Stakeholder Meeting	- Concerned with pedestrian traffic through the roundabout. - Discussed an education campaign for residents which would be implemented in conjunction with construction of a roundabout at the intersection. - Reviewed access to the property following construction of the roundabout. Currently access is unrestricted but will still have an entrance and exit following construction. - Municipality would provide a hard copy drawing showing access to property, once the design is finalized. - Asked why roundabout had been selected by Municipality over traffic signals. - Explained that it was the least expensive option, required fewer land purchases from properties adjacent to intersection because road widening were not required, and could be implemented immediately rather than having to wait for signal warrants which could be 8-10 years.
Local Business Owner May 30, 2013 via Stakeholder Meeting	- Owns business and property on the east side of Highway 23 south of the intersection. - Indicated that sidewalks would be extended beyond their property in conjunction with the planned Highway 23 improvements, providing that MTO approved of this improvement.

Stakeholder	Comments/ Concerns
	- They are interested in one shared access to their property as well as lands located immediately south of their business that currently has no access to Highway 23. - Discussed history of access to Highway for their property. MTO has indicated that no access will be permitted for the adjacent property. - Discussed option of providing a dedicated shared access in exchange for limiting the current unrestricted access to their business off of the Highway.
Local Business Owner May 30, 2013 via Stakeholder Meeting	- Owns business and property on the east side of Highway 23 south of the intersection. - Indicated that no road widening would be needed in front of their business with the roundabout option preferred by the Municipality. - Prefers the roundabout option. - Also own land fronting on Main Street east of the gas station. - No major concerns with the proposed improvements.
Local Business Owner June 3, 2013 via Stakeholder Meeting	- Reviewed design of road extensions and access onto extension. - Asked for details on the design of the roundabout. - Questioned what would happen to land isolated from adjacent property when road extension is constructed – they might be interested in purchasing. - Discussed possibility of obtaining land needed for Binning Street extension. - Discussed possibility of developing commercial uses along Main Street east of the roundabout. - Agreed to proceed with a legal survey of the Binning extension to facilitate land exchange. - Generally fine with the proposed extensions and planned roundabout designs.

4.8 Council Updates

During the course of the Class EA process, Municipal Council was regularly updated on the status of study investigations by Municipal Staff and the project engineers. Council input was sought on several occasions prior to the selection of a preliminary preferred alternative for the design of the proposed road extensions and upgrades planned for the intersection of Highway 23 and Perth Line 86. The results of the traffic study were also presented to Council prior to being submitted to the Ministry of Transportation for formal review and comment. A copy of Municipal Council presentation material is included within Appendix ‘E’.

4.9 June 4, 2013 Public Information Centre

The second public information centre was held to update members of the general public on the status of study investigations and to provide details on the preliminary preferred alternative selected by the Municipality. The meeting was held on June 4, 2013 at the Municipal Administration Centre located in Listowel. A number of display boards were arranged around the room explaining the MEA Class EA and MTO Class EA processes. A scale model of a roundabout was provided with scale model toy trucks and cars so that residents could visualize how the operation of the roundabout would occur. An image of the roundabout model is presented below.

Approximately 45 residents and stakeholders attended the meeting. Notes can be found in Appendix 'E' along with a copy of the presentation material. Table 4.7 presents a summary of comments received as a result of the public meeting and additional agency consultation undertaken as part of the Class EA process.

Table 4.7
Summary of Public Comments:
Second Public Information Centre

Agency/Individual	Comments/ Concerns	Response/Action Taken
Listowel Resident June 4, 2013 (Comment Sheet)	- Questioned where detours would be located during road reconstruction. - Concerned that use of Elma Street as a detour will negatively impact road that is already in poor condition. - Roads should be fixed before use as a detour.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Interested in the extension of water and sewage west on Perth Line 86 with the option of choosing one or both services. - Concerned with speeding traffic entering the community from the west. Think speeds should be lowered more.	- Comments noted and filed. - Response forwarded.
Local Business Owner June 4, 2013 (Comment Sheet)	- Is not in favour of a roundabout at the intersection. - Thinks a stop sign controlled intersection for traffic going north and south or a 4 way stop sign controlled intersection would be sufficient.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- A single lane traffic circle is prohibitive and regressive to growth in Listowel. - Listowel is a designated truck route for all material going from Quebec and Ontario to U.S. - Material made in Windsor or Sarnia going to Fort McMurray goes through Listowel.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Would prefer that traffic signals be constructed at the intersection. - Is interested in sewage and water but doesn't believe that the Municipality will spend money beyond Highway 23. - Street sweeper stops currently at town limit.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Please put large visible speed limit signs – more than are currently in place. - Also need a sign banning the use of engine brakes for trucks.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Uses the intersection a few times each week. - Likes the idea of a single lane roundabout.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Heavily opposed to a roundabout. - Believe traffic lights would be better.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Please construct the roundabout sooner rather than later. - Other measures could be used as traffic calming measures besides 4 way stops.	- Comments noted and filed. - Response forwarded.

Agency/Individual	Comments/ Concerns	Response/Action Taken
Listowel Resident June 4, 2013 (Comment Sheet)	- Pleased with the roundabout being selected as the preferred option. - Have viewed traffic flow from their home for many years and believe that signal lights would be a bad decision.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Very happy with the decision to go with a roundabout. - It will help the intersection and traffic control greatly. - Traffic lights will create a greater back-up of north-bound traffic than currently occurs.	- Comments noted and filed. - Response forwarded.
Listowel Resident June 4, 2013 (Comment Sheet)	- Speed limit signs located south on Highway 23 should be changed to 50 km/hr until vehicles are beyond Kincaid Street.	- Comments noted and filed. - Response forwarded.
Huron Perth Catholic District School Board June 12, 2013 (via fax)	- Indicated that they had no concerns regarding the proposed road improvements.	- Information noted and filed.
Canadian Tire Representative June 13, 2013 (via phone)	- Asked for an update on the status of the project. - Was interested in any changes which may affect the Canadian Tire property.	- Sent a map showing location of planned upgrades.
Listowel Resident June 17, 2013 (Comment Sheet)	- Interested in any future changes to Elizabeth Street West or the installation of new sidewalks in the area. - Would prefer to see traffic signals at the intersection and will avoid driving through the intersection if a roundabout is constructed. - Believes that others will also try to avoid a roundabout increasing traffic on side streets.	- Comments noted and filed. - Response forwarded.
Listowel Business July 10, 2013 (via mail)	- Own and operate a commercial/retail operation near the intersection. - The proposed construction of a roundabout at the intersection would have a material adverse effect on undeveloped commercial/retail businesses in the area. - Strongly object to the proposed project. - The intersection would be better served by installation of traffic signals. A roundabout encourages flow through traffic, which is better for residential areas. - Believes that council should reconsider its position.	- Comments noted and filed. - Response forwarded.
Listowel Business July 10, 2013 (via mail)	- Generally support council's preferred option to construct a roundabout, provided that their concerns regarding access to their property and design details are addressed during final design.	- Comments noted and filed. - Response forwarded.

Agency/Individual	Comments/ Concerns	Response/Action Taken
	- Roundabout needs to be designed to accommodate large volumes of truck traffic. - Mitchell Road extension should be aligned as far east as possible to minimize encroachment on their property. - Want to maintain their access lane to Perth Line 86. - Still reviewing access points to Mitchell Road. - If roundabout is not possible, a signalized intersection would be suitable, but not a four way intersection with stop sign controls. - Agree with bike path on Binning St. and would like a separate bike path, if proposed, on Mitchell Road. - Will submit more feedback once confirmed that a roundabout is acceptable to the MTO.	

4.10 Consultation Summary

The public consultation program developed for this project was directed toward property owners located in the immediate vicinity of the intersection and proposed highway upgrades, residents of the community of Listowel, federal/provincial review agencies and First Nations communities.

Two public information centres (PICs), and a series of individual stakeholder meetings, were arranged to allow the general public and project stakeholders with multiple opportunities to provide input into the Class EA process. The feedback received from residents was primarily focused on the operation of the roundabout and the ability of truck traffic and local residents to negotiate the roundabout in a safe manner. Agency consultation entailed the standard feedback received from federal and provincial review agencies.

5.0 PRELIMINARY DESIGN ALTERNATIVES

5.1 General

A number of preliminary design alternatives were identified for the intersection and the affected section of Highway No. 23. This section of the report summarizes the process used to identify and evaluate the design alternatives for the planned intersection and road improvements. The planning alternatives identified in conjunction with this EA are as follows:

a) Alternatives for Intersection of Highway 23 & Perth Line 86

Alternative 1 – Do Nothing
This means that the proposed intersection and road improvements would not occur. The "Do Nothing" alternative means that no changes or improvements would be made to resolve the identified problems. During the Class EA planning and design process, the "Do Nothing" alternative may be implemented at any time prior to the commencement of construction. A decision to "Do Nothing" would typically be made when the costs of all other alternatives, both financial and environmental, significantly outweigh the benefits.

Alternative 2 – Signalized Intersection
Alternative would involve the following design components:

- Installation of traffic control signals at the intersection
- Construction of a new municipal road entrance at the north leg of the intersection.
- Installation of dedicated left turn lanes at all arms of the intersection
- Road widening to accommodate planned intersection improvements

Alternative 3 – Roundabout
This alternative would include the following design components:

- Replacement of the current intersection configuration with a roundabout.
- Realignment of the approaches to the roundabout.
- Construction of a new municipal road entrance at the north leg of the roundabout.
- Horizontal alignment improvements at the intersection to reduce property requirements.

Alternatives 2 & 3 are illustrated on Figures 5.1 and 5.2.

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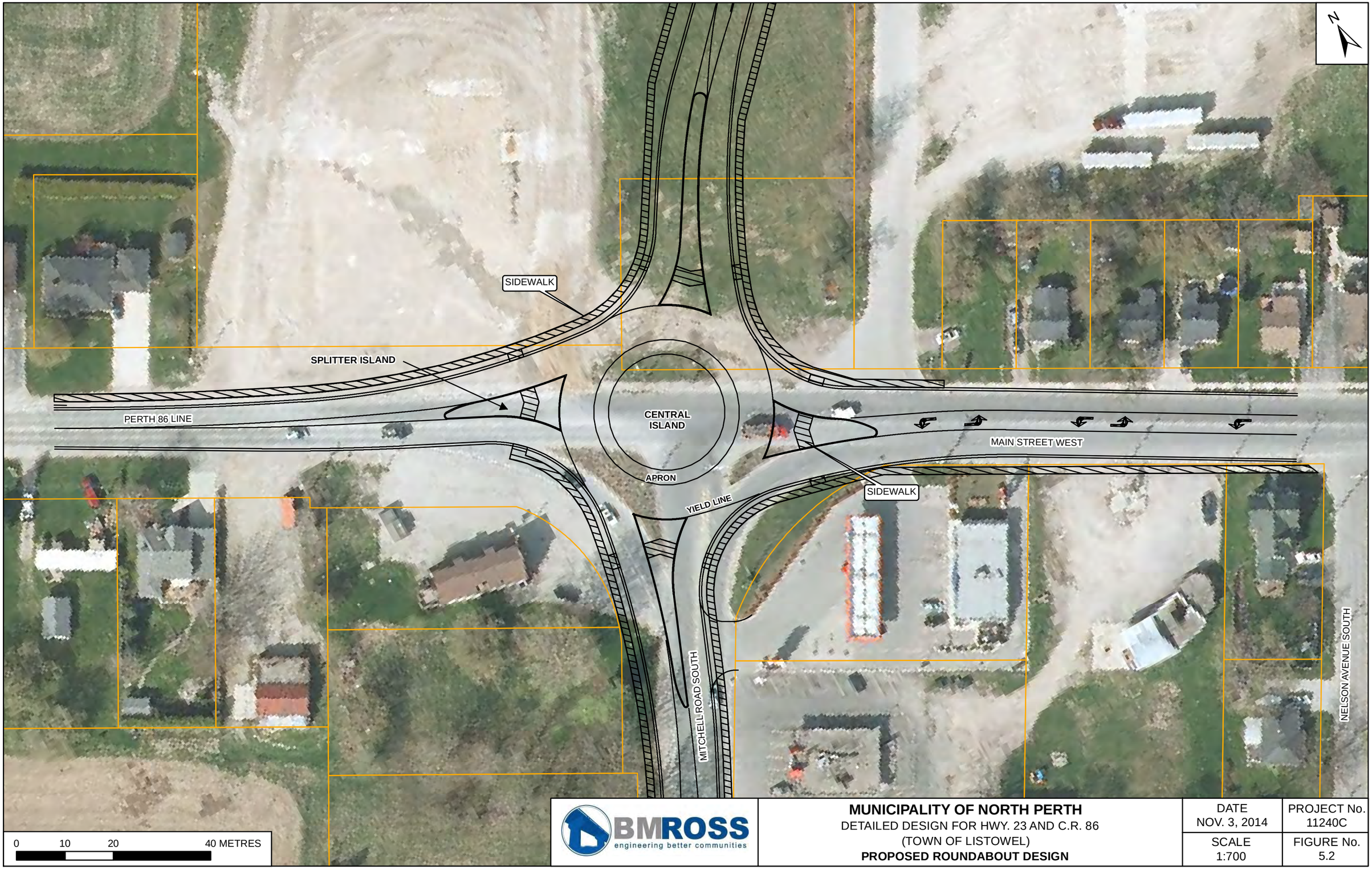
MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
SIGNALIZED INTERSECTION

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1:500	5.1



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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
PROPOSED ROUNDABOUT DESIGN

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE	FIGURE No.
1:700	5.2

b) Alternatives for Highway 23 Upgrades

Alternative 1 – Do Nothing
This means that the proposed road improvements would not occur. The "Do Nothing" alternative means that no changes or improvements would be made to resolve the identified problems. During the Class EA planning and design process, the "Do Nothing" alternative may be implemented at any time prior to the commencement of construction.

Alternative 2 – Implement Road Improvements
Alternative would involve the following design components:

- Installation of dedicated left turn lanes travelling north and south at Kincaid Street
- Installation of concrete sidewalks on the east side of the road corridor between Elma Street and Kincaid Street and on the west side of the corridor between the intersection and approximately 40 metres south of Elma Street.
- Additional access modifications.
- Minor road widening to accommodate planned road improvements.

Alternative 2 is illustrated on Figure 5.3

5.2 Preliminary Review of Alternatives

a) Summary of Required Works for Intersection Improvements

A preliminary engineering analysis was conducted to determine the works required to implement each of the identified alternatives. Table 5.1 summarizes the findings of this assessment.

Table 5.1
Primary Components of the Identified Alternatives

Alternative	Required Works
Alternative 1 (Do Nothing)	- No additional works proposed.
Alternative 2 (Signalized Intersection)	- Obtain land from adjacent property owners for planned road widening and municipal road extension. - Strip asphalt from intersection and from adjacent properties needed for road widening. - Remove existing barrier islands and utilities. - Install new watermain, storm sewers and sanitary sewers through intersection and along C.R. 86 to the west. - Construct new entrance to the north for new municipal roadway. - Construct dedicated left turn lanes at all legs of the intersection. - Install new illumination, traffic control signals, and hydro services. - Install sidewalks adjacent to intersection and new curb and gutter along limits of road allowance. - Place traffic islands between traffic lanes.

Alternative	Required Works
Alternative 3 (Roundabout)	- Obtain land from adjacent property owner for roundabout construction and municipal road extension. - Strip asphalt from intersection and from adjacent property to the north needed for roundabout construction. - Remove existing islands. - Relocate utilities. - Install new watermain, storm sewers and sanitary sewers through intersection and along C.R. 86 to the west. - Install new illumination and hydro service. - Construct roundabout. - Install sidewalks adjacent to intersection and construct new curb and gutter along new limits of road allowance.

b) Summary of Required Works for Highway No. 23 Improvements

A preliminary engineering analysis was conducted to determine the works required to implement each of the identified alternatives. Table 5.2 summarizes the findings of this assessment.

Table 5.2
Primary Components of the Identified Alternatives

Alternative	Required Works
Alternative 1 (Do Nothing)	- No additional works proposed.
Alternative 2 (Highway No. 23 Upgrades)	- Obtain land, if required, from adjacent property owners for placement of sidewalks along road allowance. - Strip material from boulevard where sidewalks and other street scaping improvements will be installed. - Reshape curbs to accommodate new entrance locations. - Construct dedicated left turning lanes going north and south at Kincaid Street.

5.3 Environmental Considerations

Section 5.1 of this report listed the alternative planning solutions that were identified to resolve deficiencies with the road infrastructure. As part of the evaluation process, it is necessary to assess what effect each option may have on the environment and what measures can be taken to mitigate the identified impacts. The two main purposes of this exercise are to:

- Minimize or avoid adverse environmental effects associated with a project;
- Incorporate environmental factors into the decision-making process.

Under the terms of the EA Act, the environment is divided into five general elements:

- Natural, Social, Cultural, Economic and Technical environment.

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MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN FOR HWY. 23 AND C.R. 86

PROPOSED HIGHWAY NO. 23 UPGRADES

DATE	PROJECT No.
NOV. 3, 2014	11240C
SCALE 1 : 1,500	FIGURE No. 5.3

The identified environmental elements can be further subdivided into specific components and sub-components that have the potential to be affected by the implementation of the alternative solutions. Table 5.3 provides an overview of the Specific Environmental Components considered of relevance to this investigation. These components were identified following the initial round of public and agency input, and a preliminary review of each alternative with respect to technical considerations and the environmental setting of the project area.

Table 5.3
Evaluation of Alternatives:
Identification of Environmental Components

Element	Component	Sub-Component
Natural	Aquatic	• Aquatic Resources • Fisheries
	Atmosphere	• Air Quality • Noise
	Surface Water	• Water Quality/ Quantity • Drainage Characteristics
	Terrestrial	• Amphibians & Reptiles • Birds, Mammals • Vegetation
	Geologic	• Physiographic Features • Groundwater Quality/ Quantity
Social	Neighbourhood	• Disruption
	Community	• Health and Safety
Cultural	Heritage	• Historical/ Cultural Resources
Economic	Project Area	• Capital and Operational Costs
	Community	• Property Taxes
Technical	Transportation	• Traffic Patterns/ Volumes • Pedestrian/ Vehicular Safety
	Infrastructure	• Condition/ Age • Servicing Capacity • Technologies • Utilities

The environmental effects of each study alternative on the specific components are generally determined through an assessment of various impact predictors (i.e., impact criteria). Given the works associated with the alternative solutions, the following key impact criteria were examined during the course of this assessment:

- Magnitude (e.g., scale, intensity, geographic scope, frequency, duration);
- Technical complexity;
- Mitigation potential (e.g., avoidance, compensation, degree of reversibility);
- Public perception;
- Scarcity and uniqueness of affected components;
- Likelihood of compliance with applicable regulations and public policy objectives.

The evaluation process described above provides the proponent with a methodology to predict the potential effects of alternative solutions. The significance of the identified impacts is largely based on the anticipated severity of the following:

- Direct changes occurring at the time of project completion (e.g., habitat disruption);
- Indirect effects following project completion (e.g., increased sedimentation/ erosion);
- Induced changes resulting from a project (e.g., additional activity in sensitive areas).

5.4 General Review of Options

a) Alternatives for Intersection of Highway No. 23 & C.R. 86

Table 5.4 provides a summary of the key considerations for each option with respect to the environmental considerations described in Table 5.3. To this end, the table identifies those benefits and impacts that were identified as significant during the initial evaluation of alternatives. Potential mitigation measures for the identified impacts are also presented.

Table 5.4
Preliminary Review of Planning Alternatives

i) ***Alternative 1 – Do Nothing***

Environmental Component	*Benefits*	*Impacts*
Natural Environment	- Few impacts anticipated to natural environment	- None Anticipated
Social Environment	- None Anticipated	- Represents a potential health and safety concern to the community due to safety issues associated with the current intersection.
Economic Environment	- Least expensive alternative	- May result in economic impacts to the community due to congestion and loss of access to future development lands to the north.
Cultural Environment	- No impacts to cultural heritage features would occur	- No impacts anticipated
Technical Environment	- Intersection configuration would remain unchanged.	- Fails to resolve ongoing congestion and delays resulting from the current intersection configuration.

ii) ***Alternative 2 – Signalized Intersection***

Environmental Component	*Benefits*	*Impacts*
Natural Environment	- Few impacts anticipated to natural environment due to limited natural features located in the vicinity of the intersection.	- Anticipated road widening will have little encroachment into naturalized areas. - Some tree removal may be required.
Social Environment	- Would address existing congestion and delays with current configuration of intersection. - Configuration that drivers are familiar with.	- Results of traffic analysis indicate that traffic signals would not be warranted for 10-15 years meaning improvements could not be implemented for a number of years.
Economic Environment	- Most expensive option. - Anticipated construction costs are 1.73 M.	- The total cost of the signalized option is approximately 20% higher than the roundabout alternative
Cultural Environment	- A Stage 1 & 2 Archaeological Assessment of the study area indicates that no cultural heritage features will be affected.	- No impacts anticipated
Technical Environment	- Conversion of the existing intersection from an un-signalized stop controlled intersection to a signalized intersection will result in improved safety and fewer delays. - A signalized intersection will generally operate at a high level of operational efficiency.	- Traffic using the intersection will generally operate at a higher rate of speed increasing the potential for collisions over the roundabout option. - Traffic islands proposed in conjunction with the signalized intersection may limit access to some properties located adjacent to the intersection.

iii) ***Alternative 3 – Roundabout***

Environmental Component	*Benefits*	*Impacts*
Natural Environment	- Few impacts anticipated to natural environment due to limited natural features located in the vicinity of the intersection.	- Anticipated roundabout footprint will have little encroachment into naturalized areas. - Some tree removal may be required.
Social Environment	- Would address existing congestion and delays with current configuration of intersection. - Roundabout can be constructed immediately.	- Drivers may be unfamiliar with a roundabout and have some hesitancy in using the intersection. - Property located northwest of the roundabout will be purchased in order to shift horizontal alignment of intersection and reduce land requirements to the south.
Economic Environment	- Less expensive option than a signalized intersection. - Anticipated construction costs are 1.33 M.	- The total cost of the roundabout option is approximately 20% less than the signalized alternative
Cultural Environment	- A Stage 1 & 2 Archaeological Assessment of the study area indicates that no cultural heritage features will be affected.	- No impacts anticipated
Technical Environment	- Conversion of the existing intersection from an un-signalized stop controlled intersection to a roundabout will result in improved safety and fewer delays. - Vehicles will generally travel through the intersection at a lower rate of speed, reducing the potential for severe collisions.	- Entrances to existing properties fronting on the intersection will have modified points of access onto the roundabout than the current intersection configuration where access is currently unrestricted for some properties.

Screening of Alternatives

Following the initial review of the identified planning alternatives, a screening process was utilized to eliminate those options which displayed significant flaws or had no practical merit in moving forward. For this reason, Alternative 1, the Do Nothing Alternative, was subsequently removed from further consideration.

b) Alternatives for Highway No. 23 Upgrades

Table 5.5 provides a summary of the key considerations for each option with respect to the environmental considerations described in Table 5.3. To this end, the table identifies those benefits and impacts that were identified as significant during the initial evaluation of alternatives. Potential mitigation measures for the identified impacts are also presented.

Table 5.5
Preliminary Review of Planning Alternatives

i) Alternative 1 – Do Nothing

Environmental Component	*Benefits*	*Impacts*
Natural Environment	- Few impacts anticipated to natural environment	- None Anticipated
Social Environment	- None Anticipated	- Represents a potential health and safety concern to the community due to the lack of sidewalks in the area.
Economic Environment	- Least expensive alternative	
Cultural Environment	- No impacts to cultural heritage features would occur	- No impacts anticipated
Technical Environment	- Road and boulevard design would remain unchanged.	- Fails to resolve ongoing concerns with access to Kincaid Street and increased urbanization and pedestrian access along the boulevards.

ii) Alternative 2 – Highway No. 23 Improvements

Environmental Component	*Benefits*	*Impacts*
Natural Environment	- Few impacts anticipated to natural environment due to limited natural features located in the vicinity of the road allowance.	- Anticipated road widening will have little encroachment into naturalized areas.
Social Environment	- Would improve walkability of the area resulting in improved health and safety for residents.	- No impacts anticipated
Economic Environment	- Anticipated construction costs are $285,000	

Environmental Component	*Benefits*	*Impacts*
Cultural Environment	- A Stage 1 & 2 Archaeological Assessment of the study area indicates that no cultural heritage features will be affected.	- No impacts anticipated
Technical Environment	- The addition of sidewalks, dedicated left turn lanes and improved access points should result in an overall improvement to the operation of the corridor.	- No impacts anticipated

5.5 Detailed Evaluation of Alternatives

a) Alternatives for Intersection of Highway No. 23 & C.R. 86

An evaluation exercise was undertaken to examine the relative impacts of the three intersection alternatives. The evaluation process involved assigning a value out of 10 for each of the stated criteria, which related to the potential impact of development on the various criteria (i.e. 10 representing significant potential impact, 1 representing minimal potential impact). Rankings for the three alternatives were then tabulated from the assigned scores. Table 5.6 summarizes the results of the detailed site assessment exercise.

Table 5.6
Evaluation of Intersection Alternatives

Evaluation Criteria		
	Signalized	Roundabout
i. Disruption to Natural Features	3	3
ii. Anticipated Impact on Affected Landowners	7	7
iii. Community Level Impacts	7	7
iv. Cultural Heritage Impacts	2	2
v. Design Considerations	5	6
vi. Transportation Considerations	8	6
vii. Economic Considerations	8	6
Total Score	40	37
Overall Ranking	**2**	**1**

Each of the individual criteria were weighted equally in this evaluation exercise, based on the assumption that all evaluation criteria would be equally important in determining a preferred intersection alternative. However, in consultation with municipal representatives, factors such as economics and technical considerations, which have the potential to impact on the community as a whole, were determined to be of a higher value relative to other factors. It was therefore concluded that some factors should have a greater impact on the final selection.

b) Alternatives for Highway No. 23 Upgrades

An evaluation exercise was undertaken to examine the relative impacts of the three intersection alternatives. The evaluation process involved assigning a value out of 10 for each of the stated criteria, which related to the potential impact of development on the various criteria (i.e. 10 representing significant potential impact, 1 representing minimal potential impact). Rankings for the three alternatives were then tabulated from the assigned scores. Table 5.7 summarizes the results of the detailed site assessment exercise.

Table 5.7
Evaluation of Intersection Alternatives

Evaluation Criteria		
	Do Nothing	Upgrades
i. Disruption to Natural Features	0	1
ii. Anticipated Impact on Affected Landowners	3	5
iii. Community Level Impacts	7	4
iv. Cultural Heritage Impacts	0	1
v. Design Considerations	6	4
vi. Transportation Considerations	7	3
vii. Economic Considerations	4	5
Total Score	27	23
Overall Ranking	**2**	**1**

Each of the individual criteria were weighted equally in this evaluation exercise, based on the assumption that all evaluation criteria would be equally important in determining a preferred intersection alternative. However, in consultation with municipal representatives, factors such as economics and technical considerations, which have the potential to impact on the community as a whole, were determined to be of a higher value relative to other factors. It was therefore concluded that some factors should have a greater impact on the final selection.

5.6 Weighted Site Evaluation

a) Alternatives for Intersection of Highway No. 23 & C.R. 86

Based on the assumption that certain factors should be weighted heavier than others during the site evaluation process, an additional evaluation exercise was performed. A decision making matrix was developed which assigned a weight to each selection criteria based on the type, scope and magnitude of the potential impact in the site evaluation exercise. A final score was then calculated by multiplying the impact value determined in the previous evaluation by the corresponding weight assigned to the various criteria.

Table 5.8 presents the results of the weighted site evaluation exercise.

Table 5.8

Weighted Site Evaluation Matrix					
Criteria		**Signalized Intersection**		**Roundabout**	
	Weighting	**Value**	**Weighted Value**	**Value**	**Weighted Value**
Disruption to Natural Features	5%	3	.15	3	.15
Impact on affected landowners	20%	7	1.4	7	1.4
Community Level Impacts	15%	7	1.05	7	1.05
Cultural Heritage Impacts	5%	2	.1	2	.1
Design Considerations	15%	5	.75	6	.9
Transportation Considerations	15%	8	1.2	6	.9
Economic Factors	25%	8	2	6	1.5
Total	100%		6.65		6

Based on consultation with the Municipality and the result of feedback received during the agency and public consultation phases of the project, it was decided that certain components should be weighted higher than others based upon the impact these factors would have on the project. Economic factors, impact on affected landowners, community level impacts and transportation considerations were therefore weighted higher than the other factors, with economics being weighted the highest. Disruption to natural features and culture heritage impacts were weighted the lowest based upon the results of specialized studies completed in conjunction with the project, which indicated that impacts to these components of the environment would be low. This resulted in a similar result to the first exercise, giving confirmation that Alternative 2, construction of a roundabout, would be the preferred alternative for the intersection.

b) Alternatives for Highway No. 23 Upgrades

A similar decision making matrix was also developed for the Highway No. 23 upgrades. Table 5.9 presents the results of the weighted site evaluation exercise for this component of the project.

Table 5.9

Weighted Site Evaluation Matrix					
Criteria		**Do Nothing**		**Do Upgrades**	
	Weighting	**Value**	**Weighted Value**	**Value**	**Weighted Value**
Disruption to Natural Features	5%	0	0	1	.05
Impact on affected landowners	20%	3	.6	5	1
Community Level Impacts	15%	7	1.05	4	.6
Cultural Heritage Impacts	5%	0	0	1	.05
Design Considerations	15%	6	.9	4	.6
Transportation Considerations	15%	7	1.05	3	.45
Economic Factors	25%	4	1	5	1.25
Total	100%	27	4.6	23	4

Similar factors were considered when deciding on the weighting for this evaluation matrix. Again, economic factors, impact on affected landowners, community level impacts and transportation considerations were therefore weighted higher than the other factors, with economics being weighted the highest. Disruption to natural features and culture heritage impacts were again weighted the lowest based upon the results of specialized studies completed in conjunction with the project, which indicated that impacts to these components of the environment would be low. This resulted in a similar result to the first exercise, giving confirmation that Alternative 2, completion of the highway upgrades, would be the least impactful alternative.

5.7 Identification of a Preferred Solution

Based on the results of the assessments undertaken above, a review of the technical components associated with the project, and input received from residents and stakeholders, the Municipality indicated a preference for a) Alternative 3: Construction of a Roundabout at the intersection of Highway No. 23 and C.R. 86, and b) Implementation of Upgrades along Highway No. 23. There are a number of attributes associated with each of the preferred Alternatives that justified its consideration as the preferred alternative (listed below):

a) Construction of a Roundabout at the intersection of Hwy. No. 23 and C.R. 86

- Provides the subject lands with an improved intersection configuration which will minimize traffic congestion and delays.
- Permits upgrades to the intersection to be implemented immediately, upon completion of the MTO Class EA process.
- Provides the Municipality with access to future development lands located north of the intersection.
- Minimizes impacts to natural features by undertaking construction primarily within previously disturbed road allowances.
- Provides more defined access points to existing commercial operations.
- Allows the Municipality to implement servicing upgrades along Perth Line 86 and in the vicinity of the intersection in conjunction with the planned transportation improvements.
- Implements the most cost effective alternative considered.

b) Implementation of Highway No. 23 Upgrades

- Provides the road corridor with improved lane configuration which will minimize traffic congestion and delays.
- Provides the community with improved accessibility and walkability to local businesses and commercial enterprises.
- Minimizes impacts to natural features by undertaking construction primarily within previously disturbed road allowances.

Based upon these considerations, the overall benefit of implementing the identified Alternatives was seen to substantially outweigh the potential adverse impacts associated with the project.

6.0 PREFERRED ALTERNATIVE

The recommended preliminary design alternative for the intersection of Highway 23 and Perth Line 86 and for the Highway 23 corridor south of the intersection includes the following features:

- Reconstruction of the intersection of Highway 23 and Perth Line 86 and installation of a roundabout at the intersection with a new municipal entrance to the north (Haverkamp Avenue North) ;
- The roundabout is a single-lane design with an inscribed circle diameter (ICD) of 44 metres. The diameter is comprised of a circulatory road width of 7 metres, a truck apron width of 3 metres, and a central island diameter of 24 metres.

- The central island will be landscaped to provide a civic feature and block sightlines through the middle of the roundabout to increase conspicuity at night. Landscaping will be completed using forgiving trees, bushes and grasses that will not pose a hazard to motorists. Pedestrian crosswalks will be provided through the splitter islands at a distance of one passenger car length from the ICD to separate the driver tasks of looking for pedestrians and viewing oncoming traffic in the roundabout.
- Municipal sewage and water servicing will be constructed within the intersection in conjunction with the project in order to extend municipal servicing to the west along Perth Line 86 and to several properties located southwest of the intersection.
- Hydro servicing will need to be relocated to accommodate the roundabout. Illumination of the intersection will also be reconfigured and shall be in accordance with MTO's Policy for Roundabout Lighting.
- To accommodate the roundabout and new municipal road extension, property will be obtained from the landowner located north and west of the intersection. Discussions with the landowners have been ongoing since the initiation of the Class EA process.
- Construction of a north-bound left turn lane on Highway 23 at Kincaid St. with 15 m storage, 60 m parallel lane and 145 m taper length;
- Construction of a south-bound left turn lane on Highway 23 at Kincaid St. with 30 m storage, 60 m parallel lane and 145 m taper length; and
- Installation of sidewalks on Highway 23 between Perth Line 86 and Kincaid Street.

7.0 POTENTIAL IMPACTS AND MITIGATION

7.1 Environmental Impacts

Based upon the findings of the review of planning alternatives, site specific assessments, and feedback received from the general public and from review agencies, the project has the potential to impact upon a limited number of specific environmental components. They are as follows:

- Natural Environment
- Social Environment
- Technical Environment

The potential impacts to each identified feature are described in detail within this section of the report. Measures designed to minimize the impacts are also presented. The determination of appropriate mitigation measures incorporated an assessment of previous studies and investigations, site specific requirements and an evaluation of a broad range of alternatives. This assessment was based on consideration of three broad approaches to impact mitigation; avoidance, minimization of adverse effects and compensation.

7.2 Natural Environment

A number of site specific recommendations were made to address potential impacts to the habitat identified within the affected road corridor. These recommendations are as follows:

- Implementation of tree protection measures as per OPSS 801. It is also recommended that planting of new trees be incorporated in to the proposed design in order to compensate for tree loss.

- Avoid tree and vegetation removal during the peak migratory bird nesting season (outside of April 1 to August 31). If trees or vegetation is to be removed during the peak season, a nest search should be conducted within 2 days of removal by a qualified professional to confirm the absence of nests.

- Erosion and sediment control measures should be incorporated during construction to prevent sediment from escaping and impacting natural features located off-site.

7.3 Social Environment

a) Disruption Posed by Construction

Reconstruction of the intersection and the associated highway upgrades will involve excavation and construction within existing travelled road corridors. Construction activities associated with the project may therefore inconvenience local residents by restricting vehicular traffic movement and disturbing private property.

b) Traffic Related Impacts

The potential traffic-related impacts resulting from the proposed works are expected to be similar to those experienced during normal road construction activities. A detour will be established to facilitate construction of the roundabout and for the anticipated Highway 23 road work. Access for local residents will be maintained at all times. Figure 7.1 illustrates the proposed detour routes to be used during construction of the roundabout.

c) Property Requirements

As discussed, approximately 0.94 ha of land will be purchased from an adjacent property owner to facilitate construction of the roundabout and new municipal road extension. Based upon ongoing discussions with the affected landowners, a number of measures will be incorporated into the detailed design phase of the project to address access issues presented by the new intersection and municipal road configuration.

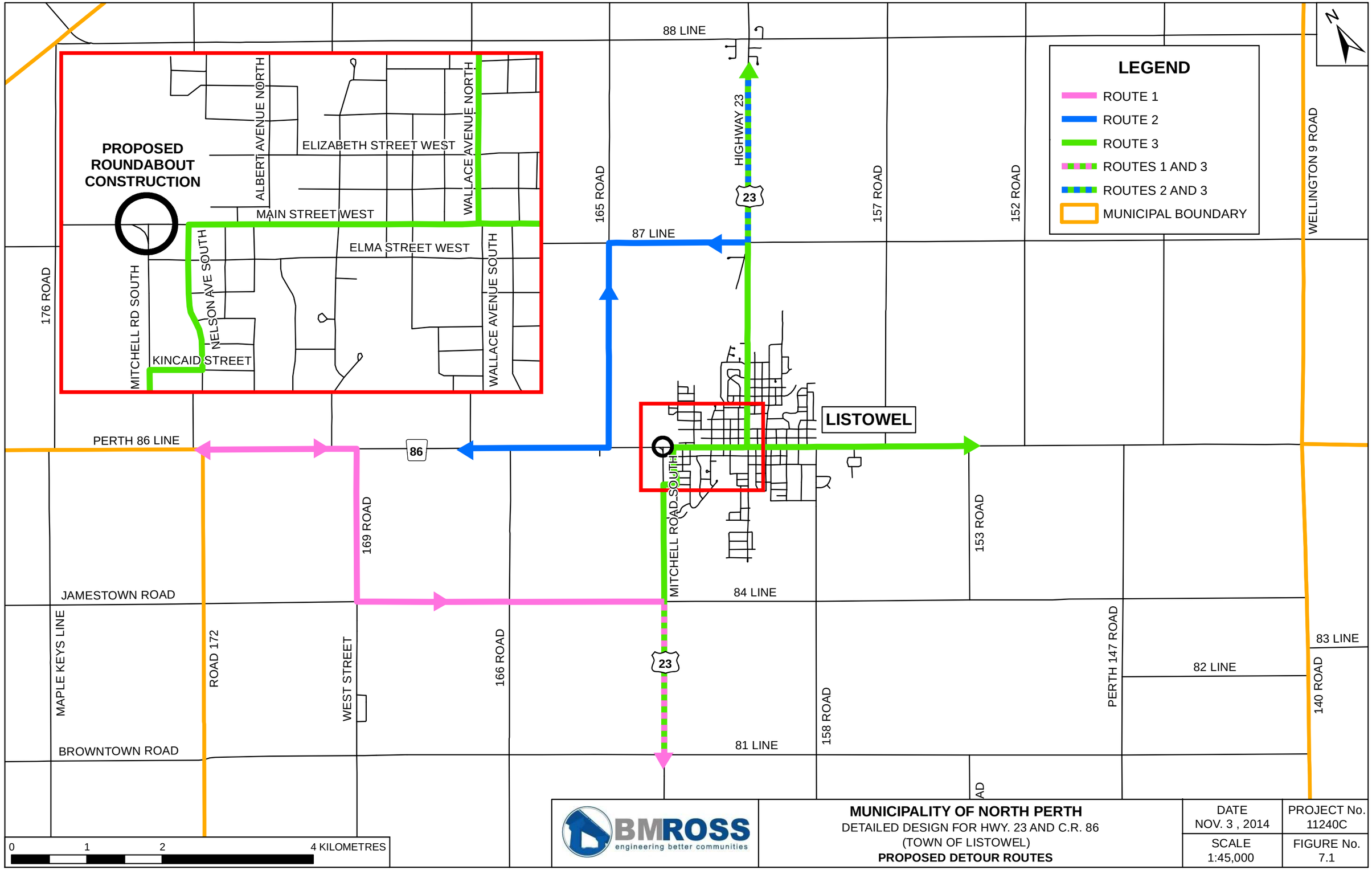
7.4 Technical Environment

a) Construction Mitigation

Construction-related activities associated with project implementation have the potential to impact upon existing environmental features, the general public and construction workers. The Contractor would therefore be responsible for carrying out these activities in accordance with industry safety standards and all applicable legislation. Mitigation measures would also be incorporated into the construction specifications to ensure that operations are conducted in a manner that limits detrimental effects to the environment. Table 7.1 outlines a series of standard mitigation measures that are commonly incorporated into construction specifications. Contract specifications may need to be modified depending upon requirements of the regulatory agencies.

Table 7.1
Typical Mitigation Measures for Construction-Related Activities

Construction Activity	Typical Mitigation Measure
Refuelling and Maintenance	- Identify suitable locations for refuelling and maintenance areas. - Avoid cleaning equipment in locations where debris can gain access to sewers or watercourses. - Prepare to intercept, clean up, and dispose of any spillage that may occur (whether on land or water).
Traffic Control	- Require the Contractor to prepare and submit a traffic plan to the Project Engineer for review and acceptance. - Maintain traffic flow for private accesses at all times during construction (as practical). - Provide adequate signage and barricades.
Disposal	- Dispose of all construction debris in approved locations. - Avoid emptying fuel, lubricants or pesticides into sewers or watercourses.
Dust Control	- Cover or wet down dry materials and rubbish to prevent blowing dust and debris. - Avoid the use of chemical dust control products adjacent to watercourses.
Site Clearing	- Implement protective measures to safeguard trees from construction operations. - Restrict equipment or vehicles from being parked, repaired or refuelled near the dripline area of any tree not designated for removal. - Prohibit construction and earth materials from being stockpiled within the defined dripline areas. - Restrict tree removal to areas designated by the Contract Administrator. - Minimize stripping of topsoil and vegetation.
Sedimentation/ Erosion Control	- Erect sediment fencing to control excess sediment loss during construction period. - Minimize the removal of vegetation from sloped approaches to watercourses. - Protect watercourses, catch basins and pipe ends from sediment intrusion. - Complete restoration works following construction. - Install straw bale check dams in ditch lines following rough grading of ditches.
Potential Site Contamination	- Contractors/consultants will visually survey disturbed areas during the construction phase of the project for signs of potential contamination.
Noise Control	- Establish procedures to minimize noise levels in accordance with local by-laws. - Avoid night time or Sunday work, except in emergency situations.



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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN FOR HWY. 23 AND C.R. 86
(TOWN OF LISTOWEL)
PROPOSED DETOUR ROUTES

DATE	PROJECT No.
NOV. 3 , 2014	11240C
SCALE	FIGURE No.
1:45,000	7.1

7.5 Operations Phase

Upon completion of the proposed works the Municipality of North Perth, the County of Perth and the Ministry of Transportation would undertake maintenance of the road, water and sanitary sewer facilities constructed in conjunction with this project in accordance with normal practices. The roundabout and Highway No. 23, south of the intersection, will continue to be maintained by the Ministry of Transportation and the other legs of the intersection will be maintained by the Municipality and County respectively.

8.0 CONCLUSIONS AND PROJECT IMPLEMENTATION

8.1 Conclusions

Based upon the findings of the environmental impact evaluation, no potential impacts were identified with the preferred preliminary design alternatives that could not be adequately mitigated. To this end, the proposed project appears to be appropriate for the study area and should not result in adverse environmental effects.

8.2 Selection of Preferred Alternatives

a) Intersection of Highway 23 and Perth Line 86

Given the foregoing, **Alternative 3 – Construction of a Roundabout at the Intersection of Highway 23 and Perth Line 86** was selected as the preferred solution to the identified problem. This recommendation was presented to, and supported by, Municipal Council and staff. The works associated with the preferred alternative are summarized in section 5.9 of this report.

b) Highway 23 Upgrades

Given the foregoing, **Alternative 2 – Implementation of Road Improvements** was selected as the preferred solution to the identified problem. This recommendation was presented to, and supported by, Municipal Council and staff. The works associated with the preferred alternative are summarized in section 5.9 of this report.

8.3 Final Public Consultation

A Notice of Completion was recently circulated to local residents, stakeholders and government review agencies. The notice identified the preferred alternative and provided the process for appeal of the selected alternative (i.e., a Part II Order request to the Minister of the Environment prior to the conclusion of the review period) if there are unresolved environmental issues. The following summarizes the distribution of the notice.

Contents:	Identification of preferred solution, key project components
Issued:	February 18, 2015
Placed In:	Listowel Banner (February 18 and February 25, 2015)
Distributed To:	12 review agencies, adjacent property owners and stakeholders.

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9. Golder Associates Ltd., Stage 1 & 2 Archaeological Assessment, Mitchell Road South Improvements and Binning Street West Extension, Municipality of North Perth, Community of Listowel, July 5, 2012.

APPENDIX A

NATURAL ENVIRONMENT STUDY

Highway No. 23, Listowel
Natural Heritage Assessment

Prepared for:

B.M. Ross & Associates Ltd.
Engineers and Planners
62 North Street
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N74 2T4

Project No. 1540

Date: (Revised) October 2014

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Highway No. 23, Listowel
Natural Heritage Assessment

Project Team:

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Report submitted on October 22, 2014

Elaine Gosnell
Terrestrial and Wetland Biologist
Project Manager

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List of Appendices

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) has been retained by BM Ross to prepare a natural heritage assessment for proposed highway improvements located on Highway No. 23 (Mitchell Road South) and County Road 86, within the town of Listowel, Ontario. The improvements include widening of the road surface and the construction of a roundabout at the intersection of Highway No. 23 and County Road 86. This assessment is being carried out in conjunction with the Class Environmental Assessment (EA) for improvements to Highway No. 23 in Listowel, Ontario for the Ontario Ministry of Transportation.

This report summarizes background information on natural heritage features, as well as the results of site visits to characterize the natural features on site. This study has been developed in accordance with the polices outlined in the County of Perth's Official Plan (County of Perth 2013) as well as through direct correspondence with the Maitland Valley Conservation Authority (MVCA) and the Guelph District Ontario Ministry of Natural Resources (OMNR).

The project study area is located in Ecoregion 6E and consists predominantly of agricultural fields with commercial and residential developments adjacent to Highway No. 23 as shown on Map 1. There are no significant natural features present within the project study area, however, a single woodland, designated as a significant groundwater recharge area is located approximately 300m to the northwest of the project study area (J. Lieber pers. comm. 2014). Correspondence with the OMNR indicates the lack of known Species At Risk from the area (G. Buck pers. comm. 2014).

For the purposes of this report, the term "project study area" refers to Highway No. 23 and lands within approximately 120m. The term "general study area" refers to the project study area plus approximately 1km of the area surrounding these lands. Detailed biological surveys were undertaken by NRSI on the project study area. Information on the biological features within the project study area was collected and reviewed. Legacy data collected from agencies encompassed the general study area to ensure that all surrounding natural features were considered.

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Map 1

Highway 23, Listowel

Natural Heritage Assessment

Legend

- Study Area
- Railway
- Permanent Watercourse
- Intermittent Watercourse

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Aquatic, Terrestrial and Wetland Biologists

Project: 1540 Date: August 8, 2014	NAD83 - UTM Zone 17 Size: 11x17" **1:4,000**

0 100 200 300 Meters

2.0 Relevant Policies, Legislation, and Planning Studies

Information on the natural heritage features within the subject site was collected and the features were assessed for significance. To help guide the layout of proposed road improvements areas to be protected were identified by evaluating these features against relevant policies, legislation, and planning studies as outlined in the following sections.

2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS; OMMAH 2014) is issued under the authority of Section 3 of the Planning Act and came into effect on April 30, 2014, replacing the 2005 PPS. Section 3 requires that decisions affecting planning matters shall be consistent with policy statements under the Act. Section 4.4 of the PPS establishes that the PPS is to be read in its entirety and all relevant policies are to be applied to each situation. In this context, Section 2.1 of the PPS – Natural Heritage establishes clear direction on the adoption of an ecosystem approach and the protection of resources that have been identified as 'significant.' These features are broadly defined within the PPS and rely on the Ministry of Natural Resources and Forestry (MNRF) and the municipality to identify and delineate specific natural features. The Natural Heritage Reference Manual (OMNR 2012) and the Significant Wildlife Habitat Technical Guide (OMNR 2000) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS. These features include:

a) Significant wetlands in Ecoregion 6E;
b) Significant and other coastal wetlands in Ecoregions 6E;
c) Fish habitat;
d) Significant woodlands in Ecoregion 6E;
e) Significant valleylands in Ecoregion 6E;
f) Habitat of Endangered species and Threatened species;
g) Significant Wildlife Habitat;
h) Significant ANSI

Significant Wildlife Habitats have the potential to occur within the study area, as well as habitats for provincially Endangered or Threatened species that are known from the study area vicinity. No woodlands occur within the study area.

Section 2.1.4 of the PPS states that development and site alteration shall not be permitted in significant wetlands in Ecoregion 6E, or significant coastal wetlands.

Section 2.1.5.of the PPS states that development or site alteration shall not be permitted in Significant Wildlife Habitat, or other types of significant habitat unless it has been demonstrated that there will be no negative impacts on the features or their ecological functions.

Section 2.1.6.of the PPS states that development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

Section 2.1.7 of the PPS states that development or site alteration shall not be permitted in habitat of Endangered or Threatened species except in accordance with provincial or federal requirements.

In all cases, development and/or site alteration is not permitted under the PPS on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6, unless the ecological function of the adjacent lands has been evaluated, and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (OMMAH 2014).

The Natural Heritage Reference Manual (OMNR 2010) provides technical guidance for implementing the natural heritage policies of the PPS. Although the Natural Heritage Reference Manual was based on the 2005 PPS, its guidance may be applied to the 2014 PPS. The manual represents the province's recommended technical criteria and guidance for identifying and protecting significant natural features as defined in the PPS.

The Significant Wildlife Habitat Technical Guide (SWHTG) was prepared to assist planning authorities and other participants in the land use planning system (OMNR 2000). The SWHTG is a detailed technical manual that provides information on the identification, description, and prioritization of Significant Wildlife Habitat. The manual is intended for use in the municipal policy and development process under the Planning

Act. An addendum to the SWHTG provides further detail on characterizing and identifying Significant Wildlife Habitat in Ecoregion 6E (OMNR 2012).

Similarly, SAR identified during the background review as potentially occurring within the study area were compared with available information on the habitats found within the project study area.

2.2 Endangered Species Act

The original ESA, written in 1971, underwent a year-long review which resulted in a number of changes which came into force in 2007. There is now a much stronger emphasis on science-based review and assessment of species which is completed by an independent body named The Committee on the Status of Species at Risk in Ontario (COSSARO). Species designated as Threatened or Endangered receive legal protection under the ESA and their habitats are protected generally under the Act (i.e. areas essential for breeding, rearing, feeding, hibernation and migration). The ESA (Subsection 9(1)) states that:

"No person shall,

(a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;

(b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,

(i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species,

(ii) any part of a living or dead member of a species referred to in subclause (i),

(iii) anything derived from a living or dead member of a species referred to in subclause (i); or

(c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii).

Clause 10(1)(a) of the ESA states that:

> *"No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species*"

2.3 Migratory Birds Convention Act, 1994

The federal *Migratory Birds Convention Act* (MBCA; CWS 2013) 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 migratory game birds, insectivorous birds, and several other migratory non-game birds. Bird nests that are destroyed during the course of construction and other related activities are referred to as "incidental take" and is considered illegal except under the authority of a permit obtained through the Canadian Wildlife Service (CWS). Implications of the MBCA have potential to occur during any tree or vegetation removal on the property or future construction activities

The schedule of actual on-site work must consider the MBCA (CWS 2013) windows. The timing of the peak migratory breeding bird season for the study area is between April 1 and August 31, although this is a general guideline since the Act applies to nesting at any time of the year. This legislation is applicable and should be considered in the context of tree and vegetation removal during construction.

2.4 Perth County Official Plan (2013)

The Perth County Official Plan was adopted by municipal council in January 2013. This plan outlines current policies for the protection of natural features within Perth County, including the project study area. Section 11 outlines policies related to the protection of natural features within Perth County and describes the following objectives:
The following goals are established for the "Natural Resources/Environment" designation:

(a) To identify natural resources/environment features in the County which are of provincial and local significance;
(b) To ensure the long-term protection, conservation, and enhancement of the identified "Natural Resources/Environment" areas;

(c) To protect, preserve, and enhance the various features comprising the "Natural Resources/Environment" designation by prohibiting incompatible development and by controlling and regulating compatible development;
(d) To provide a process whereby development proposals can be reviewed and assessed with respect to their potential impact on "Natural Resources/Environment" areas;
(e) To encourage the re-establishment or naturalization of "Natural Resources/Environment" areas;
(f) To promote the wise stewardship and management of "Natural Resources/Environment" areas;
(g) To encourage co-operation among the County, local municipalities, government agencies, landowners and others involved with natural resources/environment matters; and
(h) To protect the remaining forest cover of the County and encourage rehabilitation through management and stewardship initiatives; and
(i) To protect water resources, the County will encourage rehabilitation through storm water management and stewardship initiatives.

Schedule A4-3 of the Perth County Official Plan (2013) identifies Land Plan Use within areas west of Listowel, including the project study area. Lands on the west side of Highway No. 23 are designated agriculture, urban fringe and natural resources/environment. Lands on the east side of Highway No. 23 fall under the Listowel Ward Official Plan (2010) and are discussed below.

2.5 Listowel Ward Official Plan (2010)

The Listowel Ward Official Plan was approved by council in November 2010 (Listowel Ward Official Plan 2010). This plan outlines current policies for the protection of natural features within the town of Listowel, including the eastern portion of the project study area, east of Highway No. 23 and south of County Road 86. Section 10 outlines the policies related to the protection of the natural environment and describes the following objectives:

(a) To identify the remaining natural resource/environment features in the Listowel Ward;

(b) To ensure the long-term protection, preservation, conservation, and enhancement of the identified “Natural Resource/Environment” areas;
(c) To encourage the re-establishment or naturalization of “Natural Resource/Environment” areas;
(d) To promote the wise stewardship and management of “Natural Resource/Environment” areas; and
(e) To protect water resources, the Municipality will encourage rehabilitation through storm water management and stewardship initiatives.

2.6 County Of Perth Forest Conservation By-law No. 2927 (2001)

The removal or destruction of trees within the County of Perth is prohibited by by-law No. 2927 (County of Perth 2001) unless a valid permit is issued by the County. The County of Perth’s Forest Conservation By-Law (2001) provides guidance, advice and direction for landowners or developers looking to remove trees within private lands or public lands.

3.0 Methods

3.1 Collection and Review of Background Information

Background information on the natural environmental features within the study area was gathered from the Maitland Valley Conservation Authority (J. Lieber pers. comm. 2014), Ministry of Natural Resources and Forestry (G. Buck and D. Marriott pers. comm. 2014), and the Natural Heritage Information Centre (NHIC) Biodiversity Explorer Database (OMNR 2014).

Initial species lists were compiled to provide information on species reported from the vicinity of the study area (1km radius) using various atlases including the Ontario Mammal Atlas (Dobbyn 1994), Ontario Butterfly Atlas (Jones et al. 2013), Ontario Odonata Summary Atlas (NHIC 2005), and Ontario Reptile and Amphibian Atlas (Ontario Nature 2013). Data on breeding birds in the area was extracted from the Ontario Breeding Bird Atlas (BSC et al. 2006). Since this atlas provides data based on 10x10km survey squares, information on breeding birds from the square that overlaps the study area (square 17NJ04) was compiled.

All wildlife species known from background information and identified as nationally significant (COSEWIC 2013), provincially significant (OMNR 2014) were cross-referenced with habitats known to occur on the project study area or adjacent lands to ensure that their presence or potential presence was assessed in this report.

3.2 Site Visits

Two site visits were carried out within the project study areaon August 8 and September 19, 2014 to characterize the natural features on site. Studies completed on these dates are described below.

3.2.1 Vegetation Surveys

Vegetation community delineation was completed using aerial photography on August 8, 2014. The standard Ecological Land Classification (ELC) System for southern Ontario was applied (Lee et al. 1998) and updated with the newer ELC classification system (Lee 2008). Details of vegetation communities were recorded including species

composition, dominance, uncommon species or features, evidence of human impact, and surface soil characterization. All species of vascular flora observed were recorded during field surveys.

3.2.2 Tree Inventory

A comprehensive tree inventory was completed by NRSI on the project study area on September 19, 2014. Individual trees that were within the area of proposed road improvements that were ≥10cm in Diameter at Breast Height (DBH) were identified and the following information recorded:

- species,
- Diameter at Breast Height (DBH) measurement (cm),
- crown radius (metres),
- general health (excellent, good, fair, poor, very poor, snag),
- potential for structural failure (low, medium, high),
- tree location, and,
- general comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development).

3.2.3 Wildlife

All wildlife (mammals and birds) observed were documented during the site visits. Observations included direct observations of individuals, as well as signs of animal presence (e.g. tracks, scats, dens).

4.0 Existing Conditions

4.1 Soils, Terrain and Drainage

The soils within the project study area contain soils characterized as silt loam from the Listowel Series (Hoffman and Richards 1952). Soils are generally imperfect to poorly drained within this area (Hoffman and Richards 1952). Much of the project study area is agricultural or commercial development and as such, the soils are anticipated to be highly disturbed in nature. Several residences front onto Highway No. 23 and County Road 86 with manicured lawns and landscape trees found within or adjacent to the road ROW.

The majority of the subject site is very flat, with a slight slope up towards the southeast. A roadside ditch on the east side of Highway No. 23 extends from Elma Street south to Kincaid Street, conveying surface flows from south to north.

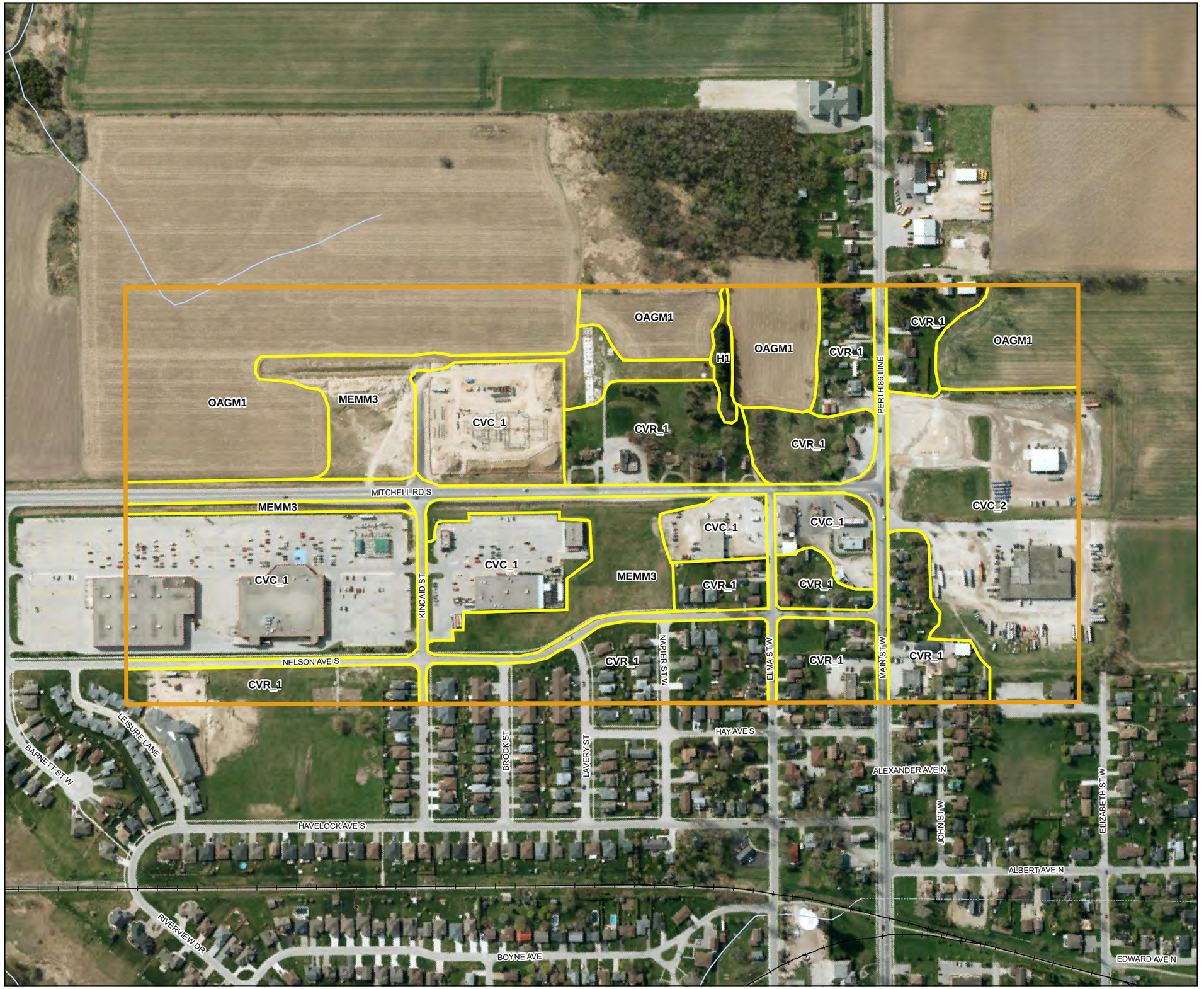
4.2 Designated Natural Areas

There are no designated natural areas located within the study area. The woodland located approximately 300m to the northwest of Highway No. 23 is classified as natural resources/environment on Schedule A-4 of the Perth County Official Plan (2013) and is considered a groundwater recharge area (J. Lieber pers. comm. 2014).

4.3 Vegetation

4.3.1 Vegetation Communities

The project study area consists entirely of human-altered landscapes, such as commercial properties, manicured lawns, and residential dwellings. A summary of ELC communities identified within the study area is provided in Table 1. ELC communities are described below in detail and shown on Map 2.



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Map 2

Highway 23, Listowel

Vegetation Communities

Legend

- Study Area
- Railway
- Permanent Watercourse
- Intermittent Watercourse
- Ecological Land Classification (ELC)

(CVC_1) Business Sector
(CVC_2) Light Industry
(CVR_1) Low Density Residential
(H1) Hedge-row (Norway Spruce)
(MEMM3) Dry-Fresh Mixed Meadow Ecosite
(OAGM1) Annual Row Crops

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Project: 1540 Date: October 3, 2014	NAD83 - UTM Zone 17 Size: 11x17" **1:4,000**

0 100 200 300 Meters

Table 1. Vegetation Communities Identified within the Project Study Area

Open Habitats	
MEMM3	Dry – Fresh Mixed Meadow Ecosite
H1	Hedge-row (Norway Spruce)
Residential	
CVR_1	Low Density Residential
Commercial and Institutional	
CVC_1	Business Sector
CVC_2	Light Industry
Agricultural	
OAGM1	Annual Row Crops

Open Habitats

Dry – Fresh Mixed Meadow Ecosite (MEMM3)

This meadow community is dominated by a mix of grasses and forbs including wild carrot (*Daucus carota*), common milkweed (*Asclepias syriaca*), coltsfoot (*Tussilago farfara*), and common dandelion (*Taraxacum officinale*).

Hedge-row (Norway Spruce)

This hedge-row community is dominated by Norway spruce (*Picea abies*). All trees are even-aged, likely pertaining to historical farmlands in the area.

Residential

Low Density Residential

A significant portion of the project study area consists of manicured lawns with scattered planted trees, including: silver maple (*Acer saccharinum*), Manitoba maple (*A. negundo*), and Norway spruce.

Commercial and Institutional

Business Sector (CVC_1)

A large section of the project study area consists of a business sector classification, with stores such as Walmart, Zehrs, A&W Restaurant and several other large businesses present along Highway No. 23.

Light Industry (CVC 2)

Adjacent to County Road 86, at the northernmost section of the project study area, are two properties classified as light industry. Much of this polygon consists of paved parking areas, with manicured lawns and planted trees, such as Manitoba maple and green ash (*Fraxinus pennsylvanica*).

Agricultural

Annual Row Crops (OAGM1)

The southwestern portion of the project study area contains agricultural fields with row crops, such as winter wheat, soybeans and oats.

4.3.2 Vascular Flora

A basic vegetation inventory and characterization of vegetation communities was conducted on August 8, 2014. A total of 56 species of plants was recorded in the project study area. A complete list of these species is appended to this report (Appendix II).

The project study area has a high number of non-native species, with half (50%) of the species being of non-native origin. This high percentage of non-native species is typical of disturbed and urban sites. No significant species of plants were observed within the subject site or are known from the background information review.

4.3.3 Tree Inventory

A total of 26 trees, consisting of 9 species were surveyed by a NRSI biologist. Of these 26 trees, 5 were non-native species comprising 39% (n=16) of the trees surveyed (see Map 3).

Table 2 provides a list of tree species inventoried within the project study area, whether they are native or non-native, and their overall condition.

Table 2. Summary of Inventoried Trees

Common Name	Scientific Name	Number of Trees to be Removed	Excellent	Good	Fair	Poor	Very Poor	Total
Native Species								
Eastern White Cedar	*Thuja occidentalis*	0		1				1
Green Ash	*Fraxinus pennsylvanica*	1	1					1
Horse Chestnut	*Aesculus hippocastanum*	0		1				1
Manitoba maple	*Acer negundo*	1			2	2		4
Silver Maple	*Acer saccharinum*	1	4	2	2			8
Sugar maple	*Acer saccharum ssp. saccharum*	0		1				1
Total		**3**	**5**	**5**	**4**	**2**	**0**	**16**
Non-Native Species								
Apple sp.	*Malus* sp.	0	1					1
Norway Maple	*Acer platanoides*	0	7	1				8
Norway Spruce	*Picea abies*	0	1					1
Total		**0**	**9**	**1**	**0**	**0**	**0**	**10**
Overall Total								**26**

Table 3 provides a summary of the overall condition of trees inventoried within the project study area, along with their structural failure rating. A majority of the trees inventoried are in good to excellent condition with a low potential for structural failure. A complete list of trees inventoried is provided in Appendix III and tree locations within the project study area are shown on Map 3.

Table 3. Overall Condition of Inventoried Trees

	Overall Condition				
Structural Failure Rating	**Excellent**	**Good**	**Fair**	**Poor**	**Total**
Low	12	3		1	16
Medium	1	3	1		5
High	1		3	1	5
Total	**14**	**6**	**4**	**2**	**26**

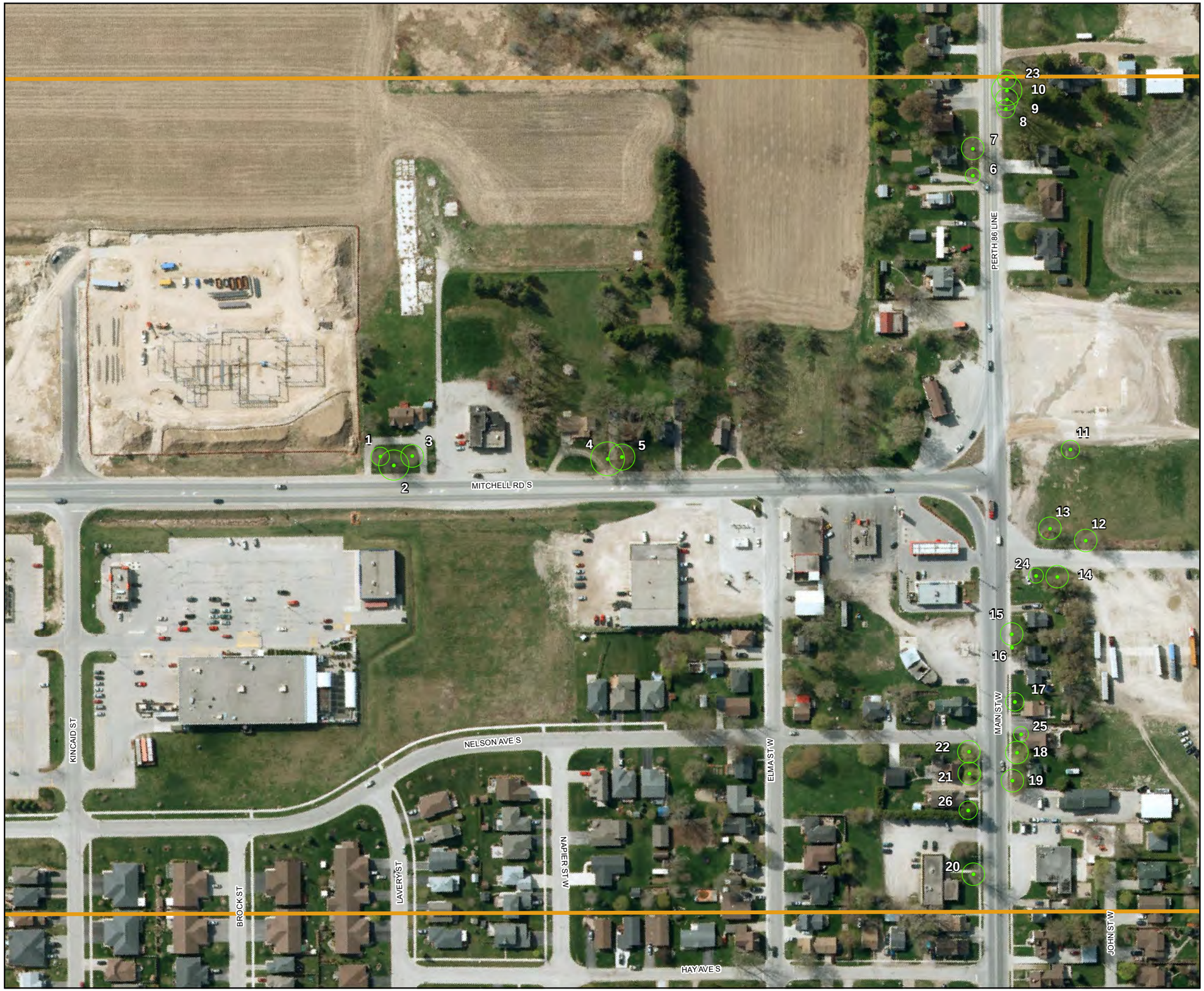
Map 3

Highway 23, Listowel

Tree Inventory Locations

Legend

- Study Area
- Inventoried Tree (crown to scale)



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4.4 Wildlife

4.4.1 Birds

A total of 75 bird species are known from the general study area based on a review of background sources (BSC et al. 2006). Of these, 5 are considered SAR and 3 are Species of Conservation Concern (SCC), as described in Table 4. A complete list of the known species found in the general study area is found in Appendix IV.

During the August 8 and September 19, 2014 site visits, 14 bird species were observed, none of which are considered species of conservation concern or species at risk. All species observed are ranked common and secure with stable populations throughout their Ontario and global populations. Based on the habitat found within the project study area, foraging and nesting habitat for barn swallow (*Hirundo rustica*) and chimney swift (*Chaetura pelagica*) is present. No individuals of these species were observed throughout the project study area; and the proposed road improvements do not involve any alterations to existing buildings, thereby the potential habitat of this species will not be affected.

Table 4. Significant Bird Species Reported From the Study Area

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Preferred Habitat[4]	Background Source	Suitable Habitats within the Project Study Area	Potential to be Impacted by Project
Bank Swallow	*Riparia riparia*	S4	THR	T	Prefers sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	OBBA (BSC 2006)	No. Suitable habitat not present since no waterways or suitable foraging locations on the project study area.	No.
Barn Swallow	*Hirundo rustica*	S4	THR	T	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water	OBBA (BSC 2006)	Yes. Open areas, and man-made structures are present within the project study area.	No. Proposed road improvements do not involve any alterations to existing buildings. No Barn Swallows were observed and no evidence of past nests was observed. Additionally the project study area is too highly developed to be suitable habitat.
Bobolink	*Dolichonyx oryzivorus*	S4	THR	T	Large, open expansive grasslands with dense ground cover; hayfields,	OBBA (BSC 2006)	No. Suitable habitat not present due to	No.

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Preferred Habitat[4]	Background Source	Suitable Habitats within the Project Study Area	Potential to be Impacted by Project
					meadows or fallow fields; requires tracts of grassland >50ha.		small size and lack of appropriate habitat throughout the project study area.	
Chimney Swift	*Chaetura pelagica*	S4	THR	T	Commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water.	OBBA (BSC 2006)	Yes. Urban areas with potential artificial nesting sites present within the project study area.	No. Proposed road improvements do not involve any alterations to existing buildings.
Eastern Meadowlark	*Sturnella magna*	S4	THR	T	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10ha in size.	OBBA (BSC 2006)	No. Suitable habitat not present due to small size and lack of appropriate habitat throughout the project study area.	No.
Eastern Wood-Pewee	*Contopus virens*	S4	SC	SC	Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks.	OBBA (BSC 2006)	No. Suitable habitat not present in the form of any woodland or forested areas throughout the project study area.	No.

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Preferred Habitat[4]	Background Source	Suitable Habitats within the Project Study Area	Potential to be Impacted by Project
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4	SC	T	Prefers open, deciduous forest with little understory; fields or pasture lands with large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	OBBA (BSC 2006)	No. Suitable habitat not present throughout the project study area.	No.
Wood Thrush	*Hylocichla mustelina*	S4	SC	T	Undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12m.	OBBA (BSC 2006)	No. Suitable habitat not present in the form of any woodland or forested areas throughout the project study area.	No.

[1]OMNR 2010b, [2]OMNR 2013, [3]COSEWIC 2012, [4]OMNR 2000

LEGEND		
SRANK	**COSEWIC**	**COSSARO**
S4 – Apparently Secure	SC – Special Concern	SC – Special Concern
	T – Threatened	THR – Threatened

4.4.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (Ontario Nature 2012), 6 species of herpetofauna are known from the study area and vicinity. One of these species, common snapping turtle, is a SCC and is described in Table 5. No herpetofauna species were observed during the field surveys and suitable habitat for amphibians and reptiles is not present in the project study area. A complete list of herpetofauna known from the study area, based on background information, is included in Appendix V.

Table 5 provides a summary of significant species known to occur, their current status ranks, and preferred habitats.

Table 5. Significant Herpetofauna Species Known From the Study Area

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Regional Status	Preferred Habitat[4]	Background Source	Suitable Habitats within the Project Study Area
Turtles								
Common Snapping Turtle	*Chelydra serpentina serpentina*	S3	SC	SC	--	Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; uses clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; hibernate together in groups in mud under water; home range size ~28ha.	Ontario Nature (2010)	Suitable habitat is not present in the project study area. No aquatic habitat.

[1]OMNR 2010b, [2]OMNR 2013, [3]COSEWIC 2012, [4]OMNR 2000

LEGEND		
SRANK	**COSEWIC**	**COSSARO**
S3 – Vulnerable	SC – Special Concern	SC – Special Concern

4.4.3 Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 17 species of mammals are reported from the vicinity of the study area. One of these species, little brown myotis, is a species at risk and is described in Table 6.

Evidence or direct observations of 2 species of mammals were observed within the subject site including: eastern cottontail (*Sylvilagus floridanus*) and eastern gray squirrel (*Sciurus carolinensis*). Both species observed are common and secure throughout their ranges.

Appendix VI provides a complete list of mammal species observed or known to occur within the subject site area.

Table 6. Significant Mammal Species Known From the Study Area

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Regional Status	Preferred Habitat[4]	Background Source	Suitable Habitats within the Project Study Area	Potential to be Impacted by Project
Little Brown Myotis	*Myotis lucifugus*	S4	END	E	--	Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges.	OMNR (2000)	Yes. Hollow trees and suitable buildings present.	No. No alterations to any buildings are proposed. Trees to be removed do not contain any suitable cavities.

[1]OMNR 2010b, [2]OMNR 2013, [3]COSEWIC 2012, [4]OMNR 2000

LEGEND		
SRANK	**COSEWIC**	**COSSARO**
S4 – Apparently Secure	E – Endangered	END – Endangered

4.4.4 Butterflies

A review of the TEA Butterfly Atlas (Jones et al. 2013) identified the presence of 60 butterfly species within the atlas square that overlaps the project study area. This includes the monarch which is a species of conservation concern described in Table 7 below. Confirmed suitable habitat for this butterfly species was found to be present in the meadows of the project study area.

Appendix VII provides a complete list of butterfly species observed or known to occur within the subject site area.

Table 7. Significant Butterfly Species Known From the Study Area

Common Name	Scientific Name	S-RANK[1]	COSSARO[2]	COSEWIC[3]	Regional Status	Preferred Habitat[4]	Background Source	Suitable Habitats within the Subject Site
Monarch	*Danaus plexippus*	S4	SC	SC	--	Open areas, meadows, agricultural fields with milkweed (*Asclepias* spp.).	Jones et al. 2013	Yes. Milkweed is found in the ROW and adjacent meadows.

[1]OMNR 2010b, [2]OMNR 2013, [3]COSEWIC 2012, [4]Layberry et al. 1998

LEGEND		
SRANK	**COSEWIC**	**COSSARO**
S3 – Vulnerable	SC – Special Concern	SC – Special Concern
S4 – Apparently Secure		

4.4.5 Odonata

A review of the NHIC Odonate Atlas (NHIC 2005) identified the presence of 16 Odonate species within the general study area. All of these species are considered common with stable populations. Due to the absence of aquatic habitats (ponds, streams, lakes) on site, breeding habitat for Odonate species is not present on the subject site.

Appendix VIII provides a complete list of Odonata observed or known to occur within the project study area and area.

5.0 Significance and Sensitivity

The natural features in the project study area were reviewed against local, provincial and national natural heritage policies, regulations and guidance documents to determine those that are significant and sensitive to the potential impacts of the proposed road improvements. These are discussed below.

5.1 Significant Wetlands

There are no significant wetlands within the study area.

5.2 Significant Woodlands

Mapping provided by the MVCA identifies significant woodlands within the local area. There are no significant woodlands that overlap with the project study area.

5.3 Significant Wildlife Habitat

Each of the four types of Significant Wildlife Habitat were assessed using information from the field visits and background data.

5.3.1 Seasonal Concentration Area

No seasonal concentration areas were identified during site visits on August 8 and September 19, 2014.

5.3.2 Rare Vegetation Communities

No rare vegetation communities were identified during the site visits on August 8 and September 19, 2014.

5.3.3 Habitat for Species of Conservation Concern

Numerous species of conservation concern are known from the general study area from the background information. Based on the background information and habitat available in the project study area, there is potential for 3 SCC to occur in the project study area. One of these species, monarch, was observed during the site visits.

The monarch butterfly (SC) is known from and has suitable habitat in the project study area. Its host plant, milkweed, is found within the road ROW which may be removed in limited quantities during the road improvements. Monarch has experienced significant

declines in the past decades largely due to alterations to its wintering habitat in Mexico as well as increased use of herbicides on its breeding grounds which destroy milkweed plants (Monarch Joint Venture 2013).

5.3.4 Animal Movement Corridors

Significant wildlife habitat attributed to animal movement corridors within Ecoregion 6E consist of amphibian movement corridors. No significant amphibian breeding habitat was identified on the project study area, and hence, significant amphibian movement corridors are also not present.

5.4 Species at Risk

Based on background information collected from the various wildlife atlases and field surveys completed, 3 SAR are known to occur in the vicinity of the study area. Candidate habitat was identified within the project study area for 1 of these species within the project study area by comparing the results of vegetation community mapping to the habitat requirements for each of these species outlined in the SWHTG (OMNR 2000).

Little brown myotis (END) make use of hollow trees and buildings for roosting and denning. Based on the tree inventory, NRSI did not find any suitable trees with potential cavities within the area of road improvements. There will be no impact to this species habitat as no suitable cavity trees will be removed and no building alterations are proposed as part of the road improvements.

5.5 Linkages

Linkages are continuous, often linear strips of the landscape which provide opportunities to connect natural features. They are important within the natural heritage system to direct wildlife movements and dispersal of otherwise isolated populations.

The project study area is highly commercial and residential in nature and does not contain any woodlands or forested parcels of land. No potential linkages have been identified base on field visits and through an extensive desktop analysis.

5.6 Ecological Buffers

Buffers are required for natural heritage features such as woodlands, wetlands, significant wildlife habitats, and watercourses to protect them from impacts during development. Core areas require a minimum 10m buffer to protect the sensitive root structure of the trees (County of Perth 2013), No significant natural features are found in the study area and no ecological buffers are warranted.

6.0 Impact Analysis

6.1 Description of the Proposed Undertaking

MTO has proposed road improvements to Highway No. 23 and to its intersection with County Road 86. The improvements include minor widening and the addition of a 1.5m concrete sidewalk within the ROW along Highway No. 23 and the construction of a roundabout at the intersection with County Road 86. The roundabout will require widening extending from the middle of the intersection approximately 100 metres east and west along County Road 86 and to the south on Highway No. 23. Additional property will be acquired to accommodate the widening for the roundabout. Details of the preferred plan were prepared by BM Ross and are shown on Map 4.

6.2 Approach to Impact Assessment

The discussion of impacts is divided into the following sections:

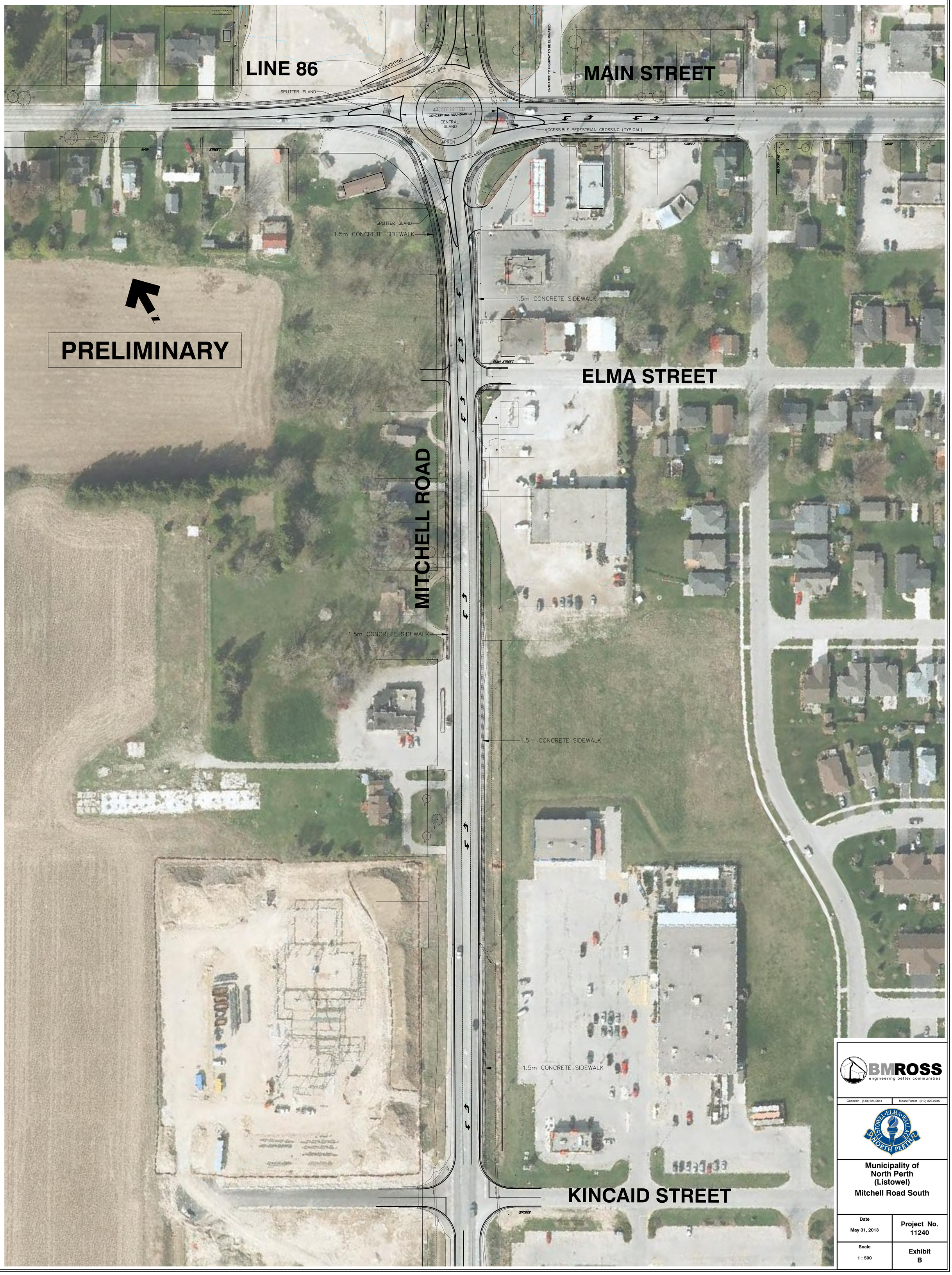
- Direct impacts to associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking;
- Indirect impacts associated with changes in site conditions such as drainage and water quantity/quality).

6.2.1 Direct Impacts

The road widening and roundabout have been located within the existing ROW as much as possible. Natural features within the project study area are very limited and there will be no direct impacts to any significant natural features.

Tree and Vegetation Removal

The proposed design of the roundabout overlaps with some landscape trees on the adjacent residential and commercial properties. Three trees will be removed including one each of green ash, silver maple and Manitoba maple, as summarized in Table 2 and shown in Appendix III.



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LISTOWEL • ELMA • WALLACE • NORTH PERTH

Municipality of North Perth (Listowel)

Mitchell Road South

Date	Project No.
May 31, 2013	11240
Scale: 1 : 500	Exhibit B

Mitigation - Where trees are to be retained at the limit of construction, tree protection fencing should be installed at or up to 1.5m outside of the dripline of trees in order to protect them from damage during construction. It is recommended that planting of new trees be incorporated into the proposed design in order to compensate for tree loss. Trees to be planted should be of suitable species (hardy, native and low maintenance) and planted and maintained according to proper arboricultural techniques.

Any tree removal work must consider the MBCA (CWS 2013) timing window to prevent impacts to nesting birds through destruction of their nests and eggs.

Mitigation – Avoid tree and vegetation removal during the peak migratory bird nesting season (outside of April 1 to August 31). This is a general guideline since the Act applies to nesting at any time of the year. If trees or vegetation is to be removed during the peak season, a nest search should be conducted within 2 days of removal by a qualified professional to confirm the absence of nests.

6.2.2 Indirect Impacts

For the purposes of the analysis of potential indirect impacts, the following categories are discussed:

- Sediment and erosion
- Stormwater management
- Indirect impacts to wildlife

<u>Sediment and Erosion</u>

During area grading, there is potential for sediment to escape the construction site during times of precipitation, and impact on natural features off-site.

Mitigation - erosion and sediment control measures are required to ensure sediment does not escape the construction area and impact natural features off-site. An erosion and sediment control strategy must be developed during final design and implemented during the construction process.

Stormwater Management

A stormwater management plan should be prepared to capture and treat road runoff for quality and quantity prior to it flowing off-site and potentially impacting natural features. The use of salt for de-icing should be minimized as much as possible and employ best management practices to avoid potential impacts to vegetation, wildlife, surface and groundwater resources.

Indirect Impacts to Wildlife

The majority of the proposed undertaking is confined to the road ROW. Potential impacts of the preferred alternative are limited to the removal of a few landscape trees with very limited value to wildlife. Correspondence with the MNRF (G. Buck pers. comm. 2014) has indicated the lack of SAR protected under the ESA within the project study area.

The presence of milkweed in the road ROW is habitat for Monarch butterfly, a SCC. The minor loss of milkweed due to the proposed improvements is not anticipated to be a significant impact to monarch. The ROW will be re-vegetated following construction and milkweed is likely to self-seed from neighbouring plants in the adjacent meadow areas. No additional surveys or mitigation is proposed.

Noise and dust associated with construction is anticipated to be temporary, and no significant impacts to wildlife from noise and dust are expected.

7.0 Summary and Recommendations

NRSI was retained to complete a natural heritage assessment for the proposed highway improvements located on Highway No. 23 (Mitchell Road South) and at the intersection with County Road 86, within the town of Listowel, Ontario. The assessment is being carried out in conjunction with the Class Environmental Assessment (EA) for the Ontario Ministry of Transportation. This report provides a summary of the natural features within the project study area and provides an analysis of potential impacts.

Based on NRSIs findings, as well as feedback from the MNRF (G. Buck pers. comm. 2014; Appendix IX), there are no significant natural features within the project study area and there are no significant impacts to natural features anticipated as part of the proposed undertaking. Impacts are limited to the removal of a few landscape trees from residential and commercial properties. Several SAR and species of conservation concern are known from the general study area from background information and there is suitable habitat for some within the project study area. Due to the limited extent of construction, none are expected to be impacted by the proposed undertaking, which is similarly voiced by the MNR (G. Buck pers. comm. 2014; Appendix IX).

The following recommendations are provided for general protection of natural features and wildlife during construction:

- any trees to be retained should be protected with fencing, installed at or up to 1.5m beyond the dripline,
- if trees are to be removed, it should be done outside of the peak nesting season for migratory birds (outside of April 1 to August 31). If trees or vegetation is to be removed during the peak season, a nest search should be conducted within 2 days of removal by a qualified professional to confirm the absence of nests,
- a sediment and erosion control plan should be prepared, implemented and maintained by a qualified professional,
- stormwater management be provided, including salt mitigation measures,
- any trees to be planted are of suitable species and are done so and maintained according to accepted arboricultural practices.

8.0 References

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APPENDIX I
Site Photographs

Photo 1. Viewing west, at the eastern section of the subject property.

Photo 2. Viewing north, on Highway 23 at the Elma Street.

Photo 3. Facing south, on Highway 23, towards the A&W Restaurant, at the far southern end of the subject property.

APPENDIX II

Vascular Flora Observed within the Project Study Area

Vascular Plant Species Reported From the Project Study Area

Scientific Name	Common Name	CC	CW	Weed	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	Perth County	NRSI Observed
SOURCE:		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	MNR RARE 4th Ed. 2009	SARO List	SARA Registry	SARA Registry	OLDHAM 1993	
Gymnosperms	**Conifers**									
Cupressaceae	**Cypress Family**									
Thuja occidentalis	White Cedar	4	-3		S5				X	X
Pinaceae	**Pine Family**									
Picea abies	Norway Spruce		5	-1	SE3					X
Pinus strobus	Eastern White Pine	4	3		S5				X	X
Dicotyledons	**Dicots**									
Aceraceae	**Maple Family**									
Acer negundo	Manitoba Maple	0	-2		S5				X	X
Acer platanoides	Norway Maple		5	-3	SE5				I	X
Acer saccharinum	Silver Maple	5	-3		S5				X	X
Acer saccharum ssp. saccharum	Sugar Maple	4	3		S5				X	X
Anacardiaceae	**Sumac or Cashew Family**									
Rhus hirta	Staghorn Sumac	1	5		S5				X	X
Apiaceae	**Carrot or Parsley Family**									
Daucus carota	Wild Carrot		5	-2	SE5				I	X
Asclepiadaceae	**Milkweed Family**									
Asclepias syriaca	Common Milkweed	0	5		S5				X	X
Asteraceae	**Composite or Aster Family**									
Achillea millefolium ssp. millefolium	Common Yarrow		3	-1	SE?					X
Ambrosia artemisiifolia	Common Ragweed	0	3		S5				X	X
Arctium minus ssp. minus	Common Burdock		5	-2	SE5				I	X
Centaurea maculosa	Spotted Knapweed		5	-3	SE5				I	X
Cichorium intybus	Chicory		5	-1	SE5				I	X
Cirsium arvense	Canada Thistle		3	-1	SE5				I	X
Erigeron annuus	Daisy Fleabane	0	1		S5					X

Rudbeckia hirta	Black-eyed Susan	0	3		S5				X	X
Solidago canadensis	Canada Goldenrod	1	3		S5				X	X
Sonchus arvensis ssp. arvensis	Field Sow-thistle				SE5				I	X
Tussilago farfara	Coltsfoot		3	-2	SE5				I	X
Campanulaceae	**Bellflower Family**									
Campanula rapunculoides	Creeping Bellflower		5	-2	SE5				I	X
Cornaceae	**Dogwood Family**									
Cornus stolonifera	Red-osier Dogwood	2	-3		S5				X	X
Dipsacaceae	**Teasel Family**									
Dipsacus fullonum ssp. sylvestris	Wild Teasel		5	-1	SE5				I	X
Ericaceae	**Heath Family**									
Vaccinium myrtilloides	Velvet-leaf Blueberry	7	-2		S5				X	X
Fabaceae	**Pea Family**									
Coronilla varia	Variable Crown-vetch		5	-2	SE5					X
Lotus corniculatus	Bird's-foot Trefoil		1	-2	SE5				I	X
Medicago lupulina	Black Medick		1	-1	SE5				I	X
Melilotus alba	White Sweet-clover		3	-3	SE5				I	X
Melilotus officinalis	Yellow Sweet-clover		3	-1	SE5				I	X
Trifolium pratense	Red Clover		2	-2	SE5				I	X
Trifolium repens	White Clover		2	-1	SE5				I	X
Vicia cracca	Tufted Vetch		5	-1	SE5				I	X
Guttiferae	**St. John's-wort Family**									
Hypericum perforatum	Common St. John's-wort		5	-3	SE5				I	X
Hippocastanaceae	**Buckeye Family**									
Aesculus hippocastanum	Horse Chestnut		5	-1	SE2					X
Lamiaceae	**Mint Family**									
Prunella vulgaris ssp. lanceolata	Heal-all	5	5		S5					X
Lentibulariaceae	**Bladderwort Family**									
Utricularia vulgaris	Greater Bladderwort	4	-5		S5				X	X

Malvaceae	**Mallow Family**									
Abutilon theophrasti	Velvet-leaf		4	-1	SE5				I	X
Oleaceae	**Olive Family**									
Fraxinus americana	White Ash	4	3		S5				X	X
Fraxinus pennsylvanica	Green Ash	3	-3		S5				X	X
Syringa vulgaris	Common Lilac		5	-2	SE5				I	X
Onagraceae	**Evening-primrose Family**									
Oenothera biennis	Common Evening-primrose	0	3		S5				X	X
Plantaginaceae	**Plantain Family**									
Plantago major	Common Plantain		-1	-1	SE5				I	X
Polygonaceae	**Smartweed Family**									
Rumex crispus	Curly-leaf Dock		-1	-2	SE5				I	X
Rosaceae	**Rose Family**									
Malus domestica	Apple									X
Salicaceae	**Willow Family**									
Populus tremuloides	Trembling Aspen	2	0		S5				X	X
Salix exigua	Sandbar Willow	3	-5		S5				X	X
Scrophulariaceae	**Figwort Family**									
Linaria vulgaris	Butter-and-eggs		5	-1	SE5				I	X
Verbascum thapsus	Common Mullein		5	-2	SE5				I	X
Tiliaceae	**Linden Family**									
Tilia cordata	Small Leaf Linden				SE1					X
Monocotyledons	**Monocots**									
Cyperaceae	**Sedge Family**									X
Juncaceae	**Rush Family**									X
Poaceae	**Grass Family**									
Bromus inermis ssp. inermis	Awnless Brome		5	-3	SE5				I	X
Phalaris arundinacea	Reed Canary Grass	0	-4		S5				X	X

Phragmites australis	Common Reed	0	-4		S5				X	X
Typhaceae	**Cattail Family**									
Typha latifolia	Broad-leaved Cattail	3	-5		S5				X	X
								Total	**47**	**56**

FLORISTIC SUMMARY & ASSESSMENT			
Species Diversity*			
Total Species:	**51**		
Native Species:	**23**	45.10%	
Exotic Species	**28**	54.90%	
Total Taxa in Region (List Region, Source)	10000		
% Regional Taxa Recorded	0.51%		
Regionally Significant Species	enter manually		
S1-S3 Species	enter manually		
S4 Species	0		
S5 Species	23		
Co-efficient of Conservatism and Floral Quality Index			
Co-efficient of Conservatism (CC) (average)		**2.26**	
CC 0 to 3	*lowest sensitivity*	15	65.22%
CC 4 to 6	*moderate sensitivity*	7	30.43%
CC 7 to 8	*high sensitivity*	1	4.35%
CC 9 to 10	*highest sensitivity*	0	0.00%
Floral Quality Index (FQI)		**10.84**	
Presence of Weedy & Invasive Species			
mean weediness		**-1.71**	
weediness = -1	*low potential invasiveness*	13	46.43%
weediness = -2	*moderate potential invasiveness*	10	35.71%
weediness = -3	*high potential invasiveness*	5	17.86%
Presence of Wetland Species			
average wetness value		**1.98**	
upland		19	37.25%
facultative upland		15	29.41%
facultative		6	11.76%

facultative wetland		8	15.69%
obligate wetland		3	5.88%

**NOTE: Species numbers only correct if all Exotics have a weediness index and all Natives have a Coefficient of Conservatism.*

LEGEND
SRANK
S5 Secure
S#? Rank Uncertain

APPENDIX III
Tree Inventory

Appendix III. Tree Inventory.

ID #	Common Name	Scientific Name	# of Stems	DBH (cm)	Crown Radius (m)	Structural Failure? (H/M/L)	Condition (E/G/S/P)	Cavities?	Retain? (Y/N)	UTM
1	Norway Maple	*Acer platanoides*	1	20	5	L	E	0	Y	17T 0502629 4842330
2	Silver Maple	*Acer saccharinum*	3	40	8	M	E	0	Y	17T 0502636 4842339
3	Norway Maple	*Acer platanoides*	1	20	6	L	E	0	Y	17T 0502639 4842347
4	Silver Maple	*Acer saccharinum*	2	55	9	M	S	0	Y	17T 0502683 4842438
5	Norway Maple	*Acer platanoides*	2	25	7	L	G	0	Y	17T 0502692 4842448
6	Horse Chestnut	*Aesculus hippocastanum*	1	50	4	L	G	0	Y	17T 0502648 4842685
7	Silver Maple	*Acer saccharinum*	3	65	6	M	G	0	Y	17T 0502635 4842696
8	Silver Maple	*Acer saccharinum*	1	45	5	H	S	1	Y	17T 0502628 4842721
9	Silver Maple	*Acer saccharinum*	2	50	6	L	E	0	Y	17T 0502637 4842714
10	Silver Maple	*Acer saccharinum*	2	75	8	L	E	0	Y	17T 0502644 4842712
11	Green Ash	*Fraxinus pennsylvanica*	1	25	5	L	E	0	N	17T 0502809 4842658
12	Silver Maple	*Acer saccharinum*	2	50	6	M	G	0	N	17T 0502855 4842637
13	Manitoba Maple	*Acer negundo*	2	35	6	H	S	0	N	17T 0502868 4842617
14	Manitoba Maple	*Acer negundo*	2	40	6	H	S	0	Y	17T 0502869 4842616
15	Silver Maple	*Acer saccharinum*	1	35	6	L	E	0	Y	17T 0502878 4842583
16	Manitoba Maple	*Acer negundo*	2	40	5	L	P	1	Y	17T 0502886 4842578
17	Apple sp.	*Malus sp.*	1	15	3	H	E	0	Y	17T 0502912 4842562
18	Norway Maple	*Acer platanoides*	1	30	6	L	E	0	Y	17T 0502932 4842549
19	Norway Maple	*Acer platanoides*	1	35	6	L	E	0	Y	17T 0502946 4842539
20	Sugar Maple	*Acer saccharum*	1	65	6	M	G	0	Y	17T 0502965 4842498
21	Norway Maple	*Acer platanoides*	1	20	6	L	E	0	Y	17T 0502931 4842523
22	Norway Maple	*Acer platanoides*	2	20	6	L	E	0	Y	17T 0502922 4842527
23	Manitoba Maple	*Acer negundo*	2	45	5	H	P	1	Y	17T 0502622 4842726
24	White Cedar	*Thuja occidentalis*	3	30	3	L	G	0	Y	17T 0502861 4842608
25	Norway Maple	*Acer platanoides*	1	15	4	L	E	0	Y	17T 0502925 4842553
26	Norway Spruce	*Picea abies*	2	50	5	L	E	0	Y	17T 050947 4842513

APPENDIX IV
Bird Species Known from the Study Area

Bird Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ04	NHIC Data	NRSI Observed
Anatidae	**Ducks, Geese & Swans**							
Branta canadensis	Canada Goose	S5				CO		X
Aix sponsa	Wood Duck	S5				CO		
Anas rubripes	American Black Duck	S4				PO		
Anas platyrhynchos	Mallard	S5				CO		
Anas clypeata	Northern Shoveler	S4				CO		
Anas crecca	Green-winged Teal	S4				PR		
Oxyura jamaicensis	Ruddy Duck	S4B, S4N				PO		
Ardeidae	**Herons & Bitterns**							
Ardea herodias	Great Blue Heron	S4B				PO		
Butorides virescens	Green Heron	S4B				PO		
Cathartidae	**Vultures**							
Cathartes aura	Turkey Vulture	S5B				PO		X
Accipitridae	**Hawks, Kites, Eagles & Allies**							
Accipiter striatus	Sharp-shinned Hawk	S5	NAR			PO		
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR		CO		
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR		CO		
Charadriidae	**Plovers**							
Charadrius vociferus	Killdeer	S5B, S5N				CO		X
Scolopacidae	**Sandpipers, Phalaropes & Allies**							
Actitis macularia	Spotted Sandpiper	S5				PR		
Columbidae	**Pigeons & Doves**							
Columba livia	Rock Pigeon	SNA				PR		
Zenaida macroura	Mourning Dove	S5				PR		
Cuculiformes	**Cuckoos & Anis**							
Coccyzus erythropthalmus	Black-billed Cuckoo	S5B				PO		
Strigidae	**Typical Owls**							
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR		PR		
Apodidae	**Swifts**							
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T	Schedule 1	PR		

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	Schedule[4]	17NJ04	Data	Observed
Trochilidae	**Hummingbirds**							
Archilochus colubris	Ruby-throated Hummingbird	S5B				PR		
Alcedinidae	**Kingfishers**							
Megaceryle alcyon	Belted Kingfisher	S4B				PO		
Picidae	**Woodpeckers**							
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	T	Schedule 1	PO		
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B				PO		
Picoides pubescens	Downy Woodpecker	S5				CO		X
Picoides villosus	Hairy Woodpecker	S5				PO		
Colaptes auratus	Northern Flicker	S4B				PO		
Falconidae	**Caracaras & Falcons**							
Falco sparverius	American Kestrel	S4				CO		
Tyrannidae	**Tyrant Flycathers**							
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		PR		
Empidonax traillii	Willow Flycatcher	S5B				PO		
Empidonax minimus	Least Flycatcher	S4B				PO		
Sayornis phoebe	Eastern Phoebe	S5B				CO		
Myiarchus crinitus	Great Crested Flycatcher	S4B				PR		
Tyrannus tyrannus	Eastern Kingbird	S4B				PR		
Vireonidae	**Vireos**							
Vireo gilvis	Warbling Vireo	S5B				PR		
Vireo olivaceus	Red-eyed Vireo	S5B				PO		
Corvidae	**Crows & Jays**							
Cyanocitta cristata	Blue Jay	S5				PR		X
Corvus brachyrhynchos	American Crow	S5B				CO		X
Alaudidae	**Larks**							
Eremophila alpestris	Horned Lark	S5B				PO		
Hirundinidae	**Swallows**							
Progne subis	Purple Martin	S4B				PO		
Tachycineta bicolor	Tree Swallo	S5B				CO		
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B				PR		
Riparia riparia	Bank Swallow	S4B	THR	T		PO		
Petrochelidon pyrrhonota	Cliff Swallow	S4B				CO		
Hirundo rustica	Barn Swallow	S4B	THR	T		PR		
Paridae	**Chickadees & Titmice**							
Poecile atricapillus	Black-capped Chickadee	S5				CO		X

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	Schedule[4]	17NJ04	Data	Observed
Sittidae	**Nuthatches**							
Sitta carolinensis	White-breasted Nuthatch	S5				PO		
Troglodytidae	**Wrens**							
Troglodytes aedon	House Wren	S5B				CO		
Turdidae	**Thrushes**							
Hylocichla mustelina	Wood Thrush	S4B	SC	T		PR		
Turdus migratorius	American Robin	S5B				CO		X
Mimidae	**Mockingbirds, Thrashers & Allies**							
Dumetella carolinensis	Gray Catbird	S4B				PR		
Toxostoma rufum	Brown Thrasher	S4B				PO		
Sturnidae	**Starlings**							
Sturnus vulgaris	European Starling	SNA				CO		X
Bombycillidae	**Waxwings**							
Bombycilla cedrorum	Cedar Waxwing	S5B				CO		
Parulidae	**Wood Warblers**							
Seiurus aurocapillus	Ovenbird	S4B				PO		
Geothylpis philadelphia	Mourning Warbler	S4B				PO		
Geothylpis trichas	Common Yellowthroat	S5B				PO		
Setophaga ruticilla	American Redstart	S5B				PO		
Setophaga petechia	Yellow Warbler	S5B				PR		
Emberizidae	**New World Sparrows & Allies**							
Spizella passerina	Chipping Sparrow	S5B				CO		
Pooecetes gramineus	Vesper Sparrow	S4B				PO		
Passerculus sandwichensis	Savannah Sparrow	S4B				PR		
Melospiza melodia	Song Sparrow	S5B				CO		X
Cardinalidae	**Cardinals, Grosbeaks & Allies**							
Cardinalis cardinalis	Northern Cardinal	S5				PR		X
Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B				PR		
Passerina cyanea	Indigo Bunting	S4B				PO		
Icteridae	**Blackbirds**							
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	No Schedule	PR		
Agelaius phoeniceus	Red-winged Blackbird	S4				CO		X
Sturnella magna	Eastern Meadowlark	S4B	THR	T		PO		
Quiscalus quiscula	Common Grackle	S5B				CO		
Molothrus ater	Brown-headed Cowbird	S4B				CO		

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	Schedule[4]	17NJ04	Data	Observed
Icterus galbula	Baltimore Oriole	S4B				CO		
Fringillidae	**Finches & Allies**							
Carpodacus mexicanus	House Finch	SNA				PR		
Spinus tristis	American Goldfinch	S5B				PR		X
Passeridae	**Old World Sparrows**							
Passer domesticus	House Sparrow	SNA				CO		X
					Total	75	0	14

[1]OMNR 2013a; [2]OMNR 2013b; [3]COSEWIC 2012; [4]Government of Canada 2012;

LEGEND
SRANK
S1 Critically Imperiled
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SU Unrankable
SNA Unranked
COSSARO
END Endangered
THR Threatened
SC Special Concern
NAR Not at Risk
COSEWIC
E Endangered
T Threatened
SC Special Concern
NAR Not at Risk
SARA Schedule
Schedule 1 Officially Protected under SARA

APPENDIX V

Herpetofauna Species Known from the Study Area

Reptile and Amphibian Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	Ontario Reptile and Amphibian Atlas[5]	NHIC Data	NRSI Observed
Turtles								
Chelydra serpentina serpentina	Snapping Turtle	S3	SC	SC	Schedule 1	X		
Chrysemys picta marginata	Midland Painted Turtle	S5				X		
Snakes								
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5				X		
Toads and Frogs								
Anaxyrus americanus	American Toad	S5				X		
Lithobates clamitans melanota	Northern Green Frog	S5				X		
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR		X		
					Total	**6**	**0**	**0**

[1]OMNR 2013a; [2]OMNR 2013b; [3]COSEWIC 2012; [4]Government of Canada 2012; [5]Ontario Nature 2013

Legend
SRANK
S3 Vulnerable
S5 Secure
COSSARO
SC Special Concern
NAR Not at Risk
COSEWIC
SC Special Concern
NAR Not at Risk

APPENDIX VI
Mammal Species Known from the Study Area

Mammal Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	Ontario Mammal Atlas[5]	NHIC Data	NRSI Observed
Didelphimorphia	**Opossums**							
Didelphis virginiana	Virginia Opossum	S4				X		
Chiroptera	**Bats**							
Eptesicus fuscus	Big Brown Bat	S5				X		
Myotis lucifugus	Little Brown Myotis	S4	END	E		X		
Lagomorpha	**Rabbits and Hares**							
Lepus europaeus	European Hare	SNA				X		
Sylvilagus floridanus	Eastern Cottontail	S5						X
Rodentia	**Rodents**							
Castor canadensis	Beaver	S5				X		
Marmota monax	Woodchuck	S5				X		
Microtus pennsylvanicus	Meadow Vole	S5				X		
Ondatra zibethicus	Muskrat	S5				X		
Sciurus carolinensis	Eastern Gray Squirrel	S5				X		X
Tamiasciurus hudsonicus	Red Squirrel	S5				X		
Carnivora	**Carnivores**							
Mephitis mephitis	Striped Skunk	S5				X		
Mustela vison	American Mink	S4				X		
Procyon lotor	Northern Raccoon	S5				X		
Vulpes vulpes	Red Fox	S5				X		
Artiodactyla	**Deer and Bison**							
Odocoileus virginianus	White-tailed Deer	S5				X		
					Total	15	0	2

[1]OMNR 2013a; [2]OMNR 2013b; [3]COSEWIC 2012; [4]Government of Canada 2012; [5]Dobbyn 1994

APPENDIX VII
Butterfly Species Known from the Project Study Area

Butterfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	TEA Atlas[5]	NHIC Data	NRSI Observed
Hesperiidae	**Skippers**							
Anatrytone logan	Delaware Skipper	S4				X		
Ancyloxypha numitor	Least Skipper	S5				X		
Carterocephalus palaemon	Arctic Skipper	S5				X		
Erynnis baptisiae	Wild Indigo Duskywing	S4				X		
Euphyes conspicua	Black Dash	S3				X		
Euphyes vestris	Dun Skipper	S5				X		
Hylephila phyleus	Fiery Skipper	SNA				X		
Poanes hobomok	Hobomok Skipper	S5				X		
Poanes viator	Broad-winged Skipper	S4				X		
Polites mystic	Long Dash Skipper	S5				X		
Polites origenes	Crossline Skipper	S4				X		
Polites peckius	Peck's Skipper	S5				X		
Polites themistocles	Tawny-edged Skipper	S5				X		
Pyrgus communis	Common Checkered Skipper	SNA				X		
Thymelicus lineola	European Skipper	SNA				X		
Wallengrenia egeremet	Northern Broken Dash	S5				X		
Papilionidae	**Swallowtails**							
Battus Philenor	Pipevine Swallowtail	SNA				X		
Papilio cresphontes	Giant Swallowtail	S3				X		
Papilio glaucus	Eastern Tiger Swallowtail	S5				X		
Papilio polyxenes	Black Swallowtail	S5				X		X
Papilio troilus	Spicebush Swallowtail	S4				X		
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5				X		
Colias philodice	Clouded Sulphur	S5				X		X
Pieris rapae	Cabbage White	SNA				X		X
Pyrisitia lisa	Little Yellow	SNA				X		
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina ladon	Spring Azure	S5				X		
Celastrina neglecta	Summer Azure	S5				X		
Cupido comyntas	Eastern Tailed Blue	S5				X		

Glaucopsyche lygdamus	Silvery Blue	S5				X		
Lycaena hyllus	Bronze Copper	S5				X		
Satyrium acadica	Acadian Hairstreak	S4				X		
Satyrium calanus	Banded Hairstreak	S4				X		
Satyrium caryaevorus	Hickory Hairstreak	S3				X		
Satyrium liparops	Striped Hairstreak	S5				X		
Satyrium titus	Coral Hairstreak	S5				X		
Strymon melinus	Grey Hairstreak	S4						
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5				X		
Boloria bellona	Meadow Fritillary	S5				X		
Boloria selene	Silver-bordered Fritillary	S5				X		
Cercyonis pegala	Common Wood-Nymph	S5				X		
Coenonympha tullia	Common Ringlet	S5				X		
Danaus plexippus	Monarch	S2N, S4B	SC	SC	Schedule 1	X		
Enodia anthedon	Northern Pearly-Eye	S5				X		
Euptoieta claudia	Variegated Fritillary	SNA				X		
Junonia coenia	Common Buckeye	SNA				X		
Lethe appalachia	Appalachian Brown	S4				X		
Lethe eurydice	Eyed Brown / Northern Eyed Brown	S5				X		
Limenitis archippus	Viceroy	S5				X		
Limenitis arthemis arthemis	White Admiral/Banded Purple	S5				X		
Limentis arthemis astyanax	Red-spotted Purple	S5				X		
Nympahlis vaualbum	Compton Tortoiseshell	S5				X		
Nymphalis antiopa	Mourning Cloak	S5				X		
Phyciodes cocyta	Northern Crescent	S5				X		
Phyciodes tharos	Pearl Crescent	S4				X		
Polygonia comma	Eastern Comma	S5				X		
Polygonia interrogationis	Question Mark	S5				X		
Polygonia progne	Grey Comma	S5				X		
Speyeria cybele	Great Spangled Fritillary	S5				X		
Vanessa atalanta	Red Admiral	S5				X		
Vanessa cardui	Painted Lady	S5				X		
Vanessa virginiensis	American Lady	S5				X		
					Total	**60**	**0**	**3**

[1]OMNR 2013a; [2]OMNR 2013b; [3]COSEWIC 2012; [4]Government of Canada 2012; [5]5Jones et al. 2013

LEGEND
SRANK
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
COSSARO
SC Special Concern
COSEWIC
SC Special Concern
SARA Schedule
Schedule 1 Officially Protected under SARA

APPENDIX VIII
Odonata Species Known from the Study Area

Dragonfly and Damselfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	OMNR[2]	COSEWIC[3]	SARA Schedule[4]	NHIC Observed (Adjacent squares)	NRSI Observed
Calopterygidae	**Broadwinged Damselflies**						
Calopteryx aequabilis	River Jewelwing	S5				X	
Calopteryx maculata	Ebony Jewelwing	S5				X	
Hetaerina americana	American Rubyspot	S4				X	
Coenagrionidae	**Narrow-winged Damselflies**						
Amphiagrion saucium	Eastern Red Damsel	S4				X	
Argia moesta	Powdered Dancer	S5				X	
Enallagma antennatum	Rainbow Bluet	S4				X	
Enallagma exsulans	Stream Bluet	S5				X	
Ischnura verticalis	Eastern Forktail	S5				X	
Nehalennia gracilis	Sphagnum Sprite	S4				X	
Aeshnidae	**Darners**						
Anax junius	Common Green Darner	S5				X	
Gomphidae	**Clubtails**						
Gomphus exilis	Lancet Clubtail	S5				X	
Libellulidae	**Skimmers**						
Leucorrhinia intacta	Dot-tailed Whiteface	S5				X	
Libellula luctuosa	Widow Skimmer	S5				X	
Libellula pulchella	Twelve-spotted Skimmer	S5				X	
Nannothemis bella	Elfin Skimmer	S4				X	
Plathemis lydia	Common Whitetail	S5				X	
					Total	**16**	**0**

[1]OMNR 2010; [2]OMNR 2012; [3]COSEWIC 2012; [4]Government of Canada 2012

LEGEND
SRANK
S4 Apparently Secure
S5 Secure

APPENDIX IX
MNRF Correspondence

Subject: RE: proj1540 - Listowel SAR Screening Memo
From: "Buck, Graham (MNR)" <Graham.Buck@ontario.ca>
Date: 21/10/2014 4:14 PM
To: Ken Burrell <kburrell@nrsi.on.ca>

Hi Ken,

MNRF is not aware of any species at risk at this site that are protected by the Endangered Species Act. Also, due to the location and proposed works the project also appears to be a low risk to species at risk.

Graham Buck
Management Biologist
Ministry of Natural Resources and Forestry
1 Stone Road West
Guelph ON
N1G 4Y2
519 826 4505
graham.buck@ontario.ca

From: Ken Burrell [mailto:kburrell@nrsi.on.ca]
Sent: October-05-14 8:58 PM
To: Buck, Graham (MNR)
Cc: Elaine Gosnell
Subject: proj1540 - Listowel SAR Screening Memo

Hi Graham,

NRSI has been retained by BM-Ross to conduct a natural heritage assessment for proposed road development at Hwy. 23 and Hwy. 85, in Listowel. We've completed a preliminary SAR screening memo, attached to this email, and were hoping for feedback, before we submit our comprehensive report and findings.

If you have any questions, please don't hesitate contact myself, or Elaine Gosnell (cc'ed here).

Kind regards,
Ken
--

APPENDIX B

STAGE 1 & 2 ARCHAEOLOGICAL ASSESSMENT

ORIGINAL REPORT

5 July 2012

STAGE 1 AND 2 ARCHAEOLOGICAL ASSESSMENT

Mitchell Road South Improvements And Binning Streets West Extension, Listowel Municipality of North Perth Perth County, Ontario

Submitted to:
Ms. Kelly Vader MCIP, RPP
B. M. Ross and Associates Ltd.
62 North Street
Goderich, Ontario N7A 2T4
Tel: (519) 524-2641 Fax: (519) 542-4403

Licensed Archaeologist: Scott Martin, Ph.D., (P218)

PIF Number: P218-224-2012

Report Number: 12-1136-0025-R01

Distribution:

3 Copies - GSP Group Inc.

1 Copy & 1 CD - Ministry of Tourism, Culture and Sport

2 Copies - Golder Associates Ltd.

Golder Associates

Personnel

Licensed Archaeologist	Scott Martin, Ph.D., (P218), Director of Field Operations
Project Director	Jim Wilson, M.A., Principal, Senior Archaeologist (P001)
Project Manager	Adria Grant, B.A., (R131), Project Archaeologist
Licensed Field Director	Shane McCartney, B.A., (R321)
Report Production	Kelly Miller, B.A., Archaeological Field Technician Stacey Carson, Cultural Sciences Group Administrator

Acknowledgments

Proponent Contact	Ms. Kelly Vader MCIP, RPP
Ministry of Tourism, Culture & Sport	Robert Von Bitter, Archaeological Data Coordinator, Shari Prowse, M.A., Archaeology Review Officer, SW Region

Executive Summary

Golder Associates Ltd. was contracted by B. M. Ross Associates Ltd. to conduct a Stage 1 and Stage 2 archaeological assessment for a proposed road upgrade and road extensions in the community of Listowel, Municipality of North Perth, Perth County, Ontario. This Stage 1 and 2 assessment was conducted to meet the standard requirements of Section 4.1 of the Planning Act (R.S.O 1990 P. 13 Part 1 Section 2d).

The Stage 1 archaeological assessment determined that areas retaining archaeological integrity were present on the property and that a Stage 2 field assessment should be conducted. The Stage 2 archaeological assessment did not result in the identification of any archaeological sites and **no further archaeological assessment is recommended**.

The Ontario Ministry of Tourism, Culture and Sport is asked to review the results and recommendations presented herein and accept this report into the Provincial Register of archaeological reports and **issue a letter stating that there are no further concerns with regards to alterations to archaeological sites on the subject property**.

This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regards to alterations to archaeological sites by the proposed development.

It is an offence under Section 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alterations to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological reports referred to in Section 65.1 of the *Ontario Heritage Act.*

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 licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act,* R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act,* 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Table of Contents

PLATES

1.0 PROJECT CONTEXT

1.1 Development Context

Golder Associates Ltd. (Golder) was contracted by B.M Ross Associates Ltd. (B.M. Ross) to conduct a Stage 1 and Stage 2 archaeological assessment for an approximate 36.9 kilometre road extension corridor located in the community of Listowel near the intersection of Perth Line 68 and Highway 23, Municipality of North Perth, Perth County, Ontario (Figures 1 and 2).

This Stage 1 and 2 assessment was conducted to meet the standard requirements of Section 3 of the Planning Act (R.S.O 1990 P. 13 Part 1 Section 2d). Permission to enter the property and remove artifacts was given by Ms. Kelly Vader of B.M. Ross.

The objective of the Stage 1 assessment was to compile all available information about the known and potential cultural heritage resources within the study area and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the provincial standards and guidelines set out in the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), the objectives of the Stage 1 Archaeological Overview/Background Study are as follows:

- To provide information about the study area's geography, history, previous archaeological fieldwork and current land conditions;
- To evaluate in detail the study area's archaeological potential and integrity which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

To meet these objectives Golder archaeologists employed the following research strategies:

- A review of relevant archaeological, historic and environmental literature pertaining to the study area;
- A review of the land use history, including pertinent historic maps; and
- An examination of the Ontario Archaeological Sites Database (ASDB) to determine the presence of known archaeological sites in and around the project area.

The objective of the Stage 2 assessment was to provide an overview of archaeological resources on the property and to determine whether any of the resources might be artifact and archaeological sites with cultural heritage value or interest and to provide specific direction for the protection, management and/or recovery of these resources.

In compliance with the provincial standards and guidelines set out in the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), the objectives of the Stage 2 Property Assessment are as follows:

- To document all archaeological resources on the property;
- To determine whether the property contains archaeological resources requiring further assessment; and
- To recommend appropriate Stage 3 assessment strategies for any archaeological sites identified.

1.2 Archaeological Context

1.2.1 The Natural Environment

The subject property is situated within the Stratford Till Plain physiographic region (Chapman & Putnam 1984:133).

> *…broad clay plain of 1,370 square miles, extending from London in the south to Blyth and Listowel in the north with a projection toward Arthur and Grand Valley. It is an area of ground moraine interrupted by several terminal moraines. The moraines are more closely spaced in the southwestern portion of the region; consequently that part resembles the Mount Elgin Ridges….Throughout the area the till is fairly uniform, being a brown calcareous silty clay whether on the ridges or the more level ground moraine. It is a product of the Huron ice lobe. Some of the silt and clay is calcareous rock flour, probably a good deal of it coming from previously deposited varved clays of the Lake Huron Basin*
>
> Chapman and Putnam 1984:133

The soils of the study area are comprised of sandy loam. This type of soil has been determined to have been ideal for pre-contact Aboriginal agricultural practices. Potable water is the single most important resource for any extended human occupation or settlement. As water sources in southwestern Ontario have remained relatively stable over time, proximity to drinkable water is regarded as a useful index for the evaluation of archaeological site potential. In fact distance to water is one of the most commonly used variables for predictive modeling of archaeological site location in Ontario. The closest potable water source is the Maitland River, which is located approximately 600 metres south of the site (Figure 1 and 2).

1.2.2 Previously Known Archaeological Sites and Surveys

At present there are no registered archaeological sites within one kilometre of the study area. Table 2 provides a general outline of the culture history for the Listowel area drawn from Ellis and Ferris (1990).

Table 1: Cultural Chronology for the Listowel Area

Period	Characteristics	Time	Comments
Early Paleo-Indian	Fluted Projectiles	9000 - 8400 B.C.	spruce parkland/caribou hunters
Late Paleo-Indian	Hi-Lo Projectiles	8400 - 8000B.C.	smaller but more numerous sites
Early Archaic	Kirk and Bifurcate Base Points	8000 - 6000 B.C.	slow population growth
Middle Archaic	Brewerton-like points	6000 - 2500 B.C.	environment similar to present
Late Archaic	Lamoka (narrow points)	2000 - 1800 B.C.	increasing site size
	Broadpoints	1800 - 1500 B.C.	large chipped lithic tools
	Small Points	1500 - 1100B.C.	introduction of bow hunting
Terminal Archaic	Hind Points	1100 - 950 B.C.	emergence of true cemeteries
Early Woodland	Meadowood Points	950 - 400 B.C.	introduction of pottery
Middle Woodland	Dentate/Pseudo-Scallop Pottery	400 B.C. - A.D.500	increased sedentism
	Princess Point	A.D. 550 – 900	introduction of corn
Late Woodland	Early Ontario Iroquoian	A.D. 900 – 1300	emergence of agricultural villages
	Middle Ontario Iroquoian	A.D. 1300 – 1400	long longhouses (100m +)
	Late Ontario Iroquoian	A.D. 1400 – 1650	tribal warfare and displacement
Contact Aboriginal	Various Algonkian Groups	A.D. 1700 – 1875	early written records and treaties
Historic	Euro-Canadian	A.D. 1796 – present	European settlement

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the Freedom of Information Act. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The Ministry of Tourism, Culture and Sport will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

1.3 Historical Context

1.3.1 Potential for Pre-Contact Aboriginal Archaeological Resources

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Golder Associates Ltd. applied archaeological potential criteria commonly used by the Ministry of Tourism, Culture and Sport (Government of Ontario 2011) to determine areas of archaeological potential within the study area. These variables include: distance to various types of water sources, soil texture and drainage, glacial geomorphology and the general topographic variability of the area.

Distance to modern or ancient water sources is generally accepted as the most important determinant of past human settlement patterns and, considered alone, may result in a determination of archaeological potential. However, any combination of two or more other criteria, such as well-drained soils or topographic variability, may also indicate archaeological potential.

In archaeological potential modeling a distance to water criterion of 300 metres is generally employed for primary water courses including lakeshores, rivers and large creeks, while a criterion of 200 metres is applied to secondary water sources, including swamps and small creeks. The closest potable water source is the Maitland River, which is 600 metres south of the site (Figure 1 and 2). In addition to providing a source of potable water the Grand River would also have been used as an important thoroughfare for pre-contact Aboriginal people.

Soil texture can be an important determinant of past settlement, usually in combination with other factors such as topography. The soils of the study area are comprised of sandy loam. As this type of soil has been found to be suitable for pre-contact agriculture this also contributes to the archaeological potential for Aboriginal sites.

The Ministry of Tourism, Culture and Sport also views the presence of previously registered archaeological resources as a prime indicator of archaeological potential. There are no previously registered archaeological sites within a one kilometre radius of the study area; however, this is likely a result of the low levels of development that would trigger assessments rather than an indication that pre-contact Aboriginal people were not occupying the area.

When the above-noted archaeological potential criteria are applied to the study area, the archaeological potential for pre-contact Aboriginal sites was deemed to be moderate to high.

1.3.2 Potential for Historic Euro-Canadian Resources

The criteria used by the Ontario Ministry of Tourism, Culture and Sport to determine potential for historic Euro-Canadian archaeological sites includes the presence of: particular, resource-specific features that would have attracted past subsistence or extractive uses; areas of initial, non-Aboriginal settlement; early historic transportation routes; and properties designated under the *Ontario Heritage Act*.

The study area is located in the community of Listowel, Municipality of North Perth, Perth County, Ontario. The area enters the Euro-Canadian historic record as part of Treaty No. 27½ which was:

> *… an agreement made at Amherstburg in the Western District of the Province of Upper Canada on the 26th of April, 1825, between James Givens, Esquire, Superintendent of Indian Affairs, on behalf of His Majesty King George the Fourth and the Chiefs and Principal Men of the part of the Chippewa Nation of Indians, inhabiting and claiming the tract of land … . Wawanosh Township in the County of Huron was named after Way-way-nosh the principal Chief of the Band making this Treaty.*
>
> Morris 1943:26-27

Treaty Number 27½ was subsequently confirmed on July 10th, 1827 as Treaty Number 29 with only a minor change in the legal description of the boundaries of the land surrender (Morris 1943:27). While it is difficult to exactly delineate treaty boundaries today, Figure 3 provides an approximate outline of the limits of Treaty No. 27½.

The 1879 Map of the Township of Wallace in the Illustrated Historical Atlas of Perth County does not indicate the presence of any structures within the study area or list the names of the property owners (Figure 4). This is not unusual in that only subscribers to the atlas had their names recorded and their homes depicted. Historic maps are not always accurate and the absence of a structure on the map does not necessarily mean that none were present. Due to the close proximity to the historic community of Listowel, the potential for historic archaeological resources was judged to be moderate to high.

1.3.3 Existing Conditions

The Stage 2 field assessment was conducted on April 18th, 2012 under archaeological consulting license P218, issued to Scott Martin of Golder by the Ministry of Tourism, Culture and Sport.

The weather during the assessment was sunny and clear and at no time were conditions detrimental to the recovery of archaeological material. The study area is approximately 4.5 acres in size.

2.0 STAGE 2 FIELD ASSESSMENT METHODS

The study area consists primarily of agricultural land with lesser areas of lawn and previous disturbance. Eighty five percent of the study area was assessed by standard pedestrian survey at five metre intervals (Plates 1 and 2). The area was recently ploughed and weathered, surface visibility was excellent and at no times were the conditions detrimental to the recovery of cultural material. In the event that an artifact was encountered during the pedestrian survey, survey intervals were intensified to one metre within a twenty metre radius of the find.

Ten percent of the study area was assessed by the standard shovel test pit method at a five metre interval (Plates 3 and 4). Each test pit was at least 30 centimetres in diameter and was dug five centimetres into subsoil, and each pit was examined for stratigraphy, cultural features or evidence of fill. All soil was screened through six millimetre hardware cloth to facilitate the recovery of any cultural material. Each test pit was back filled and topped up with additional soil when necessary.

Five percent of the study area had previously been disturbed due to landscaping activities between two existing businesses. This landscaping involved the creation of a sloped berm and would have eradicated any archaeological integrity (Plates 5 and 6).

All recovered artifacts will be temporarily housed at the London, Ontario office of Golder until their transfer to the Ministry of Tourism, Culture and Sport collections facility located at 900 Highbury Avenue, London. GPS co-ordinates for any locations found are provided in the supplementary documentation, have been taken from a Garmin eTrex Legend handheld GSP unit using the North American Datum (NAD) 83, with a minimal accuracy of five metres.

3.0 RECORD OF FINDS

The Stage 2 archaeological assessment was conducted using the methods described in Section 2.0. Figure 5 illustrates the areas assessed, the techniques employed and Plates 1 to 6 illustrate the Stage 2 survey conditions. All field notes, maps and photographs are housed at the London, Ontario Golder office.

The Stage 2 archaeological assessment did not result in the identification of any archaeological sites of cultural heritage value or interest and no further archaeological assessment is recommended.

4.0 ANALYSIS AND CONCLUSIONS

The Stage 1 archaeological assessment determined that the pre-contact Aboriginal archaeological potential was moderate to high, given the suitability of the sandy loam soil for pre-contact Aboriginal agricultural practices, and the proximity of the Maitland River.

Conversely, historic Euro-Canadian archaeological potential was deemed to be moderate to high due to the close proximity to the community of Listowel and the established early settlement of Perth Township. As a result, the study area required Stage 2 archaeological assessment and deemed to have moderate to high archaeological potential.

The Stage 2 archaeological assessment did not result in the identification of any archaeological sites and no further archaeological assessment is recommended.

5.0 RECOMMENDATIONS

The Stage 2 assessment did not result in the identification of any archaeological resources of cultural heritage value or interest and **no further archaeological assessment is recommended**.

The Ontario Ministry of Tourism, Culture and Sport is asked to review the results and recommendations presented herein, accept this report into the Provincial Register of archaeological reports and **issue a letter stating that there are no further concerns with regards to alterations to archaeological sites on the subject property**.

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Adria Grant, B.A.
Project Archaeologist

ORIGINAL SIGNED

Jim Wilson, M.A.
Principal, Senior Archaeologist

KM/AEG/JAW/slc

n:\active\2012\1136 - arch\12-1136-0025 bm ross-stage 1-2 mitchell rd binning st-listowel\rpts\1211360025-r01\1211360025-r01 july 5 12 bm ross stage 1-2 mitchell road listowel.docx

6.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regards to alterations to archaeological sites by the proposed development.

It is an offence under Section 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alterations to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological reports referred to in Section 65.1 of the *Ontario Heritage Act.*

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 licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act,* R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act,* 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

7.0 BIBLIOGRAPHY AND SOURCES

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8.0 IMAGES

Plate 1: Pedestrian Survey, Assessed at Five Metres Intervals

Plate 2: Pedestrian Survey, Assessed at Five Metre Intervals

Plate 3: Test Pit Survey, Assessed at Five Metres Intervals

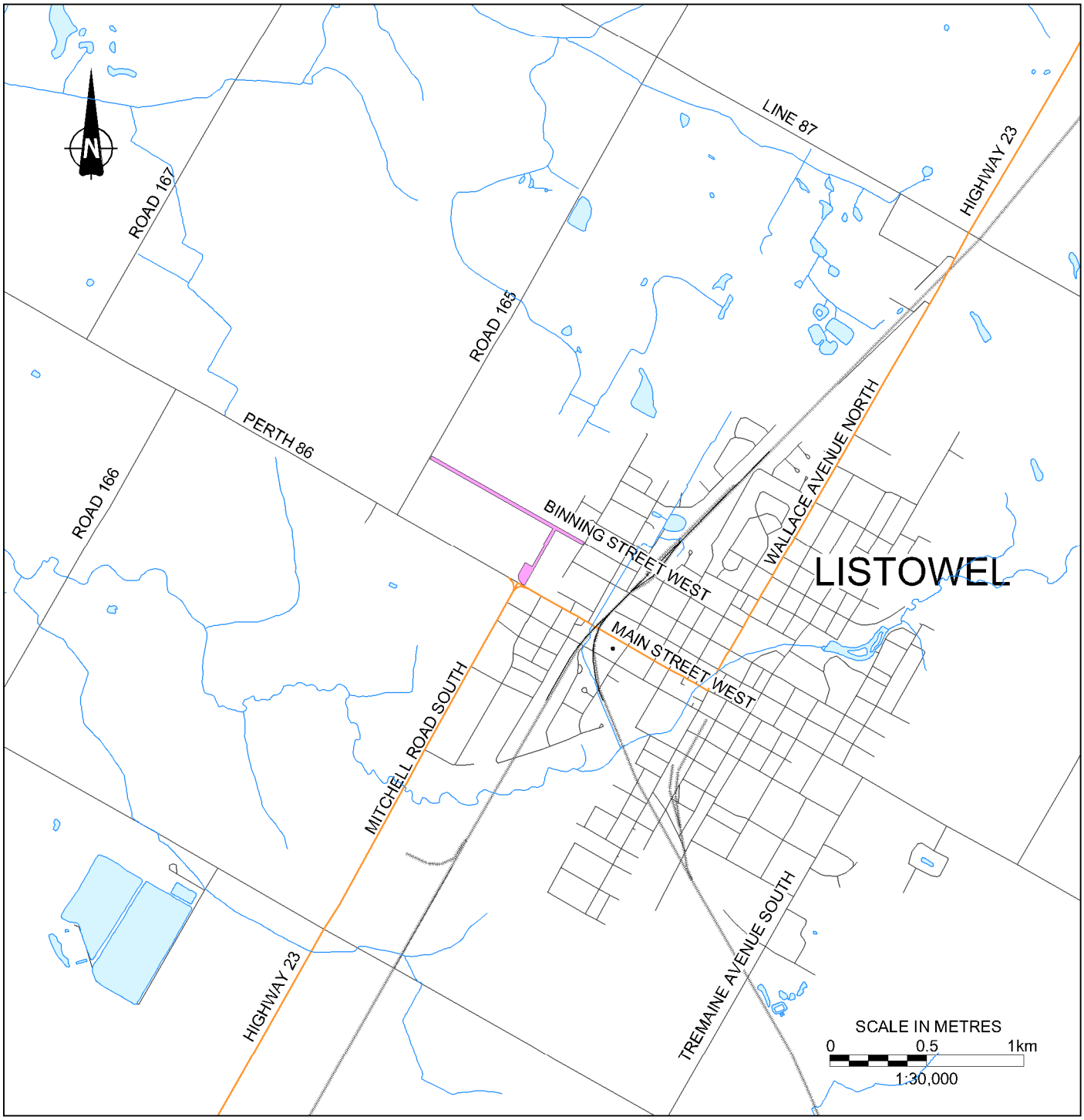
Plate 4: Test Pit Survey, Assessed at Five Metres Intervals

Plate 5: Disturbed Area, Not Assessed

Plate 6: Disturbed Area, Not Assessed

9.0 MAPS

All maps follow on the succeeding pages.



LEGEND

APPROXIMATE LIMITS OF STUDY AREA

REFERENCE

DRAWING BASED ON ONTARIO BASIC MAPPING (OBM) BY THE GEOGRAPHY NETWORK AS OF MAY 14, 2012; AND CANMAP STREETFILES V2008.4.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT: STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT
MITCHELL ROAD SOUTH IMPROVEMENTS
AND BINNING STREET WEST EXTENSION
LISTOWEL, ONTARIO

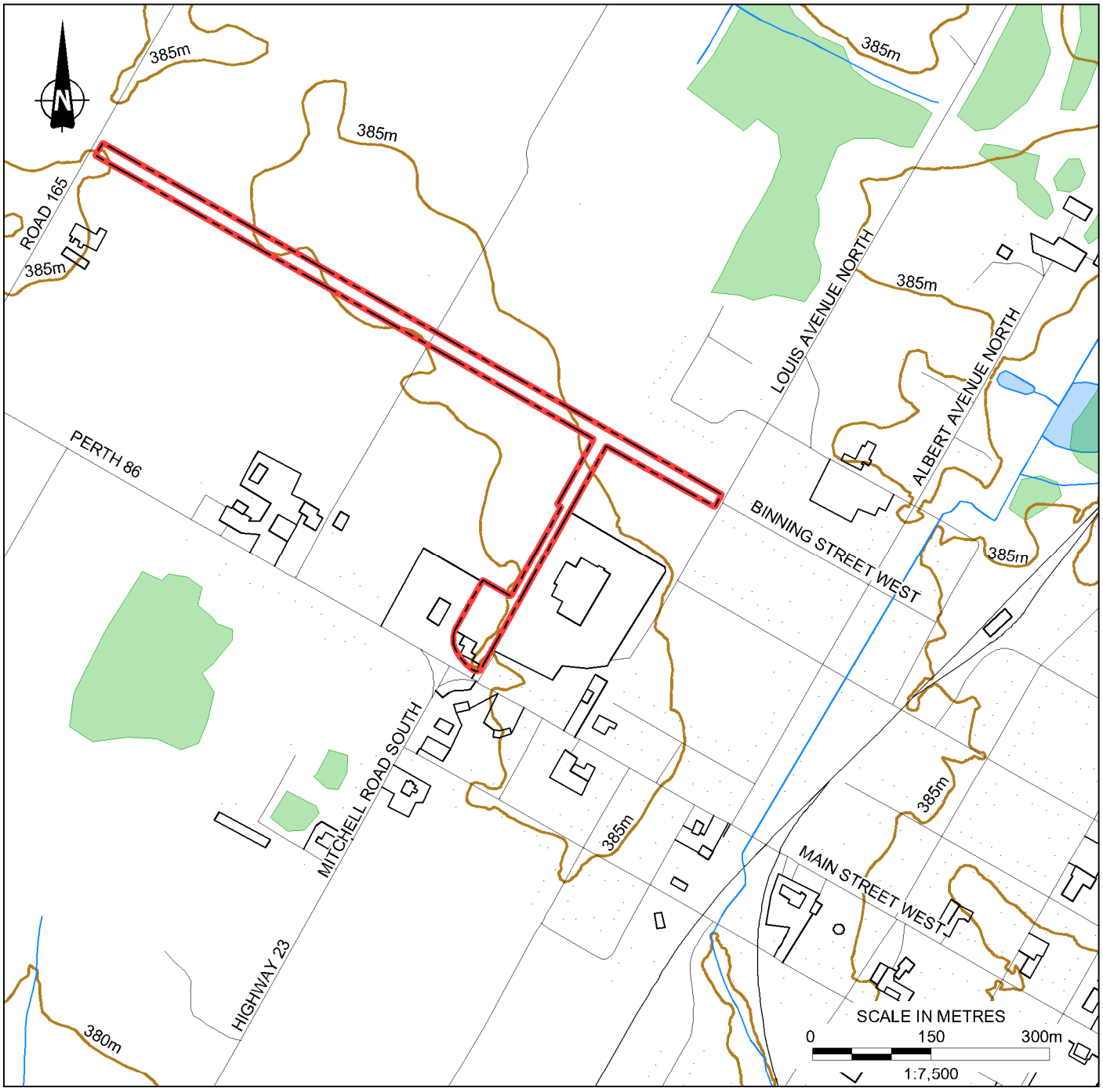
TITLE: **LOCATION OF STUDY AREA**

Golder Associates
LONDON, ONTARIO

PROJECT No.	12-1136-0025		FILE No.	1211360025-R01001
			SCALE	AS SHOWN
CADD	DCH	May 14/12	REV.	
CHECK				

FIGURE 1

Drawing file: 1211360025-R01001.dwg Jun 21, 2012 - 9:30am



LEGEND

LINES:

- RIVER/STREAM/CREEK/DRAINAGE DITCH
- OBM GROUND SURFACE CONTOUR

AREAS:

- WOODED/TREE LINE/BRUSH AREA
- WATER BODY
- APPROXIMATE LIMITS OF STUDY AREA

REFERENCE

DRAWING BASED ON ONTARIO BASIC MAPPING (OBM) BY THE GEOGRAPHY NETWORK AS OF MAY 14, 2012; AND CANMAP STREETFILES V2008.4.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT: STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT
MITCHELL ROAD SOUTH IMPROVEMENTS
AND BINNING STREET WEST EXTENSION
LISTOWEL, ONTARIO

TITLE: **STUDY AREA IN DETAIL**

Golder Associates
LONDON, ONTARIO

PROJECT No. 12-1136-0025			FILE No. 1211360025-R01002	
			SCALE AS SHOWN	REV.
CADD	DCH	May 24/12	**FIGURE 2**	
CHECK				

Drawing file: 1211360025-R01002.dwg Jun 21, 2012 - 9:28am

LEGEND

TREATY BOUNDARY

Treaty No. 381, Volume 3 (May 9th, 1781): Mississauga and Chippewa
Crawford's Purchase (Oct. 9th, 1783): Algonquin and Iroquois
Crawford's Purchase (Oct. 9th, 1783): Mississauga
Crawford's Purchases (1784, 1787, 1788): Mississauga
John Collins' Purchase (1785): Chippewa
Treaty No. 2 (May 19th, 1790): Odawa, Chippewa, Pottawatomi, and Huron
Treaty No. 3 (Dec. 2nd, 1792): Mississauga
Haldimand Tract: from the Crown to the Mohawk (1793)
Tyendinaga: from the Crown to the Mohawk (1793)
Treaty No. 3¾ (Oct. 24th, 1795): from the Crown to Joseph Brant
Treaty No. 5 (May 22nd, 1798): Chippewa
Treaty No. 6 (Sep. 7th, 1796): Chippewa
Treaty No. 7 (Sep. 7th, 1796): Chippewa
Treaty No. 13 (Aug. 1st, 1805): Mississauga
Treaty No. 13A (Aug. 2nd, 1805): Mississauga
Treaty No. 16 (Nov. 18th, 1815): Chippewa
Treaty No. 18 (Oct. 17th, 1818): Chippewa
Treaty No. 19 (Oct. 28th, 1818): Chippewa
Treaty No. 20 (Nov. 5th, 1818): Chippewa
Treaty No. 21 (Mar. 9th, 1819): Chippewa
Treaty No. 27 (May 31st, 1819): Mississauga
Treaty No. 27½ (Apr. 25th, 1825): Ojibwa and Chippewa
Treaty No. 35 (Aug. 13th, 1833): Wyandot or Huron
Treaty No. 45 (Aug. 9th, 1836): Chippewa and Odawa
Treaty No. 45½ (Aug. 9th, 1836): Saugeen
Treaty No. 57 (Jun. 1st, 1847): Iroquois of St. Regis
Treaty No. 61, Robinson Treaty (Sep. 9th, 1850): Ojibwa
Treaty No. 72 (Oct. 30th, 1854): Chippewa
Treaty No. 82 (Feb. 9th, 1857): Chippewa
Williams Treaty (Oct. 31st and Nov. 15th, 1923): Chippewa and Mississauga
Williams Treaty (Oct. 31st, 1923): Chippewa

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
ALL LOCATIONS ARE APPROXIMATE.

REFERENCE

1. Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
2. Treaty Boundary - Approximate Treaty Boundary was created by Golder Associates Ltd. Jan. 2009.
MORRIS, J.L. 1943. Indians Of Ontario. Reprinted 1964. Department Of Lands And Forests, Toronto.
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2008

PROJECT

**STAGE 2 ARCHAEOLOGICAL ASSESSMENT
MITCHELL ROAD SOUTH IMPROVEMENTS
AND BINNING STREET WEST EXTENSION
LISTOWEL, ONTARIO**

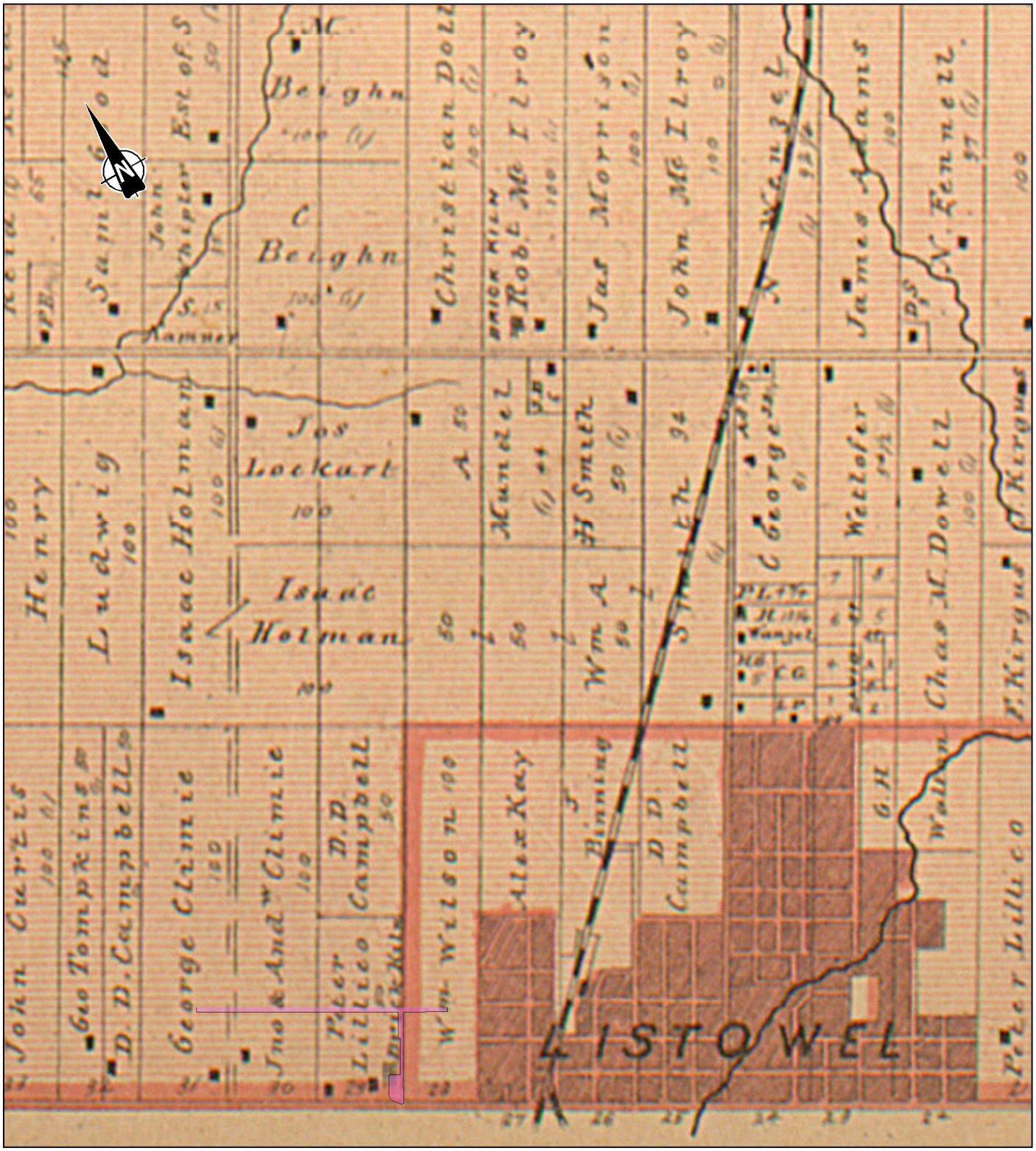
TITLE

TREATY BOUNDARIES BASED ON MORRIS, 1943

Golder Associates

PROJECT No.	12-1136-0025		FILE No.	1211360025-R01003
GIS	JMC	Jan. 23/09	SCALE	1:2,500,000 REV.
CADD	CDR	JUNE 21/ 2012		
CHECK				

FIGURE 3



LEGEND

APPROXIMATE LIMITS OF STUDY AREA

REFERENCE

DRAWING BASED ON 1879 MAP OF WALLACE TOWNSHIP: IN SEARCH OF YOUR CANADIAN PAST: THE CANADIAN COUNTY ATLAS DIGITAL PROJECT, McGILL UNIVERSITY.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
ALL LOCATIONS ARE APPROXIMATE.

PROJECT: STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT
MITCHELL ROAD SOUTH IMPROVEMENTS
AND BINNING STREET WEST EXTENSION
LISTOWEL, ONTARIO

TITLE: **A PORTION OF THE 1879 MAP OF WALLACE TOWNSHIP**

Golder Associates
LONDON, ONTARIO

PROJECT No.	12-1136-0025	FILE No.	1211360025-R01004
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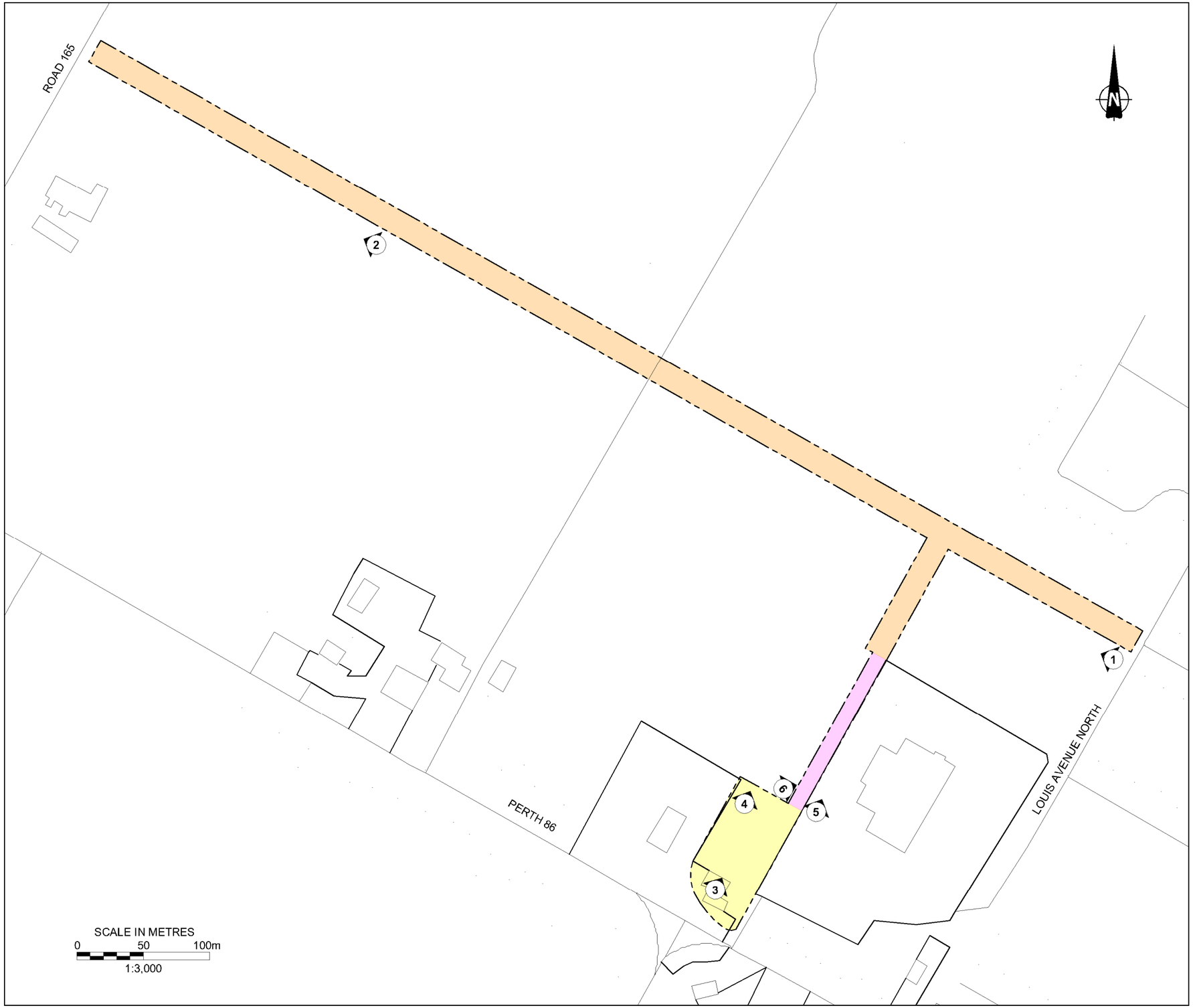
CADD	DCH	May 24/12	
CHECK			

FIGURE 4

Drawing file: 1211360025-R01004.dwg Jun 21, 2012 - 9:26am



LEGEND

- APPROXIMATE LIMITS OF STUDY AREA
- AREA OF PREVIOUS DISTURBANCE, NOT ASSESSED
- TEST PIT SURVEY AT 5m INTERVALS
- PEDESTRIAN SURVEY AT 5m INTERVALS
- 1 PHOTOGRAPH LOCATION, VIEWING DIRECTION, AND PLATE NUMBER
- 5 PHOTOGRAPH LOCATION AND PLATE NUMBER (FACING GROUND)

REFERENCE

DRAWING BASED ON ONTARIO BASIC MAPPING (OBM) BY THE GEOGRAPHY NETWORK AS OF MAY 14, 2012; AND CANMAP STREETFILES V2008.4.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT
MITCHELL ROAD SOUTH IMPROVEMENTS
AND BINNING STREET WEST EXTENSION
LISTOWEL, ONTARIO

TITLE

METHODS AND RESULTS OF STAGE 2 FIELD INVESTIGATION

Golder Associates
LONDON, ONTARIO

PROJECT No.	12-1136-0025		FILE No.	1211360025-R01005
			SCALE	AS SHOWN
CADD	DCH	May 24/12	REV.	
CHECK				

FIGURE 5

Drawing file: 1211360025-R01005.dwg Jun 21, 2012 - 9:01am

10.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder has prepared this report in a manner consistent with the level of care and skill ordinary exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, 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 by Ms. Kelly Vader of B.M. Ross and Associated Limited.

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. The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products. 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.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consultants Archaeologists* (Government of Ontario 2011).

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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Golder Associates

APPENDIX C

TRANSPORTATION STUDY

Memorandum

FILE: 120810

TO: KELLY VADER, BM ROSS

FROM: JIM MALLETT

DATE: JUNE 1, 2012

RE: LISTOWEL TRANSPORTATION STUDY – FUTURE TRAFFIC GROWTH ASSUMPTIONS

The follow is a summary of the assumptions being made for the traffic growth for the future conditions in Listowel for the Highway 23 and Line 86 Transportation Study.

STUDY AREA

The following intersections are being analysed in this study:

- Main Street (Perth Line 86) and Road 165
- Main Street (Perth Line 86) and Mitchell Street (Highway 23)
- Main Street (Perth Line 86) and Havelock Avenue
- Main Street (Perth Line 86) and Albert Avenue
- Albert Avenue and Binning Street
- Mitchell Street (Highway 23) and Kincaid Street

BACKGROUND GROWTH

Background traffic growth is expected to generally follow the forecasted population growth in Listowel. The projected growth was taken from the North Perth Master Growth Plan. Within the plan, a low growth and high growth scenario was presented for Listowel. The low growth scenario is based on compound annual average growth rates from historical observation from 1966-2006, which is 0.56% for Listowel. The high growth scenario is based on the County of Perth's projected population growth rates for urban settlement areas, which is 1.38%.

The growth is assumed to be accommodated by infill development within Listowel. According to the Master Growth Plan, there is upwards of 967 residential units in 67.5 hectares of infill potential. Also, there is 2.9 ha and 28.5 ha of land available for commercial and industrial infill development, respectively.

For the purposes of this study, the high growth scenario will be used and the

Transportation Planning
Transit Planning
Traffic Engineering
Parking Planning

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existing traffic will be factored by a rate of 1.38% per annum.

Traffic From Other Potential Developments

As indicated in the North Perth Master Growth Plan, there are 3 potential expansion areas for growth in Listowel, as shown in **Figure 1**. Area A is identified as 50 ha of industrial lands, while Areas B and C are identified as residential lands, 50 and 25 ha in area, respectively. Area B is the subject of a development plan that includes a recreation complex, a school, a cemetery and 22.3 hectares of residential development.

According to the Master Growth Plan, there is no justification or rationale to add any additional land for industrial purposes within Listowel. Therefore, Area A will not be considered when forecasting traffic from additional developments.

For the residential areas, B and C, the unit density as described about the infill land supply (967 units for 67.5 ha) will be used to estimate the number of units that could potentially be built. This would work out to be 658 units which would be used to calculate a new growth factor. 1625 residential units (from 967 infill units and 658 expansion area units) is 168% higher than just the 967 infill units alone. Applying this to the 1.38% growth rate, the new traffic growth rate that will be used is 2.32% per annum. In addition, the traffic generated from the future school and recreation complex will need to be accounted for using the Institute of Transportation Engineers' Trip Generation Report.

Traffic from the proposed commercial development on the southwest corner of Main Street and Mitchell Street will also be included. Traffic forecasts from the traffic impact study prepared for that development by F.R. Berry & Associates, revised in October 2011, will be used in this study.

Next Steps

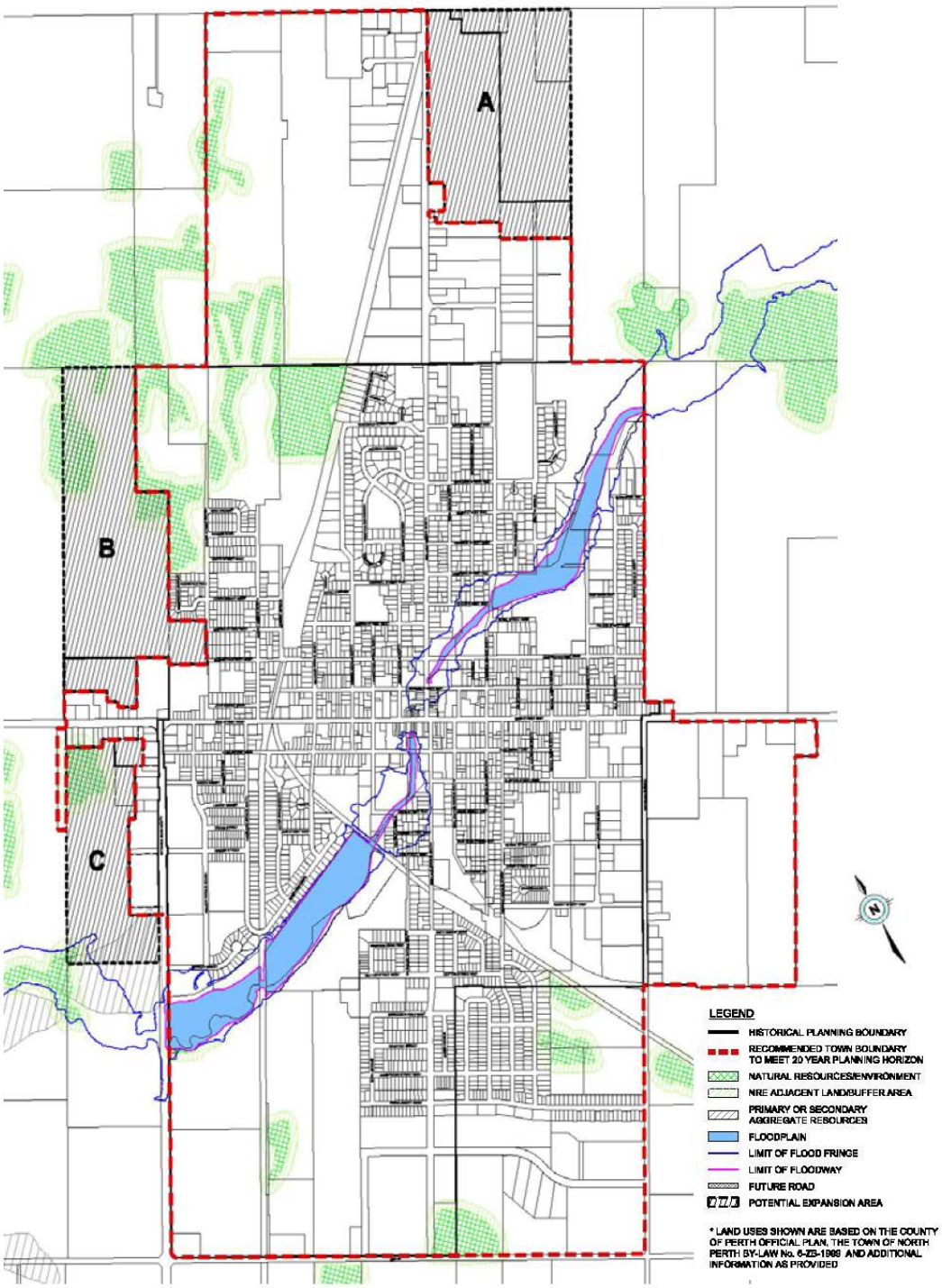
It is our intention to forecast the traffic volumes at the intersections within the study area and analysed them to determine whether the existing traffic control will be adequate or if improvements will be required.

We would be pleased to discuss any comments or questions, at your convenience.

Yours very truly,
Paradigm Transportation Solutions Limited

James J.L. Mallett
M.A.Sc., P.Eng., PTOE
Vice President

cc: Matt Brouwer, Paradigm Transportation Solutions Limited



Listowel Transportation Study
Future Traffic Growth Assumptions

Paradigm
www.ptsl.com

Figure 1

Potential Expansion Areas

Source: North Perth Master Growth Plan

www.ptsl.com

DRAFT
Transportation Study
LISTOWEL, ON

Prepared for:
B.M. Ross and Associates &
Municipality of North Perth

November 2012

Paradigm Transportation Solutions Ltd.
43 Forest Road
Cambridge ON N1S 3B4

Project Summary

Project Name: ..... **Listowel Transportation Study**

Client: ..... **Municipality of North Perth**
c/o **B.M. Ross and Associates Limited**
62 North Street
Goderich ON
N7A 2T4

Client Project Manager: ..... Kelly Vader, MCIP, RPP

Consultant: ..... **Paradigm Transportation Solutions Limited**
43 Forest Road
Cambridge ON N1S 3B4
ph: 519-896-3163
fax: 1-866-722-5117

Consultant Project Manager ..... James Mallett, M.A.Sc., P.Eng., PTOE

Report Date: ..... November 2012
Project Number: 120810

Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained by the Municipality of North Perth to conduct a review of traffic operations in Listowel, Ontario. The purpose of the study is to analyse the operations of the intersection noted above, for the current year (2012) and a ten-year (2022) horizon, assuming generalized background growth and specific development growth occurs.

Background growth was assumed considering the potential infill development within Listowel as well as potential new development areas. The general background growth rate was assumed to be 0.77% per year.

Also contributing to future traffic volumes is a proposed commercial development on the southwest corner of the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23).

A large potential development in the northwest area of Listowel was also considered. This development would consist of a residential component, an elementary school, a recreation complex, a cemetery, and "future development" (assumed to be commercial).

Conclusions

Based on the assumptions and analysis contained within this report, it is concluded that:

- under current conditions, all intersections within the study area generally operate well, with the exception of the westbound movements on Kincaid Street at Mitchell Road, which operate at LOS E during the PM peak hour;
- giving consideration to all known development plans within North Perth and the study area, traffic operations at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23) will operate poorly during the AM and PM peak hours at the 2022 horizon
- a traffic control signal is not warranted for the forecast 2022 volumes at Main Street and Mitchell Road, as the volumes to not fulfill the warrant thresholds to 120% (as required for forecast volumes), but they are fulfilled over 100% which suggests a signal would be warranted in the future if the forecasts are accurate (as 100% fulfillment of the thresholds are required for existing volumes);
- a traffic control signal or single lane modern roundabout would operate well at the intersection of Main Street and Mitchell Road at the 2022 horizon. A roundabout would have lower average delays;
- the southbound movement on Albert Street at Main Street will operate at LOS F during the 2022 PM peak hour;
- a traffic control signal is not warranted at Main Street and Albert Street as the side street volumes are very low. The volume to capacity ratio is less than 1.0, showing while delay may by high, the demand can still be accommodated at this intersection. Vehicles also have multiple options to use other intersections to turn onto Main Street;
- the westbound movements on Kincaid Street at Mitchell Road will operate at LOS E during the 2022 AM peak hour and LOS F during the 2022 PM peak hour.
- a traffic control signal is not warranted at the intersection of Mitchell Road and Kincaid Street due

to low overall volumes; and

- a separate westbound right-turn lane on Kincaid Street at Mitchell Road would allow westbound right-turns to experience a significantly reduced delay, but the left-turn and through movements would still experience long delays.

RECOMMENDATIONS

Based on the analyses contained in the report, it is recommended that:

- a westbound right-turn lane be painted on Kincaid Street at Mitchell Road to allow westbound right-turning vehicles to avoid the delays experienced by the left-turning and through vehicles;
- the municipality of North Perth undertake the necessary steps to protect sufficient land to accommodate a future modern roundabout, or a traffic control signal at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23);
- the municipality of North Perth monitor, on an bi-annual basis, the monitor and assess the traffic conditions at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23);
- when traffic conditions at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23) are such that traffic control signals can be met within 10% of the required volumes under these future conditions, that the municipality of North Perth take the necessary to design and implement a traffic control signal, or a modern roundabout;
- the traffic planning for the Northwest Development area of Listowel reflect the sensitive land uses expected within the area, including the community centre and a school, where large numbers of pedestrians and cyclists are expected and plan accordingly for incorporating traffic calming features within the development area;
- the municipality give Context Sensitive Design concepts full consideration as it plans and develops the roadway network in Northwest Listowel;
- the Binning Street extension and the Mitchell Road extension be designed to support all modes of transport with particular attention being paid to pedestrian and cyclists and ensuring that these vulnerable road users are given appropriate consideration along these corridors and at intersections;
- traffic calming features such as intersection chokers, speed humps, raised pedestrian crosswalks, pedestrian refuge islands be incorporated along the Binning Street and Mitchell Road extensions; and
- the municipality of North Perth undertake a comprehensive review of its pedestrian and cyclist network within the northwest area with a view to addressign the gaps that current exist in the system.

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Appendices

Tables

Figures

1.0 Introduction

1.1 Background

The Municipality of North has requested a review of existing and potential future traffic operations in Listowel, Ontario. The review has been prompted in part by future development opportunities, particularly on the northwest area of Listowel.

The operations review will focus on the following intersections, on the west side of Listowel:

- Main Street (Perth Line 86) and Road 165;
- Main Street and Mitchell Road (Highway 23);
- Main Street and Havelock Avenue;
- Main Street and Albert Avenue;
- Albert Avenue and Binning Street; and
- Mitchell Road and Kincaid Street.

The intersections of interest are shown in **Figure 1.1**.

1.2 Study Purpose

Paradigm Transportation Solutions Limited (Paradigm) was retained by the Municipality of North Perth to conduct a review of traffic operations in Listowel, Ontario. The purpose of the study is to analyse the operations of the intersection noted above, for the current year (2012) and a ten-year (2022) horizon, assuming general background growth and specific development growth occurs (outlined in Chapter 3).

Figure 1.1
Study Area
map source: Google

Listowel Transportation Study

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2.0 Existing Conditions

This section documents current traffic conditions, operational deficiencies, and constraints currently experienced by the public traveling at the intersections within the study area.

2.1 Existing Roads

Main Street is a two-lane road that is also Perth Line 86 and, for the section between Mitchell Road and Wallace Avenue, is also Highway 23. Main Street has a speed limit of 50 km/h within the study area, which increases to 70 km/h to the west just east of Road 165 and to 80 km/h further to the west at Road 165.

Mitchell Road South is a two-lane road that is also Highway 23. The speed limit within the study area is 50 km/h in the north section by Main Street and 70 km/h in the section near Kincaid Street.

Havelock Avenue, **Albert Avenue** and **Binning Street** are all two-lane residential streets with speed limits of 50 km/h.

Kincaid Street is a two-lane road which provides access to shopping centres on the east side of Mitchell Road and to an office building on the west side.

Road 165 is a two-lane paved rural road and has a cross-section with shoulders and ditches.

All intersections within the study area are unsignalized. The intersection of Albert Avenue and Binning Street is currently controlled by an all-way stop.

2.2 Existing Pedestrian and Cyclist Facilities

Sidewalks currently exist on Main Street to the east of Mitchell Road, along the east side of Albert Avenue for the first block north of Main Street, and along the west side of Havelock Avenue. There is also a signalized pedestrian crossing across Main Street to the east of Albert Street, which connects a community trail. **Figure 2.1** summarizes the locations of sidewalks. There are no dedicated cycling facilities within the study area

2.3 Existing Traffic Volumes

The existing volumes at the intersection of Main Street and Mitchell Road were provided by the Municipality of North Perth. The count at this intersection was performed in March 2011. The remainder of the intersections of interest for this study were performed by Paradigm in May 2012. The existing volumes are summarized in **Figure 2.2a** and **Figure 2.2b**.

2.4 Existing Traffic Operations

The operation of the intersections within the study area was evaluated using Synchro 8 with the existing turning movement volumes, lane configurations, and traffic control.

The analysis shows that the movements at all intersections generally operate well, with the exception of the westbound movements on Kincaid Street at Mitchell Road, which operates at LOS E during the PM peak hour. **Table 2.1** summarizes the operations. The detailed Synchro report is included in **Appendix A**.

TABLE 2.2: EXISTING TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Main Street & Road 165	TWSC	LOS	A	A		**A**		A	A	**A**					B		B	**B**	
			Delay	1	1		**1**		0	0	**0**					11		11	**11**	**2**
			V/C	0.01	0.01				0.09	0.09						0.10		0.10		
	2 - Main Street & Mitchell Road	TWSC	LOS		A	A	**A**	A	A		**A**	B		B	**B**					
			Delay		0	0	**0**	8	0		**5**	12		12	**12**					**6**
			V/C		0.13	0.04		0.10	0.05			0.28		0.28						
	3 - Main Street & Havelock Avenue	TWSC	LOS		A	A	**A**	A	A		**A**	B		B	**B**					
			Delay		0	0	**0**	0	0		**0**	11		11	**11**					**1**
			V/C		0.25	0.25		0.01	0.01			0.04		0.04						
	4 - Main Street & Albert Avenue	TWSC	LOS	A	A		**A**		A	A	**A**					B		B	**B**	
			Delay	1	1		**1**		0	0	**0**					14		14	**14**	**1**
			V/C	0.02	0.02				0.25	0.25						0.08		0.08		
	5 - Albert Avenue & Binning Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
			Delay	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	**7**
			V/C	0.04	0.04	0.04		0.00	0.00	0.00		0.04	0.04	0.04		0.04	0.04	0.04		
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	C	C	C	**C**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	18	18	18	**18**	19	19	19	**19**	8	0	0	**0**	8	0	0	**4**	**5**
			V/C	0.01	0.01	0.01		0.29	0.29	0.29		0.01	0.11	0.03		0.13	0.10	0.10		
PM Peak Hour	1 - Main Street & Road 165	TWSC	LOS	A	A		**A**		A	A	**A**					B		B	**B**	
			Delay	1	1		**1**		0	0	**0**					12		12	**12**	**2**
			V/C	0.01	0.01				0.18	0.18						0.11		0.11		
	2 - Main Street & Mitchell Road	TWSC	LOS		A	A	**A**	A	A		**A**	C		C	**C**					
			Delay		0	0	**0**	8	0		**5**	21		21	**21**					**9**
			V/C		0.10	0.03		0.24	0.14			0.57		0.57						
	3 - Main Street & Havelock Avenue	TWSC	LOS		A	A	**A**	A	A		**A**	B		B	**B**					
			Delay		0	0	**0**	1	1		**1**	13		13	**13**					**1**
			V/C		0.29	0.29		0.04	0.04			0.11		0.11						
	4 - Main Street & Albert Avenue	TWSC	LOS	A	A		**A**		A	A	**A**					C		C	**C**	
			Delay	0	0		**0**		0	0	**0**					22		22	**22**	**2**
			V/C	0.01	0.01				0.36	0.36						0.28		0.28		
	5 - Albert Avenue & Binning Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
			Delay	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	**7**
			V/C	0.02	0.02	0.02		0.01	0.01	0.01		0.10	0.10	0.10		0.03	0.03	0.03		
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	C	C	C	**C**	E	E	E	**E**	A	A	A	**A**	A	A	A	**A**	
			Delay	18	18	18	**18**	39	39	39	**39**	0	0	0	**0**	8	0	0	**3**	**11**
			V/C	0.12	0.12	0.12		0.69	0.69	0.69		0.00	0.15	0.02		0.12	0.15	0.15		

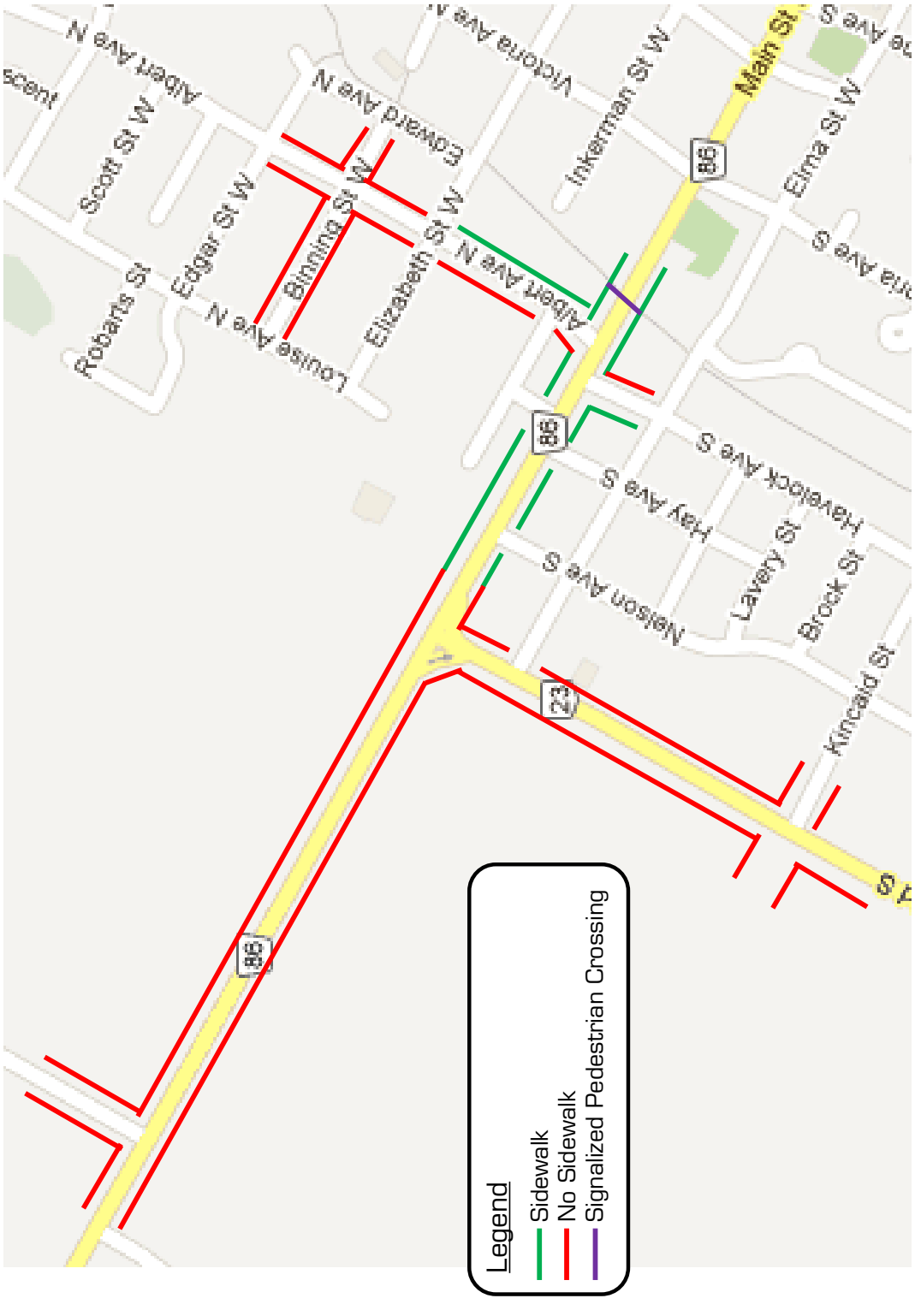

Figure 2.1

Sidewalk Inventory within Study Area

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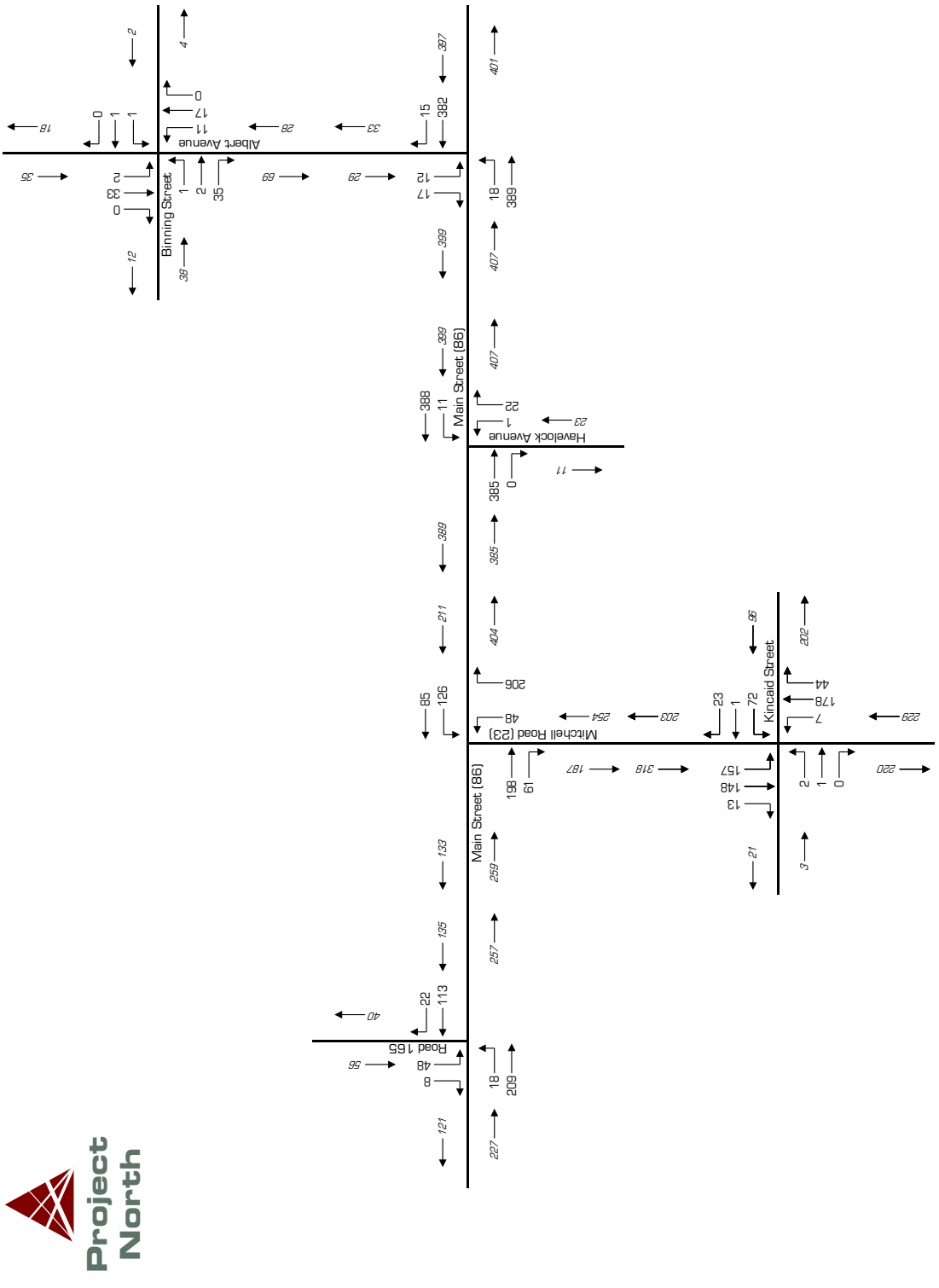

Figure 2.2a

Existing AM Peak Hour Volumes

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Figure 2.2b

Existing PM Peak Hour Volumes

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3.0 Forecast Traffic Growth

This chapter outlines the expected growth in traffic forecast to occur at the ten-year horizon, 2022. The forecasts include generalized background traffic growth, traffic from a proposed development on the southwest corner of Main Street and Mitchell Road, and traffic from an expected development in the northwest of Listowel.

3.1 Background Traffic Growth

Background traffic growth is expected to generally follow the forecast population growth in Listowel. The projected growth was taken from the North Perth Master Growth Plan. Within the plan, a low growth and high growth scenario was presented for Listowel. The low growth scenario is based on compound annual average growth rates from historical observation from 1966-2006, which is 0.56% for Listowel. The high growth scenario is based on the County of Perth's projected population growth rates for urban settlement areas, which is 1.38%. The growth is assumed to be accommodated by infill development within Listowel. According to the Master Growth Plan, there is upwards of 967 residential units in 67.5 hectares of infill potential. Also, there is 2.9 ha and 28.5 ha of land available for commercial and industrial infill development, respectively. After consultation with Municipality of North Perth planners, it was felt that the 1.38% growth rate was unrealistically high and also since expansion areas will be taken into account separately, the base growth rate used in this forecast is 0.56% per year.

As indicated in the North Perth Master Growth Plan, there are 3 potential expansion areas for growth in Listowel in addition to the infill opprotunities, as shown in **Figure 3.1**. Area A is identified as 50 ha of industrial lands, Areas B and C are identified as residential lands, 50 and 25 ha in area, respectively. According to the Master Growth Plan, there is no justification or rationale to add any additional land for industrial purposes within Listowel. Therefore, Area A will not be considered for traffic forecasts. Area B is the subject of a development plan that includes a recreation complex, a school, a cemetery and 22.3 hectares of residential development and will be forecast separately in **Section 3.3** below and will be removed from the background growth calculation. The unit density for Area C was estimated using the density described for the infill land supply (967 units for 67.5 ha = 14.3 units per hectare). Therefore, 25 hectares of residential land would yield approximately 358 units. The growth in Area C will be represented in the generalized traffic growth rate. Therefore the base growth rate of 0.56% per year was factored up by 137% (358 units in Area C in addition to the 967 infill units represented by the 0.56% growth rate) and the growth rate used for the background traffic growth is 0.77% per annum.

3.2 Commercial Development at Main and Mitchell

A commercial development is proposed for the southwest corner of the intersection of Main Street and Mitchell Road. The traffic that this development is forecast to generate was taken from the Traffic Impact Study[1] prepared for the development.

The background traffic growth plus the traffic forecast to be generated by the commercial development is shown combined in **Figure 3.2a** and **Figure 3.2b**.

[1] *Proposed Commercial Development, Highway 23 and Perth Line 86, Listowel, Traffic Impact Study, July 2011, F.R. Berry & Associates*

3.3 Potential Northwest Listowel Development

There is a development plan for the land in the northwest area of Listowel (shown as Area B in **Figure 3.1**) which would include residential units, a recreation complex, an elementary school, an area to be used for "future development", and a cemetery. A preliminary concept site plan is shown in **Figure 3.3**. This development will access the existing road network via an extension of Mitchell Road to Main Street and an extension of Binning Street, which will connect to Road 165. The recreation complex is planned to house a 900 seat arena, a possible second ice pad, 2 – 3 soccer fields and a pool.

The Institute of Transportation Engineers (ITE) Trip Generation Manual[2] was used to estimate the peak hour traffic volumes that will be generated by the development. For the residential uses, land use code (LUC) 210 – Single Family Detached was used. For the elementary school, LUC 520 – Elementary School was used. For the area labeled "Future Development" at the intersection of Perth Line 86 and Road 165, it was assumed that the future development would be commercial, so LUC 820 – Shopping Centre was used. For the recreation complex, a combination of LUC 465 – Ice Rink, LUC 488 – Soccer Complex, and LUC 495 – Recreational Community Centre was used. For the second ice pad, the same rate as the soccer field was used, as it would operate similar to a community soccer field (minor sport with parent spectators) than an arena with seating (outside spectator for larger events). **Table 3.1** summarizes the trip generation for this development area.

TABLE 3.1: DEVELOPMENT TRIP GENERATION

Development Component	ITE Land Use Code	Units	AM Peak Hour				PM Peak Hour			
			Rate	Total	In	Out	Rate	Total	In	Out
Residential	210 Single Family Detached	55.1 acres	2.06	114	35	78	2.75	152	100	52
School	520 Elementary School	565 students	0.45	254	140	114	0.15	85	42	43
Future Development	820 Shopping Centre	67082.4 ft^2	1	67	41	26	3.73	250	123	128
	Passby		*0%*	*0*	*0*	*0*	*34%*	*86*	*43*	*43*
3 Soccer Fields	488 Soccer Complex	3 fields	1.4	4	2	2	20.67	62	43	19
900 Seat Arena	465 Ice Rink	900 seats	0	0	0	0	0.12	108	49	59
2nd Ice Pad (no seating)	488 Soccer Complex	1 pad	1.4	1	1	1	20.67	21	14	6
Pool	495 Recreational Community Centre	15 000 ft^2	1.62	24	15	9	1.45	22	8	14
Total Generation				**465**	**234**	**231**		**699**	**378**	**321**
Passby				0	0	0		86	43	43
Net Generation				**465**	**234**	**231**		**613**	**335**	**278**

The generated trips were assigned to the road network within the study area are shown in **Figure 3.4a** and **Figure 3.4b**.

[2] *Trip Generation Manual, 8th Edition, Institute of Transportation Engineers, Washington, DC, 2008.*

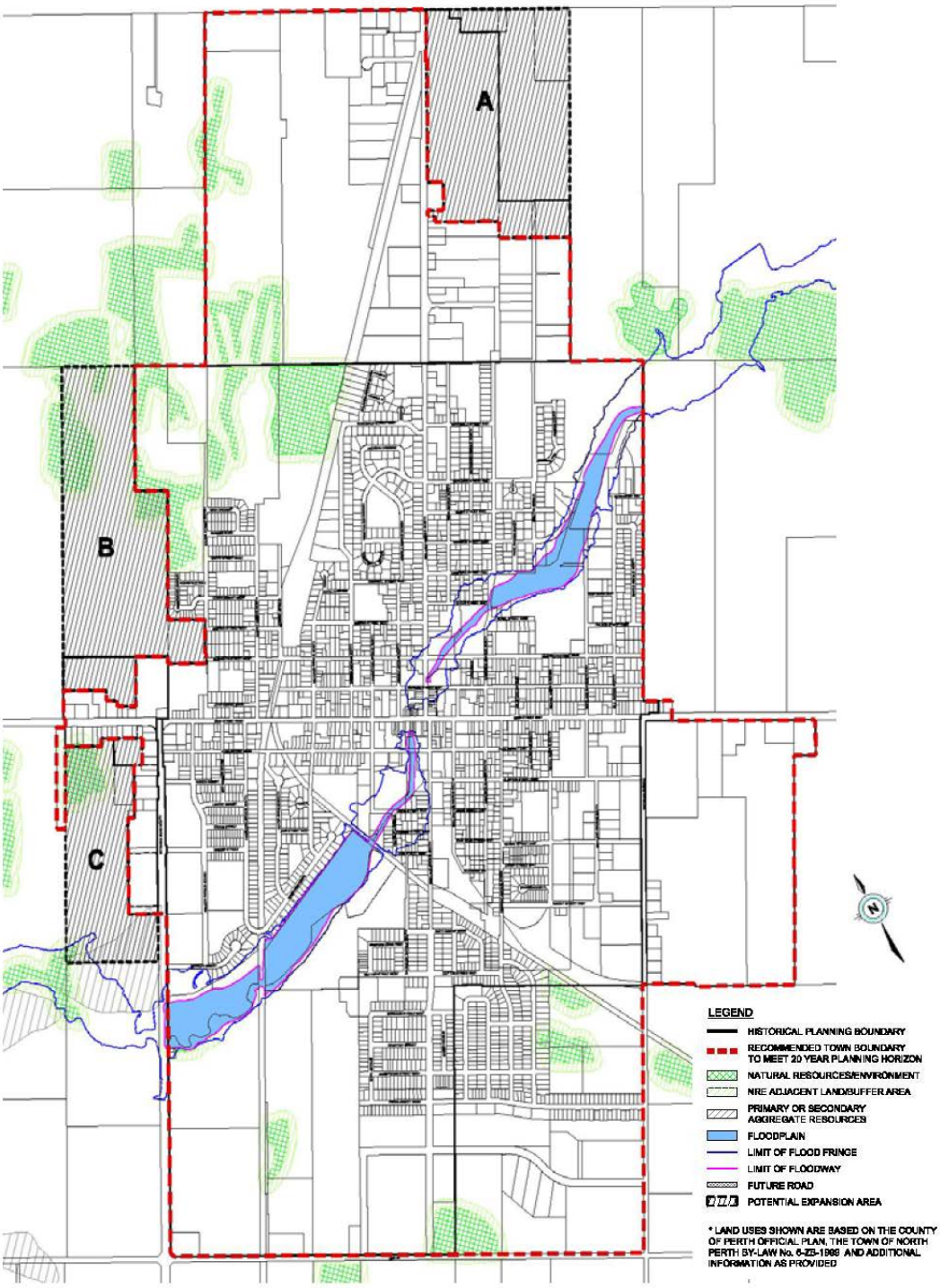

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Figure 3.1
Potential Expansion Areas
Source: North Perth Master Growth Plan

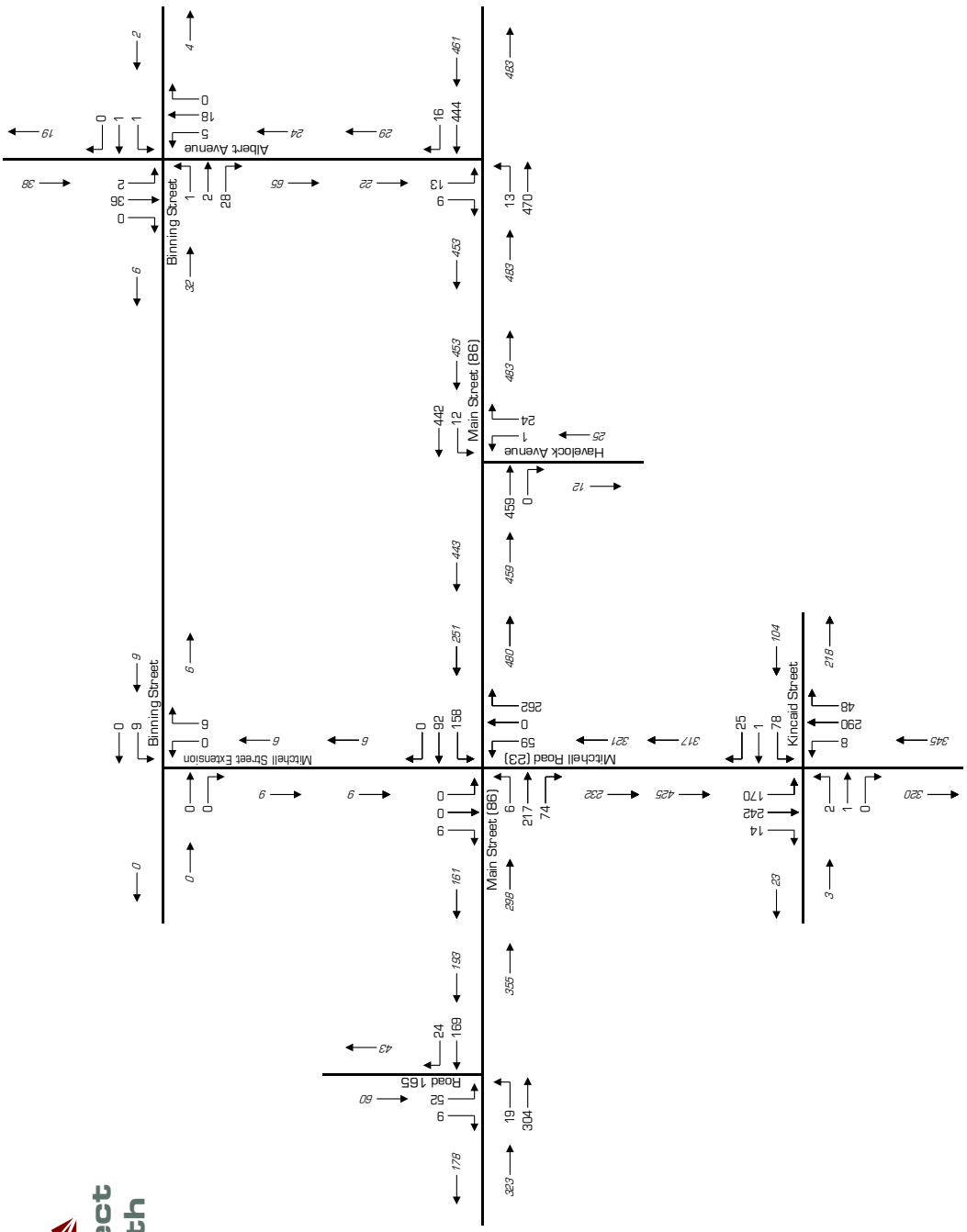

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Figure 3.2a

2022 Background plus Commercial Development AM Traffic Volumes

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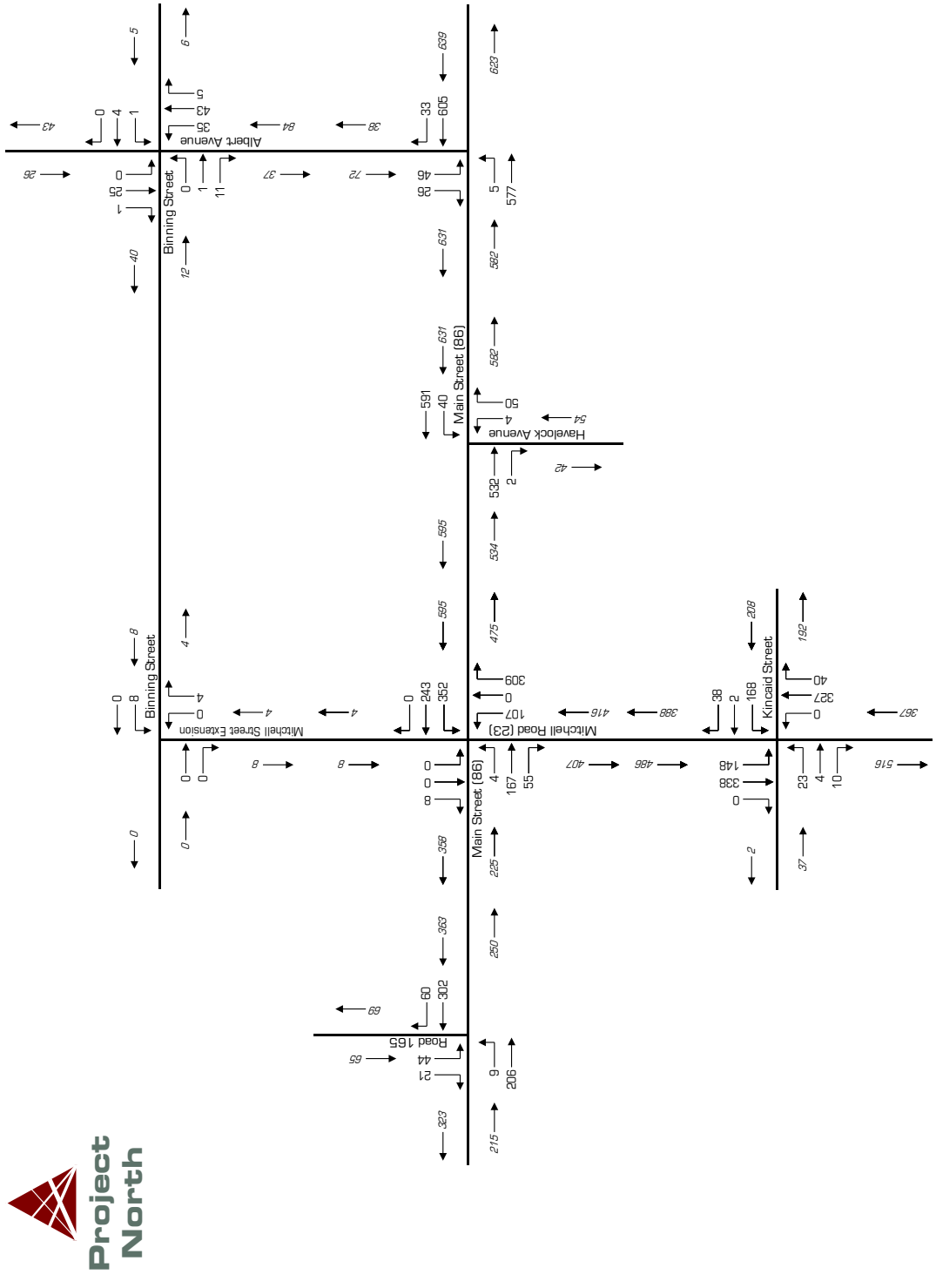

Figure 3.2b

2022 Background plus Commercial Development PM Traffic Volumes

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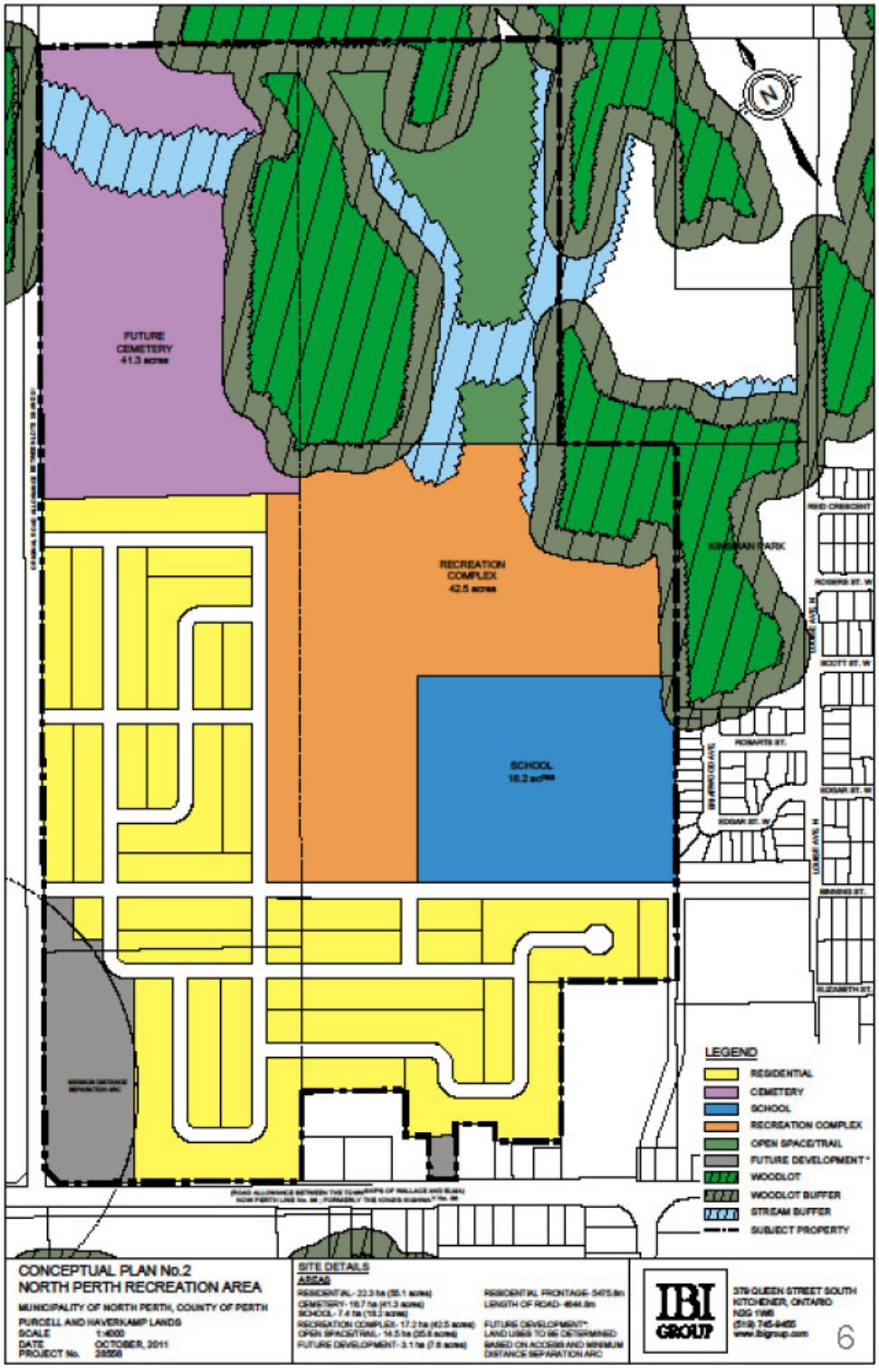

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Figure 3.3

Northwest Listowel Development Site Concept

Source: Recreation Complex Business Plan Presentation

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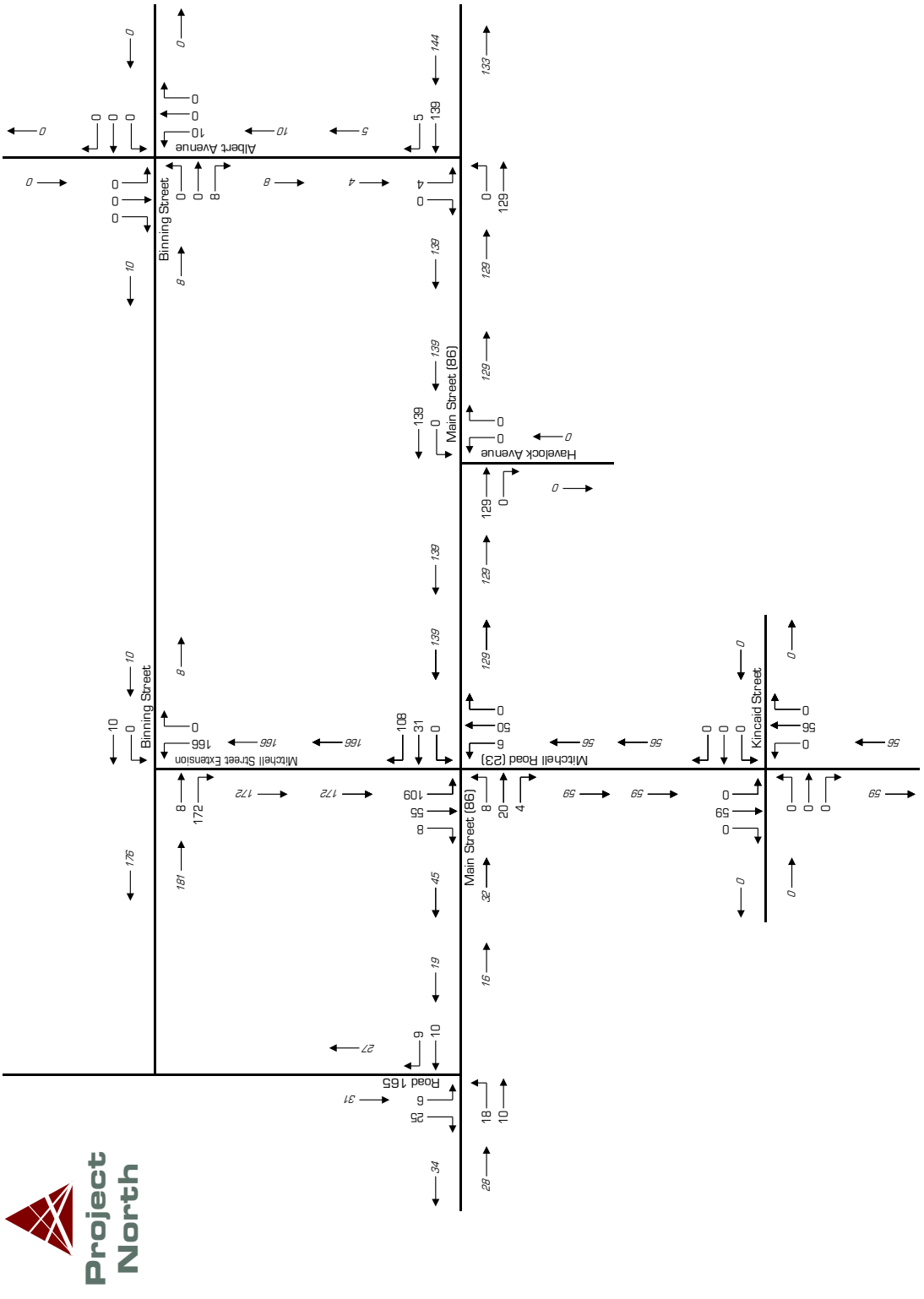

Figure 3.4a

2022 Northwest Listowel Development AM Peak Hour Traffic Volumes

Listowel Transportation Study

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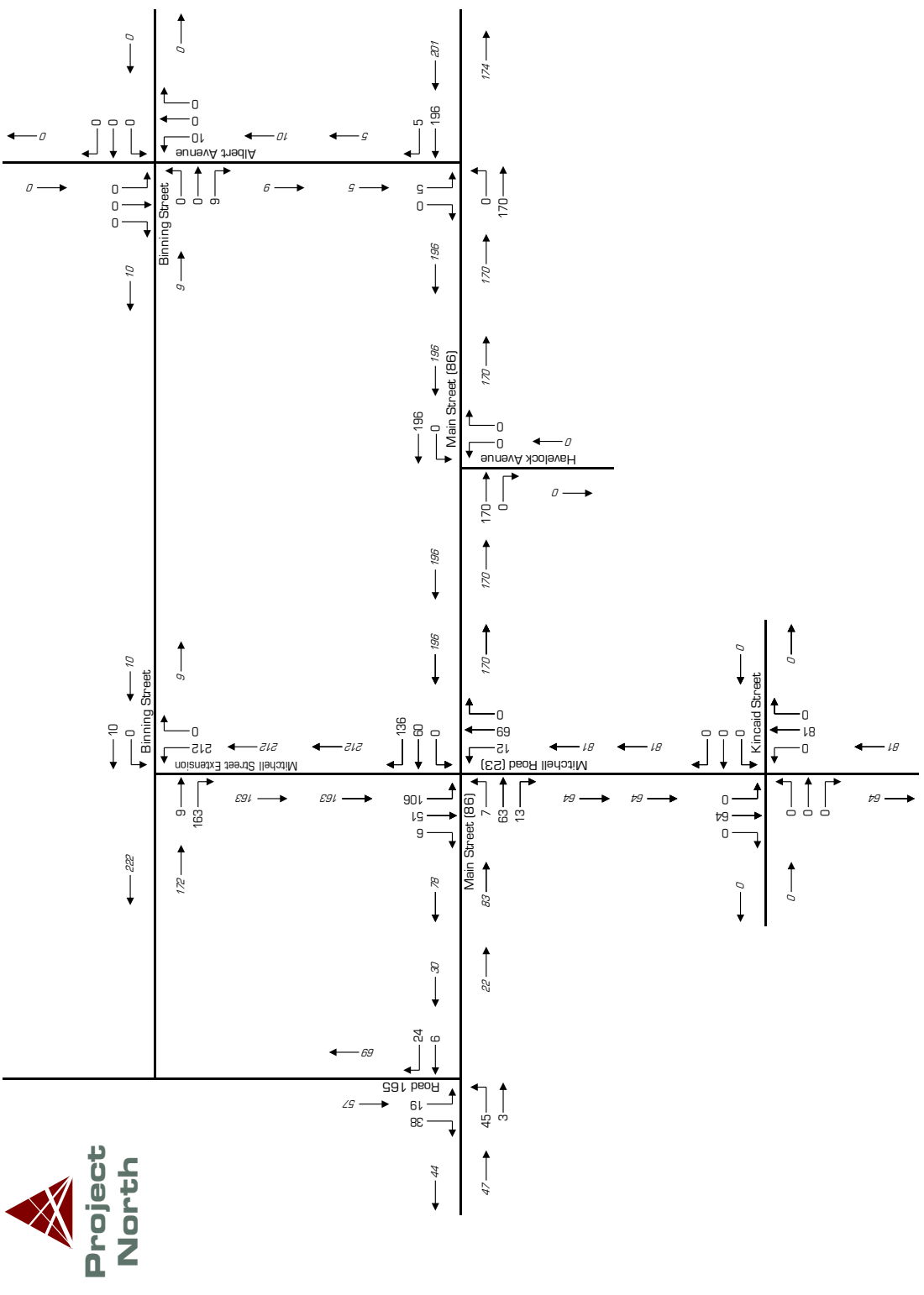

Figure 3.4b

2022 Northwest Listowel Development PM Peak Hour Traffic Volumes

Listowel Transportation Study

Project North

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4.0 Evaluation of 2022 Traffic Conditions

4.1 2022 Total Traffic Volumes

The total 2022 traffic volumes, which are the addition of the background growth, proposed commercial development and potential northwest Listowel development, is summarized in **Figure 4.1a** and **Figure 4.1b**.

4.2 2022 Traffic Operations

Based on the forecast 2022 total traffic volumes, LOS analyses have been conducted using Synchro 8 and the AM and PM peak hour conditions for the intersections within the study area. No improvements to the lane configurations or intersection control were assumed. A summary of the LOS conditions is provided in **Table 4.1** and detailed reports can be found in **Appendix B**. Based on the analysis, it is noted that the movements and intersection will operate well, with the following exceptions:

- The intersection of Main Street and Mitchell Road will operate at LOS F for the sidestreet (Mitchell Road) volume during both the AM and PM peak hours;
- The southbound movement on Albert Street will operate at LOS F during the PM peak hour; and
- The westbound movements on Kincaid Street will operate at LOS E during the AM peak hour and LOS F during the PM peak hour.

TABLE 4.1: 2022 TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Main Street & Road 165	TWSC	LOS	A	A		**A**		A	A	**A**					B		B	**B**	
			Delay	1	1		**1**		0	0	**0**					14		14	**14**	**3**
			V/C	0.03	0.03				0.14	0.14						0.19		0.19		
	2 - Main Street & Mitchell Road	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	D	C	C	**C**	F	C	C	**F**	
			Delay	8	0	0	**0**	8	0	0	**3**	32	15	15	**18**	126	20	20	**84**	**18**
			V/C	0.01	0.15	0.05		0.14	0.15	0.15		0.35	0.38	0.38		0.93	0.25	0.25		
	3 - Main Street & Havelock Avenue	TWSC	LOS		A	A	**A**	A	A		**A**	B		B	**B**					
			Delay		0	0	**0**	0	0		**0**	14		14	**14**					**1**
			V/C		0.38	0.38		0.01	0.01			0.06		0.06						
	4 - Main Street & Albert Avenue	TWSC	LOS	A	A		**A**		A	A	**A**					D		D	**D**	
			Delay	0	0		**0**		0	0	**0**					26		26	**26**	**1**
			V/C	0.02	0.02				0.39	0.39						0.14		0.14		
	5 - Albert Avenue & Binning Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
			Delay	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	**7**
			V/C	0.04	0.04	0.04		0.00	0.00	0.00		0.04	0.04	0.04		0.05	0.05	0.05		
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	D	D	D	**D**	E	E	E	**E**	A	A	A	**A**	A	A	A	**A**	
			Delay	29	29	29	**29**	45	45	45	**45**	8	0	0	**0**	9	0	0	**3**	**6**
			V/C	0.02	0.02	0.02		0.57	0.57	0.57		0.01	0.22	0.03		0.16	0.20	0.20		
	7 - Mitchell Road Extension & Binning Street	TWSC	LOS		A	A	**A**	A	A		**A**	A		A	**A**					
			Delay		0	0	**0**	4	4		**4**	10		10	**10**					**5**
			V/C		0.12	0.12		0.01	0.01			0.22		0.22						
PM Peak Hour	1 - Main Street & Road 165	TWSC	LOS	A	A		**A**		A	A	**A**					C		C	**C**	
			Delay	2	2		**2**		0	0	**0**					16		16	**16**	**3**
			V/C	0.05	0.05				0.25	0.25						0.29		0.29		
	2 - Main Street & Mitchell Road	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	F	F	F	**F**	F	F	F	**F**	
			Delay	8	0	0	**0**	9	0	0	**4**	###	102	102	**324**	Err	79	79	**6228**	**695**
			V/C	0.01	0.15	0.04		0.30	0.28	0.28		2.86	1.08	1.08		11.03	0.63	0.63		
	3 - Main Street & Havelock Avenue	TWSC	LOS		A	A	**A**	A	A		**A**	C		C	**C**					
			Delay		0	0	**0**	1	1		**1**	18		18	**18**					**1**
			V/C		0.45	0.45		0.05	0.05			0.18		0.18						
	4 - Main Street & Albert Avenue	TWSC	LOS	A	A		**A**		A	A	**A**					F		F	**F**	
			Delay	0	0		**0**		0	0	**0**					72		72	**72**	**3**
			V/C	0.01	0.01				0.54	0.54						0.64		0.64		
	5 - Albert Avenue & Binning Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
			Delay	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	**7**
			V/C	0.02	0.02	0.02		0.01	0.01	0.01		0.11	0.11	0.11		0.03	0.03	0.03		
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	D	D	D	**D**	F	F	F	**F**	A	A	A	**A**	A	A	A	**A**	
			Delay	34	34	34	**34**	277	277	277	**277**	0	0	0	**0**	9	0	0	**2**	**48**
			V/C	0.25	0.25	0.25		1.42	1.42	1.42		0.00	0.26	0.03		0.15	0.26	0.26		
	7 - Mitchell Road Extension & Binning Street	TWSC	LOS		A	A	**A**	A	A		**A**	B		B	**B**					
			Delay		0	0	**0**	3	3		**3**	11		11	**11**					**6**
			V/C		0.11	0.11		0.01	0.01			0.27		0.27						

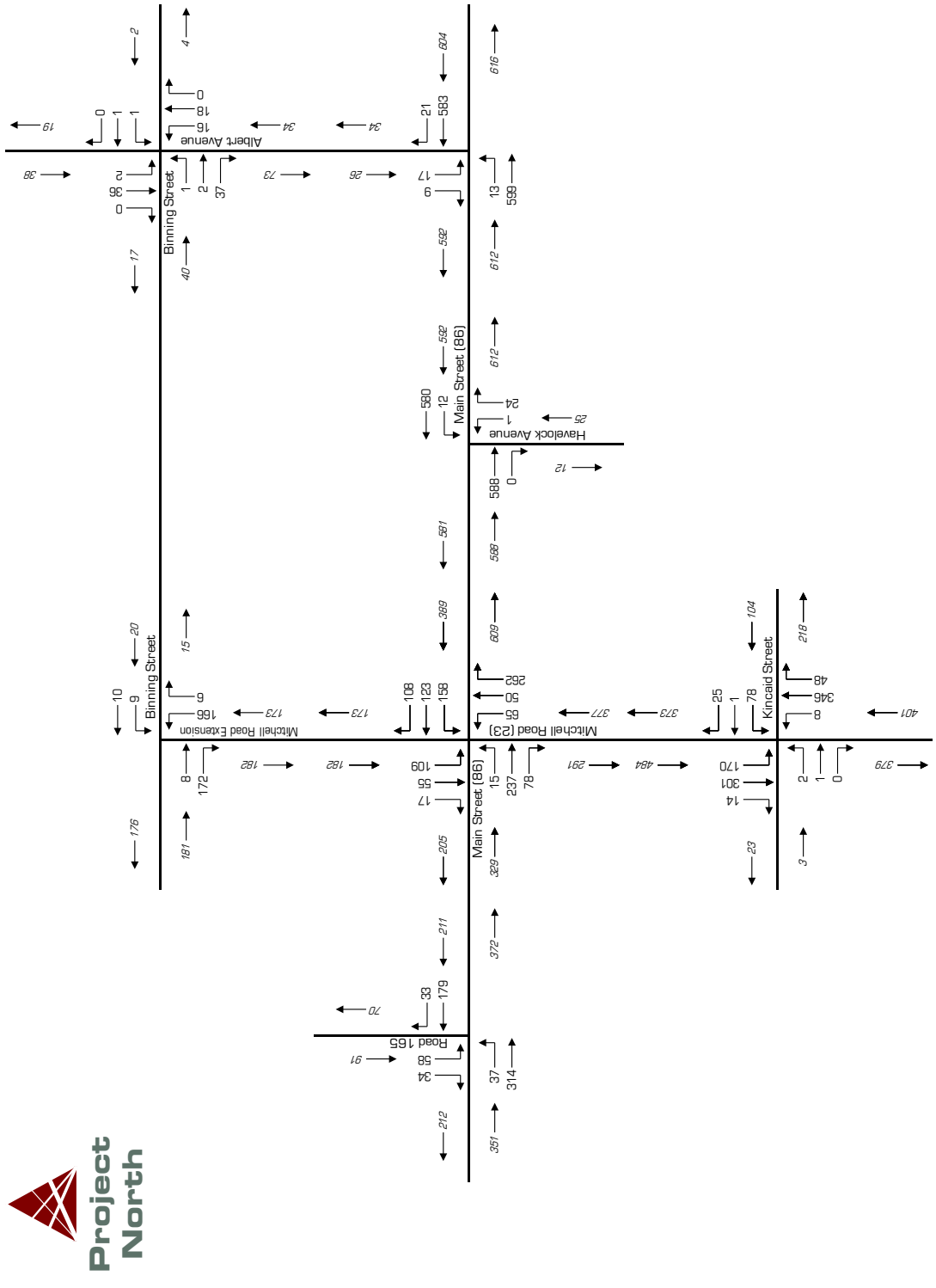

Figure 4.1a

Total 2022 AM Peak Hour Traffic Volumes

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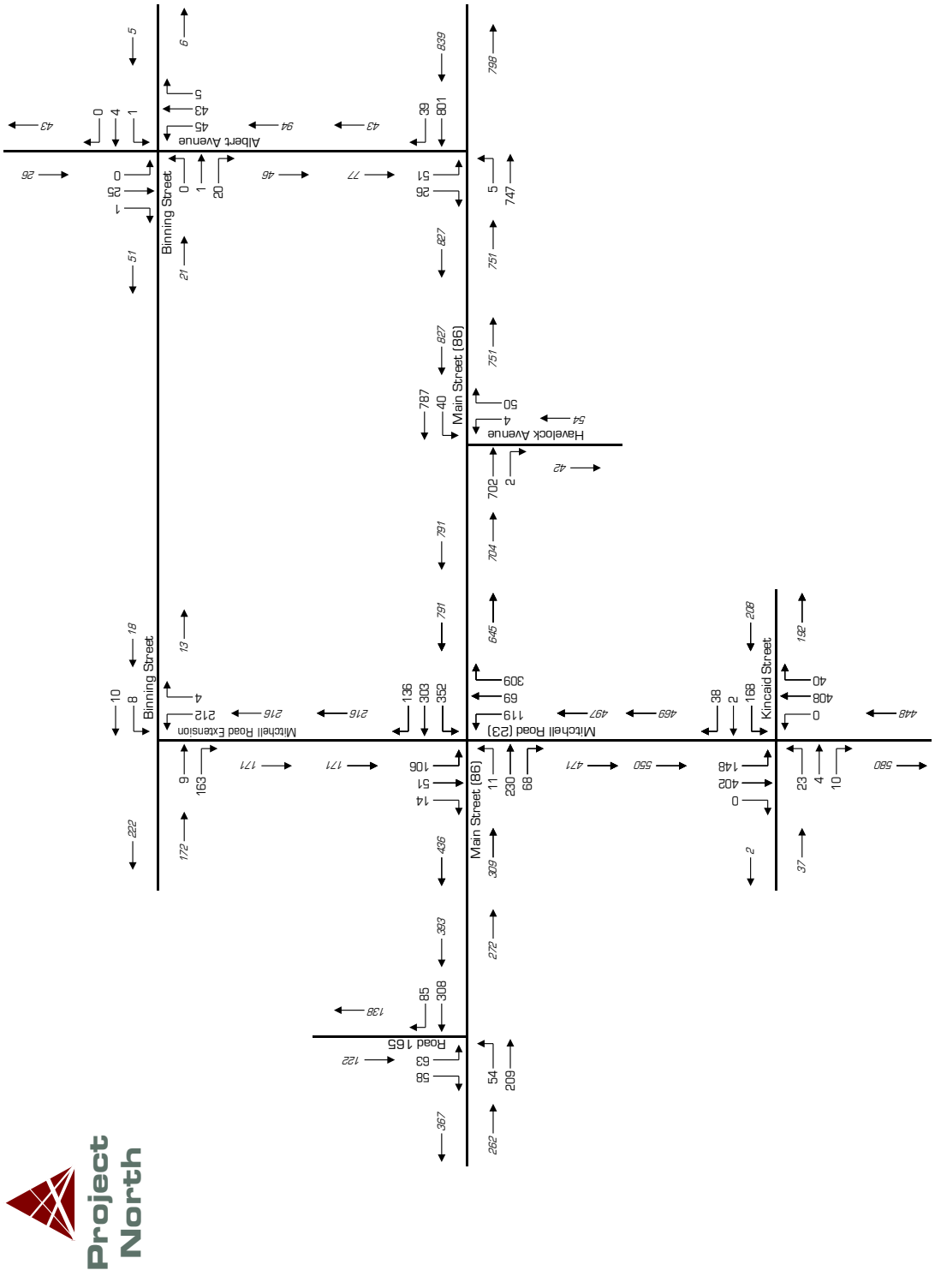

Figure 4.1b

Total 2022 PM Peak Hour Traffic Volumes

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5.0 Remedial Measures

The following sections review what, if any, measures should be implemented to mitigate the deficiencies in traffic operations.

5.1 Main Street (Perth Line 86) and Mitchell Road (Highway 23)

Mitchell Road is expected to be extended with the development of the Northwest Listowel development area. This will change the intersection of Main Street and Mitchell Road to a four-legged intersection with Mitchell Road being stop controlled. The analysis of the 2022 total traffic conditions indicate that the intersection will operate very poorly, especially in the PM peak hour, delays being very long and V/C ratios exceeding 1.0.

A signal warrant analysis was performed for this intersection for the 2022 total traffic conditions. The signal warrant analysis is based on Book 12 of the Ontario Traffic Manual published by the Ministry of Transportation. For forecast conditions, two justification tests are considered: Minimum Vehicular Volume and Delay To Cross Traffic. For both justification tests, the average hourly volume calculated using the AM and PM peak hour volumes are used and since it is an existing intersection, the justification thresholds must be met at 120% of what they would be for current year traffic volumes (by comparison, a new intersection must meet the thresholds at 150%). Both justification tests have two components, and both components of at least one justification test must be met for a signal to be warranted. This is the standard test for the justification of signals used throughout the province of Ontario for municipalities of all sizes.

The Signal Warrant Calculation worksheet is included in **Appendix C** and the results are summarized in **Table 5.1**. As both thresholds of at least one warrant were not fulfilled to 120%, a traffic control signal is not justified. However, it should be noted that the Minimum Vehicular Volume warrant was fulfilled 106%, which would warrant a signal in the future if the forecast volumes are accurate and eventually become "existing" volumes in 2022. Also, it should be considered that the delays that will be experienced by the side street movements will unacceptable to a point at which this intersection should be signalized regardless of the vehicular volume warrant not being met at 120%.

As an alternative to signalization, a roundabout could be considered for this intersection. As the westbound left-turn and northbound right-turn movements are the highest two volumes in the PM peak hour and the first and third highest volumes in the AM peak hour, these volume conditions would be ideal for a roundabout, as those two movements would not conflict with each other and can operate simultaneously without reducing capacity.

Table 5.1: Signal Warrant Analysis Results Summary (Main and Mitchell)

		% Fulfilled
Warrant 1 - Minimum Vehicular Volume	All Approaches	105.7%
	Minor Street Approaches	180.3%
Warrant 2 - Delay To Cross Traffic	Major Street Approaches	63.2%
	Traffic Crossing Major Street	174.3%

5.2 Main Street and Albert Avenue

The southbound movements on Albert Avenue are forecast to operate at LOS F during the PM peak hour. A signal warrant analysis was perform for this intersection and it was found that a traffic control signal is not warranted, as the side street volumes are well below the warrant threshold (**Appendix C**).

It should be noted that vehicles attempting to turn onto Main Street from Albert Avenue have other options to exit the neighbourhood, as they could travel east on Elizabeth Street to the signalized intersection at Wallace Avenue (Highway 23), from which they could use the signalized intersection at Wallace Avenue and Main Street. Also, if Mitchell Road is extended north of Main Street, and the intersection is signalized, this would provide another opportunity for vehicles to exit the neighbourhood.

It should also be noted that while the delay is classified as LOS F, the volume to capacity ratio during the PM peak hour is forecast to be 0.64 for the southbound lane, which indicates that even with the delay, the movement would still not be over capacity.

5.3 Mitchell Road (Highway 23) and Kincaid Street

The westbound movement on Kincaid Street operates at LOS E under existing conditions and is forecast to operate at LOS E during the AM peak hour and LOS F during the PM peak hour under the 2022 total traffic conditions.

A signal warrant analysis of this intersection at the 2022 horizon indicates that a traffic control signal is not warranted at this intersection. The signal warrant calculation worksheet is included in **Appendix C**. All components of the warrant calculation were less than 100% fulfilled.

The V/C ratio of the westbound movements is forecast to be 1.42 during the PM peak hour of the 2022 horizon. This means that the demand for these movements will be greater than the rate at which vehicles can be accommodated. As it is likely the left-turn movement would have a greater delay than the right-turn movement, it may be helpful to formalize a separate right-turn lane, allowing right-turning vehicles to be serviced with less delay. This would not help the left-turning or through vehicles, however. The pavement width is sufficient on this leg of the intersection that a right-turn lane can be accommodated by repainting the lane lines.

5.4 Analyses of Remedial Measures

A Synchro analysis was done with a signal implemented at the intersection of Main Street and Mitchell Road, and a westbound right-turn lane on Kincaid Street at Mitchell Road to evaluate the effectiveness of the remedial measures mentioned above. Alternatively, a roundabout was analyzed using Arcady 7 to show the effectiveness of a roundabout compared to a signal. A single lane roundabout with an inscribed circle diameter of 40 metres was assumed. **Table 5.2** shows the 2022 horizon operations with the remedial measures in place.

The analysis of the remedial measures shows that a traffic control signal at Main Street and Mitchell Road would improve the operations of that intersection so that the LOS for any movement would be no worse than LOS C. A single lane roundabout would also operate well at this intersection and delays would be less than a signal.

The addition of a westbound right-turn lane on Kincaid Street at Mitchell Road would allow the right-turning vehicles to bypass the delays experienced by the left and through vehicles, reducing the level-of-service to LOS B. The left and through movements would still have LOS F operations, however.

TABLE 5.2: 2022 TRAFFIC OPERATIONS WITH REMEDIAL MEASURES

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	2 - Main Street & Mitchell Road	Signal	LOS	A	A	A	**A**	A	A	A	**A**	C	C	A	**B**	C	B	B	**C**	**A**
			Delay	6	7	2	**6**	8	4	4	**6**	24	20	8	**12**	27	17	17	**23**	**10**
			V/C	0.02	0.25	0.09		0.27	0.25	0.25		0.31	0.15	0.57		0.45	0.21	0.21		
	2 - Main Street & Mitchell Road	Roundabout	LOS				**A**				**A**				**A**				**A**	**A**
			Delay				**5**				**5**				**6**				**4**	**5**
			V/C				**0.32**				**0.33**				**0.38**				**0.16**	
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	D	D	D	**D**	F	F	B	**E**	A	A	A	**A**	A	A	A	**A**	
			Delay	29	29	29	**29**	50	50	11	**41**	8	0	0	**0**	9	0	0	**3**	**6**
			V/C	0.02	0.02	0.02		0.53	0.53	0.04		0.01	0.22	0.03		0.16	0.20	0.20		
PM Peak Hour	2 - Main Street & Mitchell Road	Signal	LOS	A	A	A	**A**	B	A	A	**B**	C	C	A	**B**	C	B	B	**C**	**B**
			Delay	6	7	2	**6**	13	8	8	**11**	27	20	7	**14**	25	17	17	**22**	**12**
			V/C	0.02	0.24	0.08		0.59	0.47	0.47		0.50	0.20	0.58		0.42	0.18	0.18		
	2 - Main Street & Mitchell Road	Roundabout	LOS				**A**				**A**				**A**				**A**	**A**
			Delay				**5**				**10**				**6**				**5**	**8**
			V/C				**0.32**				**0.68**				**0.46**				**0.20**	
	6 - Mitchell Road & Kincaid Street	TWSC	LOS	D	D	D	**D**	F	F	B	**F**	A	A	A	**A**	A	A	A	**A**	
			Delay	34	34	34	**34**	262	262	11	**216**	0	0	0	**0**	9	0	0	**2**	**38**
			V/C	0.25	0.25	0.25		1.36	1.36	0.07		0.00	0.26	0.03		0.15	0.26	0.26		

5.5 Land Protection

Since neither a traffic control signal, nor a modern roundabout can currently be justified for the intersection of Main Street and Mitchell Road with the ten-year forecast period, but is expected to be required in the future, it is prudent that the land taking for the Mitchell Road extension and the development of the Northwest lands provide sufficient flexibility for the Municipality to implement its preferred design option at a future date.

Figure 5.1 presents a preliminary functional concept of the required lane configurations to accommodate traffic projections to 2022 and beyond, if the intersection was to operate under traffic signal control. **Figure 5.2** presents a preliminary functional concept of the required configuration of a modern roundabout.

Preliminary functional engineering plans should be developed to ensure that sufficient land is available to the municipality as it develops the Northwest Area to permit either solution to be constructed.

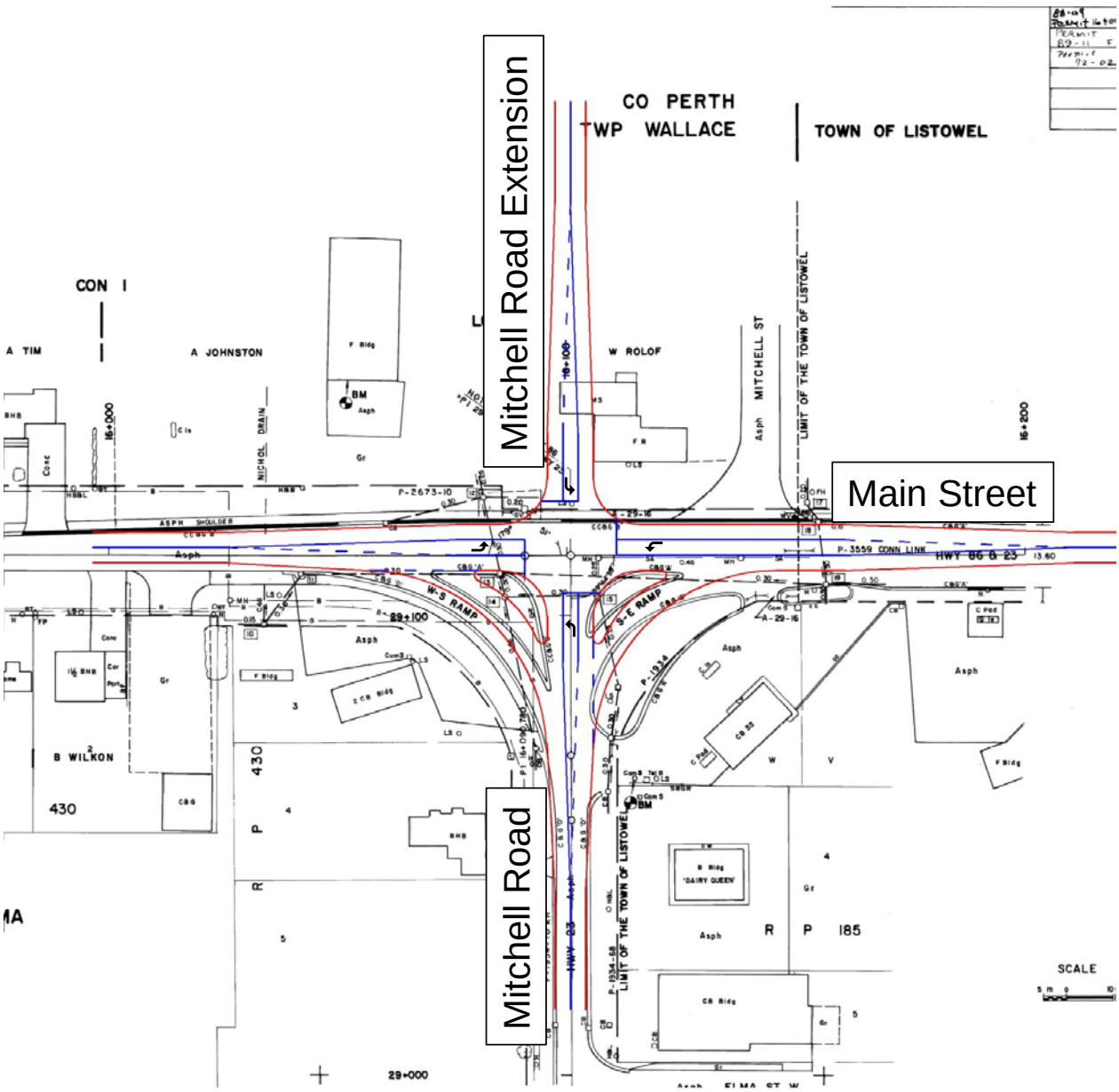

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Figure 5.1

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Main Street & Mitchell Road – Signalized Concept

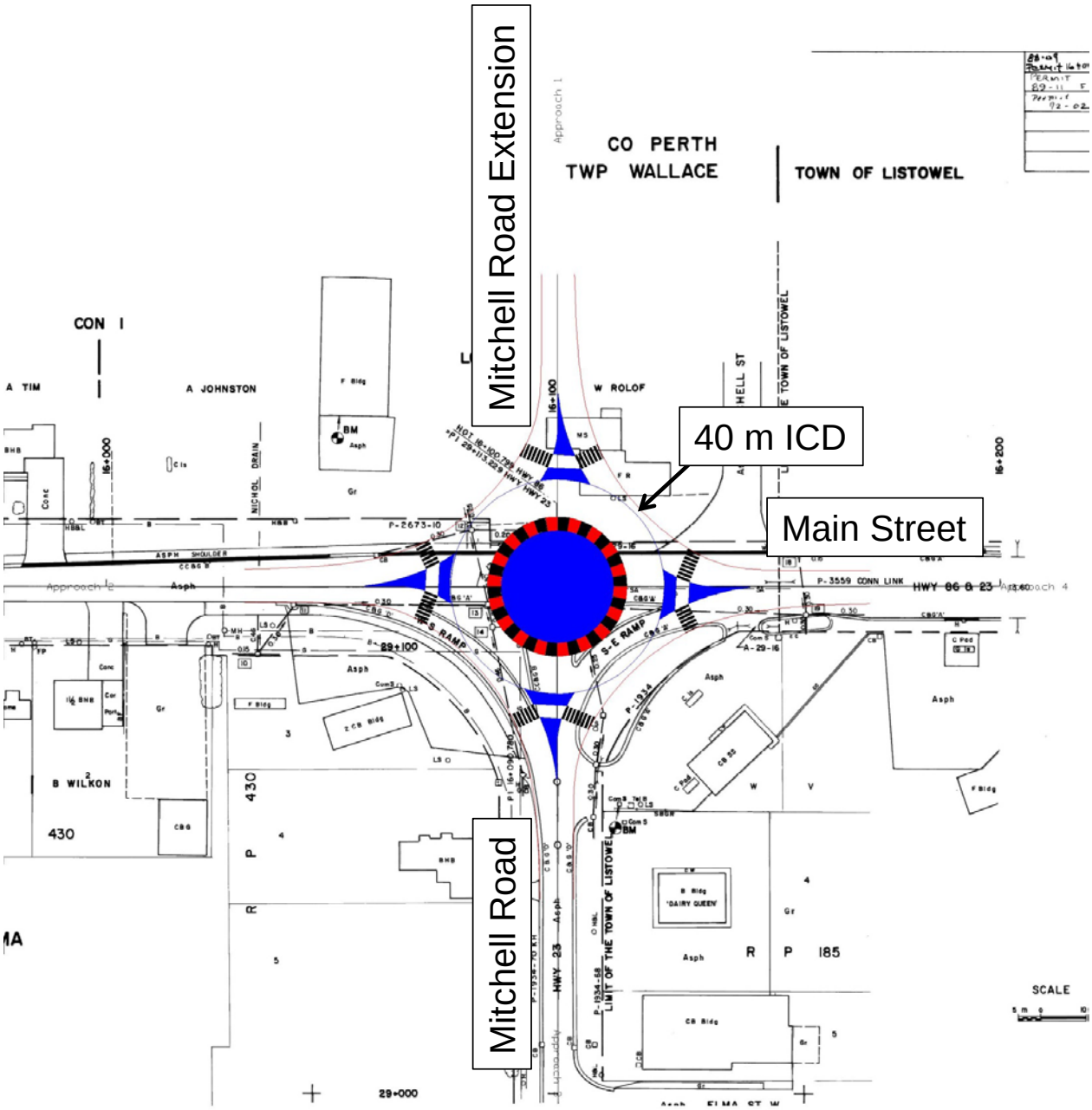

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Figure 5.2

Main Street & Mitchell Road – Roundabout Concept

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6.0 Interim Horizon (2017)

While a signal is not warranted for forecast conditions at 2022 where the warrant must be met at 120%, the warrant suggests that a signal could be warranted if the forecasts prove accurate as they are met over 100%. An interim 5-year horizon (2017) with reduced development was analysed to determine if the warrant would still exceed 100% and therefore suggest a signal could be warranted by 2017.

6.1 2017 Development and Traffic

The amount of forecast traffic was reduced from what was assumed in the 2022 horizon analysis. A timeline of expected development dates was provided by the Municipality of North Perth to assist in the forecasting of traffic to 2017.

6.1.1 Background Traffic Growth

5 years of growth at the same growth rate as the 2022 horizon (0.77% per year) was assumed for the background traffic growth.

6.1.2 Commercial Development at Main and Mitchell

The planned commercial development and Main and Mitchell was assumed to be built and occupied by the 2017 horizon, therefore all traffic forecast by the Traffic Impact Study for this development was included.

6.1.3 Potential Northwest Listowel Development

The development in the northwest area of Listowel is only expected to be partially completed by 2017. The public school and community recreation centre are expected to be completed, the residential area is expected to be partially completed and the cemetery and "future development" area (assumed to be commercial in section 3.3) would not be completed.

The residential component of the development are expected to be completed over a period from 2016 to 2020, therefore by the 2017 horizon, 40% of the traffic generated by the residential component was included in the traffic forecasts. **Figure 6.1a** and **Figure 6.1b** show the 2017 total traffic volumes.

6.2 Signal Warrant Analysis

The signal warrant for the intersection of Main Street and Mitchell Street was reanalyzed using the 2017 forecast volumes. The results are included in Appendix C and summarized is Table 6.1. It was found that the signal warrant would not reach 100% fulfillment and is unlikely that a signal would be warranted at that level of development if the traffic is accurately forecast. Therefore, most of the northwest development will need to be developed before a signal would potentially be warranted.

Table 6.1: 2017 Signal Warrant Analysis Results Summary (Main and Mitchell)

		% Fulfilled
Warrant 1 - Minimum Vehicular Volume	All Approaches	91.7%
	Minor Street Approaches	161.8%
Warrant 2 - Delay To Cross Traffic	Major Street Approaches	53.5%
	Traffic Crossing Major Street	145.3%

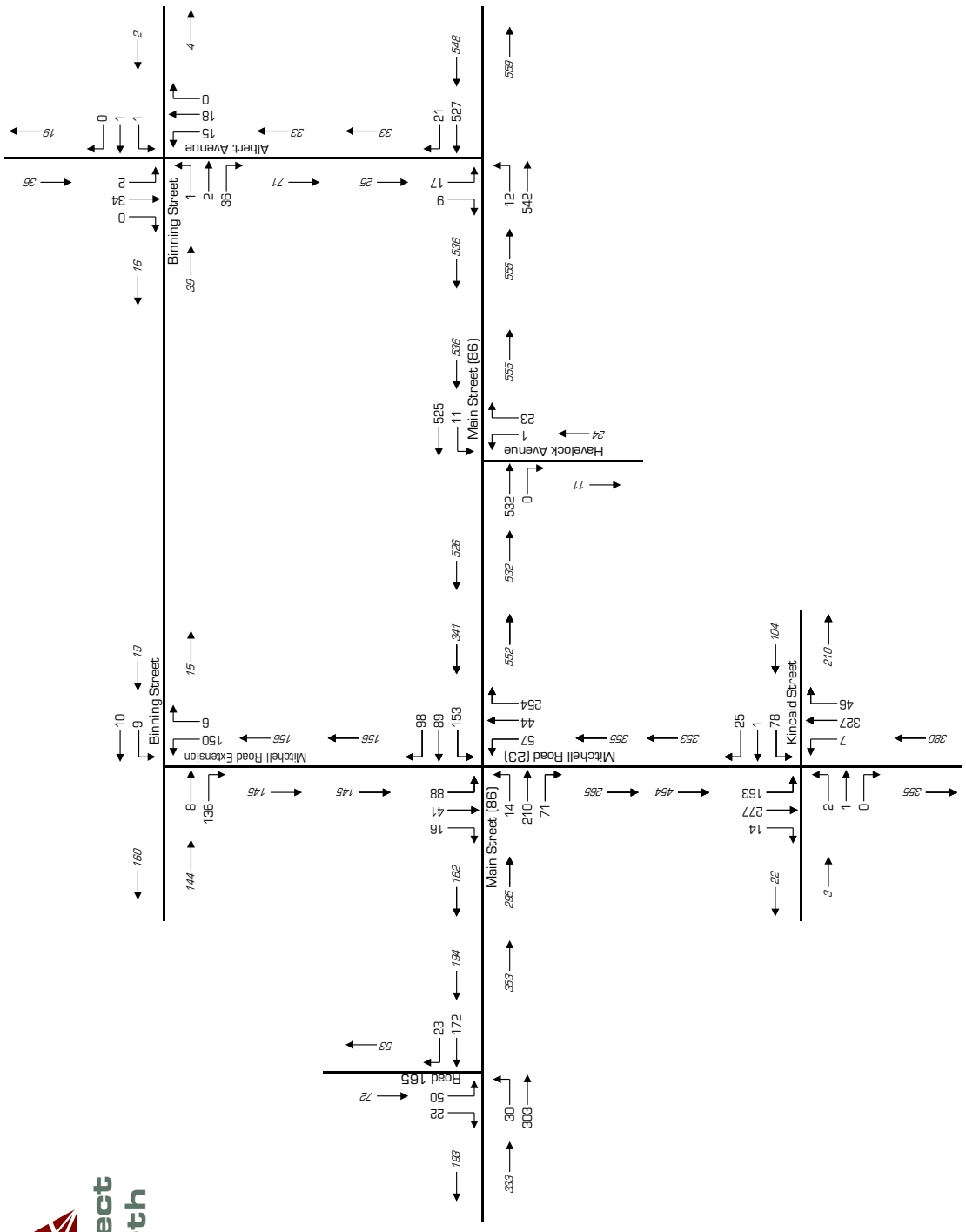

Figure 6.1a

Total 2017 AM Peak Hour Traffic Volumes

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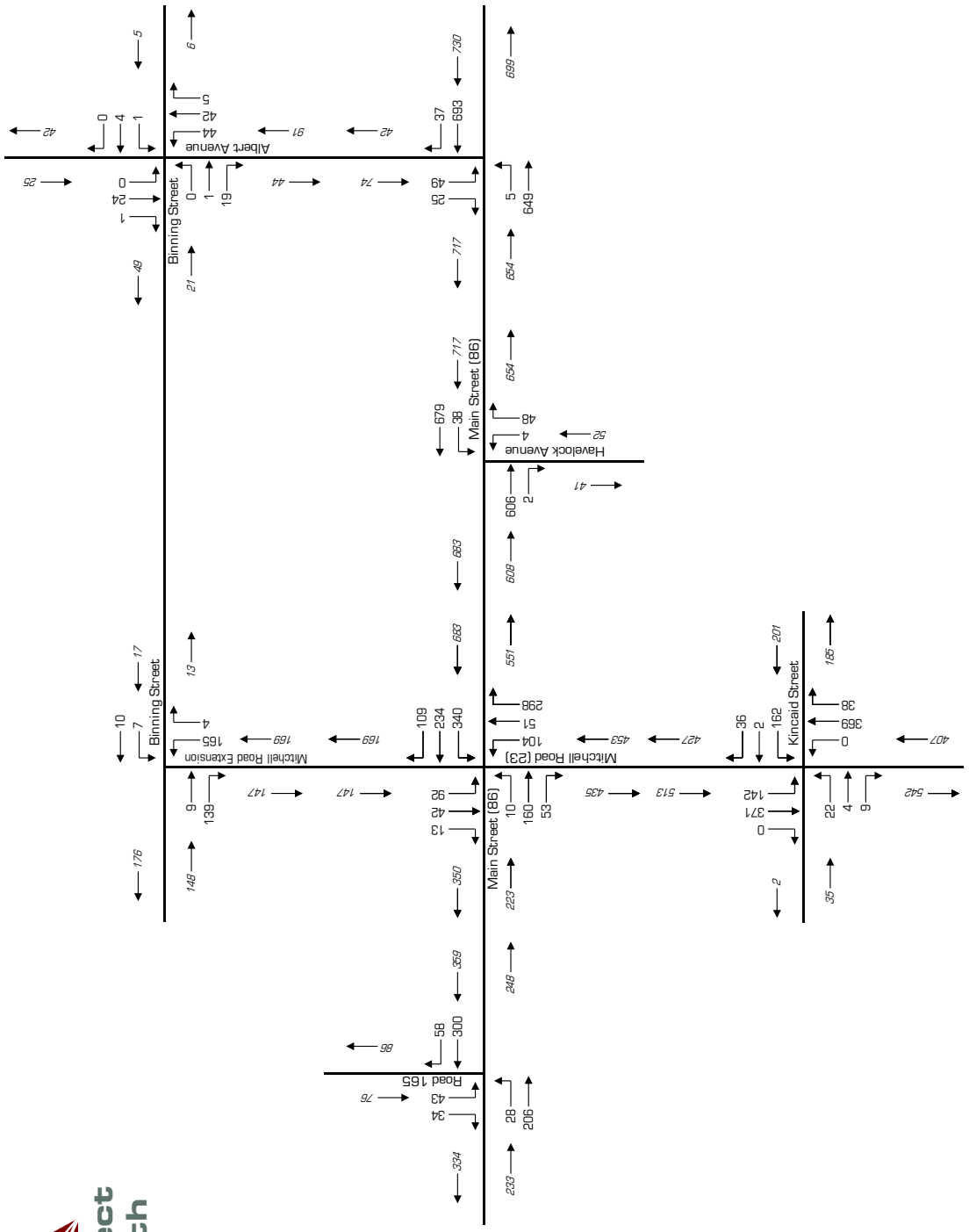

Figure 6.1b

Total 2017 PM Peak Hour Traffic Volumes

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7.1 Northwest Area Network Overview

7.1 Traffic Calming

With the planned development of the Northwest Area, the extension of Binning Avenue and Mitchell Road will create important transportation corridors traversing the neighbourhood. Current development concepts anticipate that a school and community centre will be developed in such a manner that they will front onto the Binning Street extension.

Control of traffic speeds along the Binning Street extension should be given a high degree of consideration in the development of detailed plans for this area.

It is recommended that traffic calming features such as intersection chokers, speed humps, raised pedestrian crosswalks, pedestrian refuge islands be incorporated along the Binning Street and Mitchell Road extensions. Details of these features can be found in the "*Canadian Guide to Traffic Calming*" published by the Transportation Association of Canada.

7.2 Pedestrian and Cyclist Planning

Given the desire of the municipality to locate land uses that are expected to draw significant numbers of vulnerable road users to them, it is paramount that appropriate pedestrian facilities (sidewalks) and cyclist facilities (trials, cycling lanes) be provided in the area. Further, that in areas where there is an expectation of pedestrian/cyclist conflict with vehicles, such as along the Binning Street and Mitchell Road extensions and at the intersections of the two streets, particular attention be paid to providing for safe pedestrian/cyclist passage and crossings.

7.3 Design Standards

Traffic speeds and volumes have been shown to correlate strongly the features that are designed within roadway corridors. In many cases over-design of transportation facilities has seen negative effects such as increased travel speeds and pedestrian collision rates. To that end, many municipalities have adopted "Context Sensitive Design" practices and "Complete Streets" policies. These processes and policies reflect that a transportation network must be designed to incorporate all modes of transport and respect the environment in which it is planned to operate.

Figure 7.1 provides an example of a Context Sensitive Design framework that reflects these concepts. It is recommended that the municipality give these concepts full consideration as it develops the roadway network in Northwest Listowel.

	Suburban (C-3)				General Urban (C-4)				Urban Center/Core (C-5/6)			
	Residential		Commercial		Residential		Commercial		Residential		Commercial	
	Avenue	Street	Avenue	Street	Avenue	Street	Avenue	Street	Avenue	Street	Avenue	Street
Context												
Building Orientation (entrance orientation)	front, side	front, side	front, side	front, side	front	front	front	front	front	front	front	front
Maximum Setback [1]	20 ft.	20 ft.	5 ft.	5 ft.	15 ft.	15 ft.	0 ft.	0 ft.	10 ft.	10 ft.	0 ft.	0 ft.
Off-Street Parking Access/Location	rear, side	rear, side	rear, side	rear, side	rear, side	rear, side	rear, side	rear, side	rear	rear, side	rear, side	rear, side
Roadside												
Recommended Roadside Width [2]	12.5 ft.	10.5 ft.	15 ft.	14 ft.	12.5 ft.	10.5 ft.	16 ft.	14 ft.	19.5 ft.	16 ft.	19.5 ft.	16 ft.
Pedestrian Buffers (planting strip exclusive of travel way width) [2]	6-8 ft. planting strip	5-8 ft. planting strip	6 ft. tree well	5-6 ft. tree well	6-8 ft. planting strip	5-8 ft. planting strip	6 ft. tree well	5-6 ft. tree well	6 ft. tree well	6 ft. tree well	6 ft. tree well	6 ft. tree well
Street Lighting	For all collector thoroughfares in all context zones, intersection safety lighting, basic street lighting, and retail pedestrian-scaled lighting is recommended. See Chapter 8 (Roadside Design Guidelines) and Chapter 10 (Intersection Design Guidelines).											
Traveled Way												
Desired Operating Speed (mph)	30	25	30	25	30	25	25-30 [3]	25	25-30	25	25-30 [3]	25
Design Speed	Design speed should be a maximum of 5 mph over the operating speed. Design speed is used as a control for certain geometric design elements including sight distance, and horizontal and vertical curvature.											
Number of Through Lanes	2-4	2	2-4	2	2-4	2	2-4	2-4	4	2-4	4	2-4
Lane Width [4]	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.
Parallel On-Street Parking Width	7 ft.	7 ft.	7-8 ft.	7-8 ft.	7 ft.	7 ft.	7-8 ft.	7-8 ft.	7 ft.	7 ft.	7-8 ft.	7-8 ft.
Min. Combined Parking/Bike Lane Width	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.	13 ft.
Horizontal Radius (per AASHTO) [5]	510 ft.	333 ft.	510 ft.	333 ft.	510 ft.	333 ft.	510 ft.	333 ft.	510 ft.	333 ft.	510 ft.	333 ft.
Vertical Alignment	Use AASHTO minimums as a target, but consider combinations of horizontal and vertical per AASHTO Green Book.											
Medians which will accommodate single left-turn lanes at intersections [6]	Optional 14 ft.	None	Optional 14 ft.	None	Optional 14 ft.	None	Optional 14 ft.	None	Optional 14 ft.	None	Optional 14 ft.	None
Bike Lanes	On collector Avenues, bike lanes may be provided (6 ft.-5 ft. wide adjacent to 7-8 ft. parking lanes respectively).											
Access Management [7]	Provide low to moderate levels of access management on collector Avenues and Streets											
Typical Traffic Volume Range (vpd)	1,500-10,000	500-5,000	1,500-15,000	1,000-10,000	1,500-10,000	500-5,000	1,500-15,000	1,000-10,000	1,500-10,000	500-5,000	1,500-15,000	1,000-10,000
Intersections												
Roundabout	Consider urban single lane roundabouts at intersections on collector avenues and streets with less than 20,000 entering vehicles per day											
Curb Return Radii	Refer to Chapter 10 on Intersection Design Guidelines for details											

Source: Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, A Proposed Recommended Practice, FHWA, ITE 2005

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Figure 7.1

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Context Sensitive Neighbourhood Design Standards

8.0 Conclusions and Recommendations

8.1 Conclusions

Based on the assumptions and analysis contained within this report, it is concluded that:

- under current conditions, all intersections within the study area generally operate well, with the exception of the westbound movements on Kincaid Street at Mitchell Road, which operate at LOS E during the PM peak hour;
- giving consideration to all known development plans within North Perth and the study area, traffic operations at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23) will operate poorly during the AM and PM peak hours at the 2022 horizon
- a traffic control signal is not warranted for the forecast 2022 volumes at Main Street and Mitchell Road, as the volumes to not fulfill the warrant thresholds to 120% (as required for forecast volumes), but they are fulfilled over 100% which suggests a signal would be warranted in the future if the forecasts are accurate (as 100% fulfillment of the thresholds are required for existing volumes);
- a traffic control signal or single lane modern roundabout would operate well at the intersection of Main Street and Mitchell Road at the 2022 horizon. A roundabout would have lower average delays;
- the southbound movement on Albert Street at Main Street will operate at LOS F during the 2022 PM peak hour;
- a traffic control signal is not warranted at Main Street and Albert Street as the side street volumes are very low. The volume to capacity ratio is less than 1.0, showing while delay may by high, the demand can still be accommodated at this intersection. Vehicles also have multiple options to use other intersections to turn onto Main Street;
- the westbound movements on Kincaid Street at Mitchell Road will operate at LOS E during the 2022 AM peak hour and LOS F during the 2022 PM peak hour.
- a traffic control signal is not warranted at the intersection of Mitchell Road and Kincaid Street due to low overall volumes; and
- a separate westbound right-turn lane on Kincaid Street at Mitchell Road would allow westbound right-turns to experience a significantly reduced delay, but the left-turn and through movements would still experience long delays.

8.2 Recommendations

Based on the analyses contained in the report, it is recommended that:

- a westbound right-turn lane be painted on Kincaid Street at Mitchell Road to allow westbound right-turning vehicles to avoid the delays experienced by the left-turning and through vehicles;
- the municipality of North Perth undertake the necessary steps to protect sufficient land to accommodate a future modern roundabout, or a traffic control signal at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23);
- the municipality of North Perth monitor, on an bi-annual basis, the monitor and assess the traffic conditions at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23);

- when traffic conditions at the intersection of Main Street (Perth Line 86) and Mitchell Road (Highway 23) are such that traffic control signals can be met within 10% of the required volumes under these future conditions, that the municipality of North Perth take the necessary to design and implement a traffic control signal, or a modern roundabout;

- the traffic planning for the Northwest Development area of Listowel reflect the sensitive land uses expected within the area, including the community centre and a school, where large numbers of pedestrians and cyclists are expected and plan accordingly for incorporating traffic calming features within the development area;

- the municipality give Context Sensitive Design concepts full consideration as it plans and develops the roadway network in Northwest Listowel;

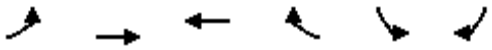
- the Binning Street extension and the Mitchell Road extension be designed to support all modes of transport with particular attention being paid to pedestrian and cyclists and ensuring that these vulnerable road users are given appropriate consideration along these corridors and at intersections;

- traffic calming features such as intersection chokers, speed humps, raised pedestrian crosswalks, pedestrian refuge islands be incorporated along the Binning Street and Mitchell Road extensions; and

- the municipality of North Perth undertake a comprehensive review of its pedestrian and cyclist network within the northwest area with a view to addressign the gaps that current exist in the system.

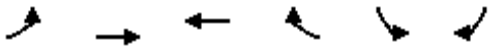
Appendix A

Existing Traffic Operations Analyses



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	18	209	113	22	48	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.978		0.980	
Flt Protected		0.996			0.959	
Satd. Flow (prot)	0	1725	1516	0	1727	0
Flt Permitted		0.996			0.959	
Satd. Flow (perm)	0	1725	1516	0	1727	0
Link Speed (k/h)		80	80		80	
Link Distance (m)		182.6	710.1		264.6	
Travel Time (s)		8.2	32.0		11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	10%	20%	36%	4%	0%
Adj. Flow (vph)	20	227	123	24	52	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	247	147	0	61	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	209	113	22	48	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	227	123	24	52	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	147				401	135
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	147				401	135
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				91	99
cM capacity (veh/h)	1411				593	919

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	247	147	61
Volume Left	20	0	52
Volume Right	0	24	9
cSH	1411	1700	624
Volume to Capacity	0.01	0.09	0.10
Queue Length 95th (m)	0.3	0.0	2.6
Control Delay (s)	0.7	0.0	11.4
Lane LOS	A		B
Approach Delay (s)	0.7	0.0	11.4
Approach LOS			B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	198	61	126	85	48	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		12.0	50.0		0.0	12.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1696	1455	1656	1652	1583	1404
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1696	1455	1656	1652	1583	1404
Link Speed (k/h)	50			50	50	
Link Distance (m)	710.1			361.2	490.6	
Travel Time (s)	51.1			26.0	35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	11%	9%	15%	14%	15%
Adj. Flow (vph)	215	66	137	92	52	224
Shared Lane Traffic (%)						
Lane Group Flow (vph)	215	66	137	92	52	224
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	198	61	126	85	48	206
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	215	66	137	92	52	224
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			215		582	215
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			215		582	215
tC, single (s)			4.2		6.5	6.4
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.4
p0 queue free %			90		87	72
cM capacity (veh/h)			1314		409	793

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	215	66	137	92	276
Volume Left	0	0	137	0	52
Volume Right	0	66	0	0	224
cSH	1700	1700	1314	1700	978
Volume to Capacity	0.13	0.04	0.10	0.05	0.28
Queue Length 95th (m)	0.0	0.0	2.8	0.0	9.3
Control Delay (s)	0.0	0.0	8.1	0.0	12.0
Lane LOS			A		B
Approach Delay (s)	0.0		4.8		12.0
Approach LOS					B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

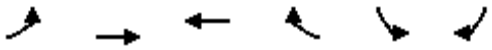
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	385	0	11	388	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.870	
Flt Protected				0.999	0.998	
Satd. Flow (prot)	1667	0	0	1700	1650	0
Flt Permitted				0.999	0.998	
Satd. Flow (perm)	1667	0	0	1700	1650	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	361.2			63.3	118.6	
Travel Time (s)	26.0			4.6	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	0%	12%	0%	0%
Adj. Flow (vph)	418	0	12	422	1	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	418	0	0	434	25	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	385	0	11	388	1	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	418	0	12	422	1	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			418		864	418
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			418		864	418
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	96
cM capacity (veh/h)			1151		324	639

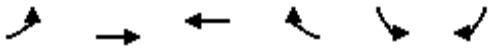
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	418	434	25
Volume Left	0	12	1
Volume Right	0	0	24
cSH	1700	1151	613
Volume to Capacity	0.25	0.01	0.04
Queue Length 95th (m)	0.0	0.3	1.0
Control Delay (s)	0.0	0.3	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.1
Approach LOS			B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		39.3%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	18	389	382	15	12	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.995		0.922	
Flt Protected		0.998			0.979	
Satd. Flow (prot)	0	1665	1695	0	1503	0
Flt Permitted		0.998			0.979	
Satd. Flow (perm)	0	1665	1695	0	1503	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		63.3	221.8		350.2	
Travel Time (s)		4.6	16.0		25.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	14%	12%	0%	17%	12%
Adj. Flow (vph)	20	423	415	16	13	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	443	431	0	31	0
Sign Control		Free	Free		Stop	

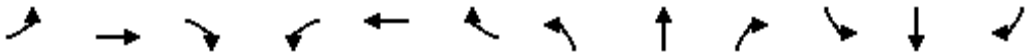
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	389	382	15	12	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	423	415	16	13	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	432				885	423
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	432				885	423
tC, single (s)	4.2				6.6	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
pO queue free %	98				96	97
cM capacity (veh/h)	1082				291	610

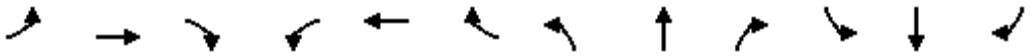
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	442	432	32
Volume Left	20	0	13
Volume Right	0	16	18
cSH	1082	1700	420
Volume to Capacity	0.02	0.25	0.08
Queue Length 95th (m)	0.4	0.0	1.9
Control Delay (s)	0.6	0.0	14.3
Lane LOS	A		B
Approach Delay (s)	0.6	0.0	14.3
Approach LOS			B

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		45.1%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	2	35	1	1	0	11	17	0	2	33	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.875										
Flt Protected		0.999			0.976			0.980			0.997	
Satd. Flow (prot)	0	1616	0	0	1854	0	0	1737	0	0	1842	0
Flt Permitted		0.999			0.976			0.980			0.997	
Satd. Flow (perm)	0	1616	0	0	1854	0	0	1737	0	0	1842	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		212.4			98.1			350.2			120.5	
Travel Time (s)		15.3			7.1			25.2			8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	9%	6%	0%	0%	3%	0%
Adj. Flow (vph)	1	2	38	1	1	0	12	18	0	2	36	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	41	0	0	2	0	0	30	0	0	38	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 15.3%		ICU Level of Service A	
Analysis Period (min) 15			



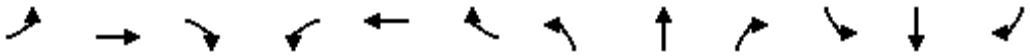
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	2	35	1	1	0	11	17	0	2	33	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	38	1	1	0	12	18	0	2	36	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	41	2	30	38
Volume Left (vph)	1	1	12	2
Volume Right (vph)	38	0	0	0
Hadj (s)	-0.50	0.10	0.20	0.06
Departure Headway (s)	3.6	4.2	4.2	4.1
Degree Utilization, x	0.04	0.00	0.04	0.04
Capacity (veh/h)	988	840	832	869
Control Delay (s)	6.7	7.2	7.4	7.3
Approach Delay (s)	6.7	7.2	7.4	7.3
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.1		
HCM Level of Service		A		
Intersection Capacity Utilization		15.3%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	0	72	1	23	7	178	44	157	148	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.968				0.850		0.988	
Flt Protected		0.968			0.964		0.950			0.950		
Satd. Flow (prot)	0	1839	0	0	1639	0	1805	1696	1509	1752	1611	0
Flt Permitted		0.968			0.964		0.950			0.950		
Satd. Flow (perm)	0	1839	0	0	1639	0	1805	1696	1509	1752	1611	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	9%	0%	6%	0%	12%	7%	3%	18%	0%
Adj. Flow (vph)	2	1	0	78	1	25	8	193	48	171	161	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	3	0	0	104	0	8	193	48	171	175	0
Sign Control		Stop			Stop			Free			Free	

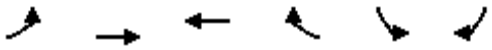
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.7%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1	0	72	1	23	7	178	44	157	148	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	0	78	1	25	8	193	48	171	161	14
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	743	766	168	711	725	193	175			241		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	743	766	168	711	725	193	175			241		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.2			2.2		
p0 queue free %	99	100	100	74	100	97	99			87		
cM capacity (veh/h)	289	290	881	303	307	838	1414			1319		

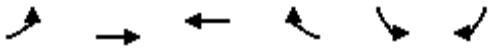
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	104	8	193	48	171	175
Volume Left	2	78	8	0	0	171	0
Volume Right	0	25	0	0	48	0	14
cSH	290	358	1414	1700	1700	1319	1700
Volume to Capacity	0.01	0.29	0.01	0.11	0.03	0.13	0.10
Queue Length 95th (m)	0.3	9.5	0.1	0.0	0.0	3.6	0.0
Control Delay (s)	17.6	19.1	7.6	0.0	0.0	8.1	0.0
Lane LOS	C	C	A			A	
Approach Delay (s)	17.6	19.1	0.2			4.0	
Approach LOS	C	C					

Intersection Summary				
Average Delay	5.0			
Intersection Capacity Utilization	34.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	8	151	227	56	41	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.973		0.957	
Flt Protected		0.997			0.967	
Satd. Flow (prot)	0	1776	1791	0	1597	0
Flt Permitted		0.997			0.967	
Satd. Flow (perm)	0	1776	1791	0	1597	0
Link Speed (k/h)		80	80		80	
Link Distance (m)		182.6	710.1		264.6	
Travel Time (s)		8.2	32.0		11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	7%	3%	4%	5%	21%
Adj. Flow (vph)	9	164	247	61	45	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	173	308	0	66	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	8	151	227	56	41	19
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	164	247	61	45	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	308				459	277
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	308				459	277
tC, single (s)	4.1				6.4	6.4
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.5
p0 queue free %	99				92	97
cM capacity (veh/h)	1264				551	718

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	173	308	65
Volume Left	9	0	45
Volume Right	0	61	21
cSH	1264	1700	595
Volume to Capacity	0.01	0.18	0.11
Queue Length 95th (m)	0.2	0.0	2.9
Control Delay (s)	0.5	0.0	11.8
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	11.8
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	25.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	156	48	307	222	94	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		12.0	50.0		0.0	12.0
Storage Lanes		1	1		1	1
Taper Length (m)			15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1776	1429	1703	1727	1687	1509
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1776	1429	1703	1727	1687	1509
Link Speed (k/h)	50			50	50	
Link Distance (m)	710.1			361.2	490.6	
Travel Time (s)	51.1			26.0	35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	13%	6%	10%	7%	7%
Adj. Flow (vph)	170	52	334	241	102	280
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	52	334	241	102	280
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	156	48	307	222	94	258
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	170	52	334	241	102	280
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			170		1078	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			170		1078	170
tC, single (s)			4.2		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.4
p0 queue free %			76		43	67
cM capacity (veh/h)			1384		180	862

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	170	52	334	241	383
Volume Left	0	0	334	0	102
Volume Right	0	52	0	0	280
cSH	1700	1700	1384	1700	673
Volume to Capacity	0.10	0.03	0.24	0.14	0.57
Queue Length 95th (m)	0.0	0.0	7.6	0.0	28.8
Control Delay (s)	0.0	0.0	8.4	0.0	21.2
Lane LOS			A		C
Approach Delay (s)	0.0		4.9		21.2
Approach LOS					C

Intersection Summary			
Average Delay	9.3		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

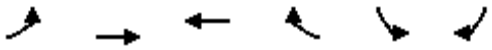
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	450	2	37	525	4	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.999				0.875	
Flt Protected				0.997	0.996	
Satd. Flow (prot)	1774	0	0	1778	1656	0
Flt Permitted				0.997	0.996	
Satd. Flow (perm)	1774	0	0	1778	1656	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	361.2			63.3	118.6	
Travel Time (s)	26.0			4.6	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	0%	0%	7%	0%	0%
Adj. Flow (vph)	489	2	40	571	4	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	491	0	0	611	54	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.8%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	450	2	37	525	4	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	489	2	40	571	4	50
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			491		1141	490
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			491		1141	490
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		98	91
cM capacity (veh/h)			1083		216	582

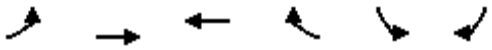
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	491	611	54
Volume Left	0	40	4
Volume Right	2	0	50
cSH	1700	1083	512
Volume to Capacity	0.29	0.04	0.11
Queue Length 95th (m)	0.0	0.9	2.8
Control Delay (s)	0.0	1.0	12.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.0	12.9
Approach LOS			B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	8	488	531	31	43	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992		0.943	
Flt Protected		0.999			0.972	
Satd. Flow (prot)	0	1760	1784	0	1742	0
Flt Permitted		0.999			0.972	
Satd. Flow (perm)	0	1760	1784	0	1742	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		63.3	221.8		350.2	
Travel Time (s)		4.6	16.0		25.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	6%	0%	0%	0%
Adj. Flow (vph)	9	530	577	34	47	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	539	611	0	81	0
Sign Control		Free	Free		Stop	

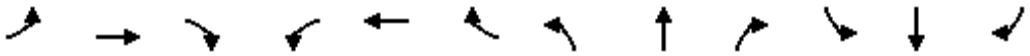
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	8	488	531	31	43	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	530	577	34	47	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	611				1142	594
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	611				1142	594
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				79	93
cM capacity (veh/h)	978				222	509

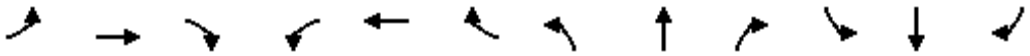
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	539	611	80
Volume Left	9	0	47
Volume Right	0	34	34
cSH	978	1700	290
Volume to Capacity	0.01	0.36	0.28
Queue Length 95th (m)	0.2	0.0	8.8
Control Delay (s)	0.3	0.0	22.1
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	22.1
Approach LOS			C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1	17	1	4	0	36	40	5	0	23	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.872						0.992			0.995	
Flt Protected					0.990			0.978				
Satd. Flow (prot)	0	1657	0	0	1881	0	0	1843	0	0	1890	0
Flt Permitted					0.990			0.978				
Satd. Flow (perm)	0	1657	0	0	1881	0	0	1843	0	0	1890	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		212.4			98.1			350.2			120.5	
Travel Time (s)		15.3			7.1			25.2			8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	1	18	1	4	0	39	43	5	0	25	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	19	0	0	5	0	0	87	0	0	26	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.1%		ICU Level of Service A	
Analysis Period (min) 15			



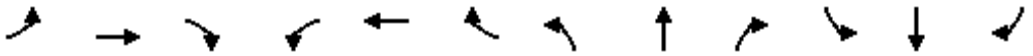
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	1	17	1	4	0	36	40	5	0	23	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	18	1	4	0	39	43	5	0	25	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	20	5	88	26
Volume Left (vph)	0	1	39	0
Volume Right (vph)	18	0	5	1
Hadj (s)	-0.57	0.04	0.05	-0.02
Departure Headway (s)	3.6	4.2	4.0	4.0
Degree Utilization, x	0.02	0.01	0.10	0.03
Capacity (veh/h)	969	829	876	885
Control Delay (s)	6.7	7.2	7.5	7.1
Approach Delay (s)	6.7	7.2	7.5	7.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.3		
HCM Level of Service		A		
Intersection Capacity Utilization		21.1%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	4	9	156	2	35	0	231	37	137	227	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.976				0.850			
Flt Protected		0.970			0.961					0.950		
Satd. Flow (prot)	0	1777	0	0	1782	0	1900	1759	1568	1805	1792	0
Flt Permitted		0.970			0.961					0.950		
Satd. Flow (perm)	0	1777	0	0	1782	0	1900	1759	1568	1805	1792	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	8%	3%	0%	6%	0%
Adj. Flow (vph)	23	4	10	170	2	38	0	251	40	149	247	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	37	0	0	210	0	0	251	40	149	247	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			



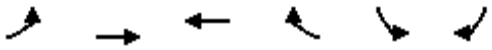
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	4	9	156	2	35	0	231	37	137	227	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	10	170	2	38	0	251	40	149	247	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	835	836	247	808	796	251	247			291		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	835	836	247	808	796	251	247			291		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	98	99	37	99	95	100			88		
cM capacity (veh/h)	250	270	797	268	285	793	1331			1282		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	37	210	0	251	40	149	247
Volume Left	23	170	0	0	0	149	0
Volume Right	10	38	0	0	40	0	0
cSH	308	305	1700	1700	1700	1282	1700
Volume to Capacity	0.12	0.69	0.00	0.15	0.02	0.12	0.15
Queue Length 95th (m)	3.2	37.8	0.0	0.0	0.0	3.1	0.0
Control Delay (s)	18.3	39.2	0.0	0.0	0.0	8.2	0.0
Lane LOS	C	E				A	
Approach Delay (s)	18.3	39.2	0.0			3.1	
Approach LOS	C	E					

Intersection Summary				
Average Delay	10.8			
Intersection Capacity Utilization	44.2%	ICU Level of Service	A	
Analysis Period (min)	15			

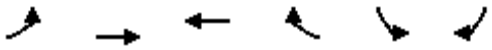
Appendix B

2022 Traffic Operations Analyses



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	37	314	179	33	58	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.979		0.950	
Flt Protected		0.995			0.969	
Satd. Flow (prot)	0	1725	1519	0	1706	0
Flt Permitted		0.995			0.969	
Satd. Flow (perm)	0	1725	1519	0	1706	0
Link Speed (k/h)		80	80		80	
Link Distance (m)		182.6	710.1		264.6	
Travel Time (s)		8.2	32.0		11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	10%	20%	36%	4%	0%
Adj. Flow (vph)	40	341	195	36	63	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	381	231	0	100	0
Sign Control		Free	Free		Stop	

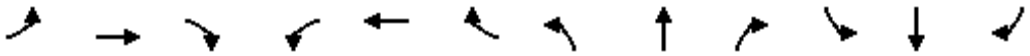
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.3%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	37	314	179	33	58	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	341	195	36	63	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	230				634	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	230				634	212
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	97				85	96
cM capacity (veh/h)	1314				426	833

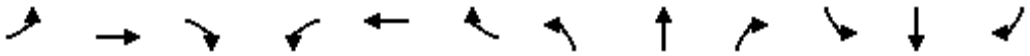
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	382	230	100
Volume Left	40	0	63
Volume Right	0	36	37
cSH	1314	1700	520
Volume to Capacity	0.03	0.14	0.19
Queue Length 95th (m)	0.8	0.0	5.6
Control Delay (s)	1.1	0.0	13.6
Lane LOS	A		B
Approach Delay (s)	1.1	0.0	13.6
Approach LOS			B

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	237	78	158	123	108	65	50	262	109	55	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		12.0	50.0		0.0	15.0		12.0	15.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.930				0.850		0.965	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1696	1455	1656	1622	0	1583	1863	1404	1770	1798	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1696	1455	1656	1622	0	1583	1863	1404	1770	1798	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		710.1			361.2			490.6			354.4	
Travel Time (s)		51.1			26.0			35.3			25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	12%	11%	9%	15%	2%	14%	2%	15%	2%	2%	2%
Adj. Flow (vph)	16	258	85	172	134	117	71	54	285	118	60	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	258	85	172	251	0	71	54	285	118	78	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.7%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	237	78	158	123	108	65	50	262	109	55	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	258	85	172	134	117	71	54	285	118	60	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	251			258			816	885	258	853	826	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	251			258			816	885	258	853	826	192
tC, single (s)	4.1			4.2			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	99			86			65	78	62	7	77	98
cM capacity (veh/h)	1314			1267			203	242	750	128	262	849

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	16	258	85	172	251	71	339	118	78
Volume Left	16	0	0	172	0	71	0	118	0
Volume Right	0	0	85	0	117	0	285	0	18
cSH	1314	1700	1700	1267	1700	203	894	128	313
Volume to Capacity	0.01	0.15	0.05	0.14	0.15	0.35	0.38	0.93	0.25
Queue Length 95th (m)	0.3	0.0	0.0	3.7	0.0	11.8	14.3	48.9	7.7
Control Delay (s)	7.8	0.0	0.0	8.3	0.0	31.9	14.5	126.4	20.3
Lane LOS	A			A		D	B	F	C
Approach Delay (s)	0.4			3.4		17.5		84.2	
Approach LOS						C		F	

Intersection Summary			
Average Delay	18.2		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

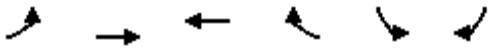
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	588	0	12	580	1	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.870	
Flt Protected				0.999	0.998	
Satd. Flow (prot)	1667	0	0	1698	1650	0
Flt Permitted				0.999	0.998	
Satd. Flow (perm)	1667	0	0	1698	1650	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	361.2			63.3	118.6	
Travel Time (s)	26.0			4.6	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	0%	12%	0%	0%
Adj. Flow (vph)	639	0	13	630	1	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	639	0	0	643	27	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	588	0	12	580	1	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	639	0	13	630	1	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			639		1296	639
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			639		1296	639
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	95
cM capacity (veh/h)			955		178	479

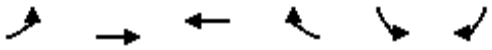
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	639	643	27
Volume Left	0	13	1
Volume Right	0	0	26
cSH	1700	955	449
Volume to Capacity	0.38	0.01	0.06
Queue Length 95th (m)	0.0	0.3	1.5
Control Delay (s)	0.0	0.4	13.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	13.5
Approach LOS			B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)		15	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	13	599	583	21	17	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.995		0.952	
Flt Protected		0.999			0.969	
Satd. Flow (prot)	0	1666	1694	0	1521	0
Flt Permitted		0.999			0.969	
Satd. Flow (perm)	0	1666	1694	0	1521	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		63.3	221.8		350.2	
Travel Time (s)		4.6	16.0		25.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	14%	12%	0%	17%	12%
Adj. Flow (vph)	14	651	634	23	18	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	665	657	0	28	0
Sign Control		Free	Free		Stop	

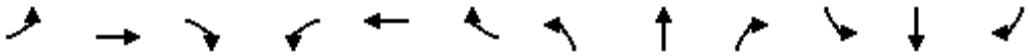
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	13	599	583	21	17	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	651	634	23	18	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	657				1324	645
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	657				1324	645
tC, single (s)	4.2				6.6	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	98				88	98
cM capacity (veh/h)	890				157	455

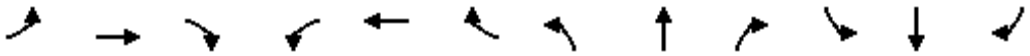
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	665	657	28
Volume Left	14	0	18
Volume Right	0	23	10
cSH	890	1700	203
Volume to Capacity	0.02	0.39	0.14
Queue Length 95th (m)	0.4	0.0	3.8
Control Delay (s)	0.4	0.0	25.5
Lane LOS	A		D
Approach Delay (s)	0.4	0.0	25.5
Approach LOS			D

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		52.0%	ICU Level of Service
Analysis Period (min)		15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	2	37	1	1	0	16	18	0	2	36	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.874										
Flt Protected		0.999			0.976			0.978			0.998	
Satd. Flow (prot)	0	1614	0	0	1854	0	0	1731	0	0	1844	0
Flt Permitted		0.999			0.976			0.978			0.998	
Satd. Flow (perm)	0	1614	0	0	1854	0	0	1731	0	0	1844	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		215.7			98.1			350.2			120.5	
Travel Time (s)		15.5			7.1			25.2			8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	9%	6%	0%	0%	3%	0%
Adj. Flow (vph)	1	2	40	1	1	0	17	20	0	2	39	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	2	0	0	37	0	0	41	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	2	37	1	1	0	16	18	0	2	36	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	40	1	1	0	17	20	0	2	39	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	43	2	37	41
Volume Left (vph)	1	1	17	2
Volume Right (vph)	40	0	0	0
Hadj (s)	-0.50	0.10	0.22	0.06
Departure Headway (s)	3.6	4.2	4.2	4.1
Degree Utilization, x	0.04	0.00	0.04	0.05
Capacity (veh/h)	981	833	826	866
Control Delay (s)	6.7	7.2	7.4	7.3
Approach Delay (s)	6.7	7.2	7.4	7.3
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.1		
HCM Level of Service		A		
Intersection Capacity Utilization		17.8%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	0	78	1	25	8	346	48	170	301	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.968				0.850		0.993	
Flt Protected		0.968			0.964		0.950			0.950		
Satd. Flow (prot)	0	1839	0	0	1639	0	1805	1696	1509	1752	1610	0
Flt Permitted		0.968			0.964		0.950			0.950		
Satd. Flow (perm)	0	1839	0	0	1639	0	1805	1696	1509	1752	1610	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	9%	0%	6%	0%	12%	7%	3%	18%	0%
Adj. Flow (vph)	2	1	0	85	1	27	9	376	52	185	327	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	3	0	0	113	0	9	376	52	185	342	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1	0	78	1	25	8	346	48	170	301	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	0	85	1	27	9	376	52	185	327	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1126	1150	335	1091	1105	376	342			428		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1126	1150	335	1091	1105	376	342			428		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.2			2.2		
p0 queue free %	99	99	100	47	99	96	99			84		
cM capacity (veh/h)	153	166	712	161	176	662	1228			1126		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	113	9	376	52	185	342
Volume Left	2	85	9	0	0	185	0
Volume Right	0	27	0	0	52	0	15
cSH	157	197	1228	1700	1700	1126	1700
Volume to Capacity	0.02	0.57	0.01	0.22	0.03	0.16	0.20
Queue Length 95th (m)	0.5	24.8	0.2	0.0	0.0	4.7	0.0
Control Delay (s)	28.5	45.2	8.0	0.0	0.0	8.8	0.0
Lane LOS	D	E	A			A	
Approach Delay (s)	28.5	45.2	0.2			3.1	
Approach LOS	D	E					

Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	44.8%	ICU Level of Service	A	
Analysis Period (min)	15			

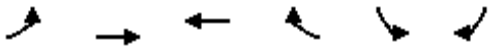
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	8	172	9	10	166	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.871				0.995	
Flt Protected				0.977	0.954	
Satd. Flow (prot)	1622	0	0	1820	1768	0
Flt Permitted				0.977	0.954	
Satd. Flow (perm)	1622	0	0	1820	1768	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	178.1			202.9	354.4	
Travel Time (s)	12.8			14.6	25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	187	10	11	180	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	0	0	21	187	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	8	172	9	10	166	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	187	10	11	180	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			196		133	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		133	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		79	99
cM capacity (veh/h)			1377		855	953

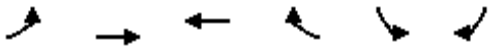
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	196	21	187
Volume Left	0	10	180
Volume Right	187	0	7
cSH	1700	1377	858
Volume to Capacity	0.12	0.01	0.22
Queue Length 95th (m)	0.0	0.2	6.6
Control Delay (s)	0.0	3.6	10.4
Lane LOS		A	B
Approach Delay (s)	0.0	3.6	10.4
Approach LOS			B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	209	308	84	63	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.971		0.935	
Flt Protected		0.990			0.975	
Satd. Flow (prot)	0	1782	1787	0	1537	0
Flt Permitted		0.990			0.975	
Satd. Flow (perm)	0	1782	1787	0	1537	0
Link Speed (k/h)		80	80		80	
Link Distance (m)		182.6	710.1		264.6	
Travel Time (s)		8.2	32.0		11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	7%	3%	4%	5%	21%
Adj. Flow (vph)	59	227	335	91	68	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	286	426	0	131	0
Sign Control		Free	Free		Stop	

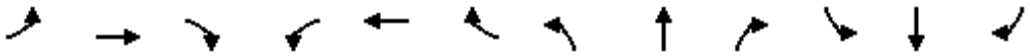
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.3%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	54	209	308	84	63	58
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	227	335	91	68	63
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	426				725	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426				725	380
tC, single (s)	4.1				6.4	6.4
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.5
p0 queue free %	95				81	90
cM capacity (veh/h)	1144				368	627

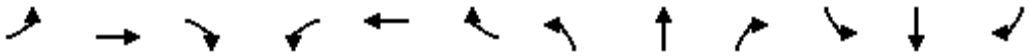
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	286	426	132
Volume Left	59	0	68
Volume Right	0	91	63
cSH	1144	1700	459
Volume to Capacity	0.05	0.25	0.29
Queue Length 95th (m)	1.3	0.0	9.4
Control Delay (s)	2.1	0.0	16.0
Lane LOS	A		C
Approach Delay (s)	2.1	0.0	16.0
Approach LOS			C

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	230	68	352	303	136	119	69	309	106	51	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		12.0	50.0		0.0	15.0		12.0	15.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850		0.968	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1776	1429	1703	1684	0	1687	1863	1509	1770	1803	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1776	1429	1703	1684	0	1687	1863	1509	1770	1803	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		710.1			361.2			490.6			351.1	
Travel Time (s)		51.1			26.0			35.3			25.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	7%	13%	6%	10%	2%	7%	2%	7%	2%	2%	2%
Adj. Flow (vph)	12	250	74	383	329	148	129	75	336	115	55	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	250	74	383	477	0	129	75	336	115	70	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	230	68	352	303	136	119	69	309	106	51	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	250	74	383	329	148	129	75	336	115	55	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	477			250			1411	1516	250	1480	1442	403
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	477			250			1411	1516	250	1480	1442	403
tC, single (s)	4.1			4.2			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.4	3.5	4.0	3.3
pO queue free %	99			70			0	10	57	0	40	98
cM capacity (veh/h)	1085			1293			45	83	777	10	92	647

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	12	250	74	383	477	129	411	115	71
Volume Left	12	0	0	383	0	129	0	115	0
Volume Right	0	0	74	0	148	0	336	0	15
cSH	1085	1700	1700	1293	1700	45	381	10	113
Volume to Capacity	0.01	0.15	0.04	0.30	0.28	2.86	1.08	11.03	0.63
Queue Length 95th (m)	0.3	0.0	0.0	10.0	0.0	111.8	115.2	Err	25.1
Control Delay (s)	8.4	0.0	0.0	9.0	0.0	1027.5	101.8	Err	79.4
Lane LOS	A			A		F	F	F	F
Approach Delay (s)	0.3			4.0		323.5		6228.4	
Approach LOS						F		F	

Intersection Summary				
Average Delay	695.2			
Intersection Capacity Utilization	54.9%	ICU Level of Service		A
Analysis Period (min)	15			

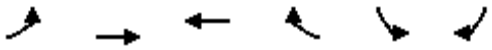
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	702	2	40	787	4	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.874	
Flt Protected				0.998	0.997	
Satd. Flow (prot)	1776	0	0	1778	1656	0
Flt Permitted				0.998	0.997	
Satd. Flow (perm)	1776	0	0	1778	1656	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	361.2			63.3	118.6	
Travel Time (s)	26.0			4.6	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	0%	0%	7%	0%	0%
Adj. Flow (vph)	763	2	43	855	4	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	765	0	0	898	58	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 84.0%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	702	2	40	787	4	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	763	2	43	855	4	54
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			765		1707	764
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			765		1707	764
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		95	87
cM capacity (veh/h)			857		96	407

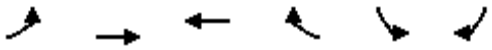
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	765	899	59
Volume Left	0	43	4
Volume Right	2	0	54
cSH	1700	857	328
Volume to Capacity	0.45	0.05	0.18
Queue Length 95th (m)	0.0	1.3	5.1
Control Delay (s)	0.0	1.4	18.3
Lane LOS		A	C
Approach Delay (s)	0.0	1.4	18.3
Approach LOS			C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	5	747	801	39	51	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.994		0.954	
Flt Protected					0.968	
Satd. Flow (prot)	0	1760	1786	0	1755	0
Flt Permitted					0.968	
Satd. Flow (perm)	0	1760	1786	0	1755	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		63.3	221.8		350.2	
Travel Time (s)		4.6	16.0		25.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	6%	0%	0%	0%
Adj. Flow (vph)	5	812	871	42	55	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	817	913	0	83	0
Sign Control		Free	Free		Stop	

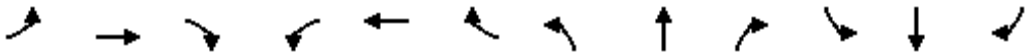
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.6%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	747	801	39	51	26
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	812	871	42	55	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	913				1715	892
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	913				1715	892
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				44	92
cM capacity (veh/h)	755				100	344

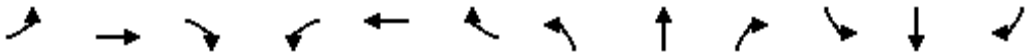
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	817	913	84
Volume Left	5	0	55
Volume Right	0	42	28
cSH	755	1700	131
Volume to Capacity	0.01	0.54	0.64
Queue Length 95th (m)	0.2	0.0	27.0
Control Delay (s)	0.2	0.0	71.7
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	71.7
Approach LOS			F

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1	20	1	4	0	45	43	5	0	25	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.871						0.993			0.995	
Flt Protected					0.990			0.976				
Satd. Flow (prot)	0	1655	0	0	1881	0	0	1841	0	0	1890	0
Flt Permitted					0.990			0.976				
Satd. Flow (perm)	0	1655	0	0	1881	0	0	1841	0	0	1890	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		212.4			98.1			350.2			120.5	
Travel Time (s)		15.3			7.1			25.2			8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	1	22	1	4	0	49	47	5	0	27	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	23	0	0	5	0	0	101	0	0	28	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.7%		ICU Level of Service A	
Analysis Period (min) 15			



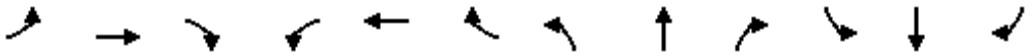
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	1	20	1	4	0	45	43	5	0	25	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	22	1	4	0	49	47	5	0	27	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	5	101	28
Volume Left (vph)	0	1	49	0
Volume Right (vph)	22	0	5	1
Hadj (s)	-0.57	0.04	0.06	-0.02
Departure Headway (s)	3.6	4.2	4.0	4.0
Degree Utilization, x	0.02	0.01	0.11	0.03
Capacity (veh/h)	958	820	871	879
Control Delay (s)	6.7	7.3	7.6	7.2
Approach Delay (s)	6.7	7.3	7.6	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.4		
HCM Level of Service		A		
Intersection Capacity Utilization		21.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	4	10	168	2	38	0	408	40	148	402	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963			0.976				0.850			
Flt Protected		0.970			0.961					0.950		
Satd. Flow (prot)	0	1775	0	0	1782	0	1900	1759	1568	1805	1792	0
Flt Permitted		0.970			0.961					0.950		
Satd. Flow (perm)	0	1775	0	0	1782	0	1900	1759	1568	1805	1792	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	8%	3%	0%	6%	0%
Adj. Flow (vph)	25	4	11	183	2	41	0	443	43	161	437	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	226	0	0	443	43	161	437	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.1%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	4	10	168	2	38	0	408	40	148	402	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	4	11	183	2	41	0	443	43	161	437	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1245	1246	437	1215	1202	443	437			487		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1245	1246	437	1215	1202	443	437			487		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
pO queue free %	80	97	98	0	99	93	100			85		
cM capacity (veh/h)	125	149	624	136	159	619	1134			1087		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	40	226	0	443	43	161	437
Volume Left	25	183	0	0	0	161	0
Volume Right	11	41	0	0	43	0	0
cSH	163	159	1700	1700	1700	1087	1700
Volume to Capacity	0.25	1.42	0.00	0.26	0.03	0.15	0.26
Queue Length 95th (m)	7.4	114.6	0.0	0.0	0.0	4.2	0.0
Control Delay (s)	34.2	276.6	0.0	0.0	0.0	8.9	0.0
Lane LOS	D	F				A	
Approach Delay (s)	34.2	276.6	0.0			2.4	
Approach LOS	D	F					

Intersection Summary				
Average Delay	48.4			
Intersection Capacity Utilization	55.1%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	9	163	8	10	212	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.872				0.998	
Flt Protected				0.978	0.953	
Satd. Flow (prot)	1624	0	0	1822	1772	0
Flt Permitted				0.978	0.953	
Satd. Flow (perm)	1624	0	0	1822	1772	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	181.4			205.5	351.1	
Travel Time (s)	13.1			14.8	25.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	177	9	11	230	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	0	20	234	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	9	163	8	10	212	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	177	9	11	230	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			187		127	98
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			187		127	98
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		73	100
cM capacity (veh/h)			1387		863	958

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	187	20	235
Volume Left	0	9	230
Volume Right	177	0	4
cSH	1700	1387	864
Volume to Capacity	0.11	0.01	0.27
Queue Length 95th (m)	0.0	0.2	8.8
Control Delay (s)	0.0	3.4	10.7
Lane LOS		A	B
Approach Delay (s)	0.0	3.4	10.7
Approach LOS			B

Intersection Summary			
Average Delay		5.9	
Intersection Capacity Utilization		29.2%	ICU Level of Service
Analysis Period (min)		15	

Appendix C

Signal Warrant Analyses

Signal Warrant Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Paradigm
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Horizon Year: 2022 Total
Region/City/Township: Listowel

Major Street: Main Street (86)
Minor Street: Mitchell Street (23)

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Warrant for new intersections with forecast traffic
120% Satisfied	No	Warrant for existing intersections with forecast traffic

	Major Street						Minor Street					
	Main Street (86)						Mitchell Street (23)					
	Eastbound			Westbound			Northbound			Southbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	15	237	78	158	123	108	65	50	262	109	55	17
PM Peak Hour	11	230	68	352	303	136	119	69	309	106	51	14

Average Hourly Volumes			
Volume	AM	PM	AHV
1A - All	1277	1768	761
1B - Minor	558	668	307
2A - Major	719	1100	455
2B - Cross	229	294	131

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	761
					% Fulfilled	105.7%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	307
					% Fulfilled	180.3%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	455
					% Fulfilled	63.2%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	131
					% Fulfilled	174.3%

Signal Warrant Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Paradigm
www.ptsl.com

Horizon Year: 2022 Total
Region/City/Township: Listowel

Major Street: Mitchell Street (23)
Minor Street: Kincaid Street

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Warrant for new intersections with forecast traffic
120% Satisfied	No	Warrant for existing intersections with forecast traffic

	Major Street						Minor Street					
	Mitchell Street (23)						Kincaid Street					
	Northbound			Southbound			Eastbound			Westbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	8	346	48	170	301	14	2	1	0	78	1	25
PM Peak Hour	0	408	40	148	402	0	23	4	10	168	2	38

Average Hourly Volumes			
Volume	AM	PM	AHV
1A - All	994	1243	559
1B - Minor	107	245	88
2A - Major	887	998	471
2B - Cross	81	195	69

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	559
					% Fulfilled	77.7%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	88
					% Fulfilled	51.8%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	471
					% Fulfilled	65.5%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	69
					% Fulfilled	92.0%

Signal Warrant Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Paradigm
www.ptsl.com

Horizon Year: 2022 Total
Region/City/Township: Listowel

Major Street: Main Street (86)
Minor Street: Albert Avenue

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Warrant for new intersections with forecast traffic
120% Satisfied	No	Warrant for existing intersections with forecast traffic

	Major Street						Minor Street					
	Main Street (86)						Albert Avenue					
	Eastbound			Westbound			Northbound			Southbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	13	599			583	21				17		9
PM Peak Hour	5	747			801	39				51		26

Average Hourly Volumes			
Volume	AM	PM	AHV
1A - All	1242	1669	728
1B - Minor	26	77	26
2A - Major	1216	1592	702
2B - Cross	17	51	17

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	728
					% Fulfilled	101.1%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	26
					% Fulfilled	10.1%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	702
					% Fulfilled	97.5%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	17
					% Fulfilled	22.7%

Signal Warrant Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Paradigm
www.ptsl.com

Horizon Year: 2017 (Interim Horizon) Total
Region/City/Township: Listowel

Major Street: Main Street (86)
Minor Street: Mitchell Street (23)

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Warrant for new intersections with forecast traffic
120% Satisfied	No	Warrant for existing intersections with forecast traffic

	Major Street						Minor Street					
	Main Street (86)						Mitchell Street (23)					
	Eastbound			Westbound			Northbound			Southbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	14	210	71	153	89	98	57	44	254	88	41	16
PM Peak Hour	10	160	53	340	234	109	104	51	298	92	42	13

Average Hourly Volumes			
Volume	AM	PM	AHV
1A - All	1135	1506	660
1B - Minor	500	600	275
2A - Major	635	906	385
2B - Cross	189	247	109

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	660
					% Fulfilled	91.7%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	275
					% Fulfilled	161.8%

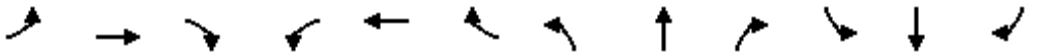
Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	385
					% Fulfilled	53.5%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	109
					% Fulfilled	145.3%

Appendix D

2022 Traffic Operations with Remedial Measures Analysis

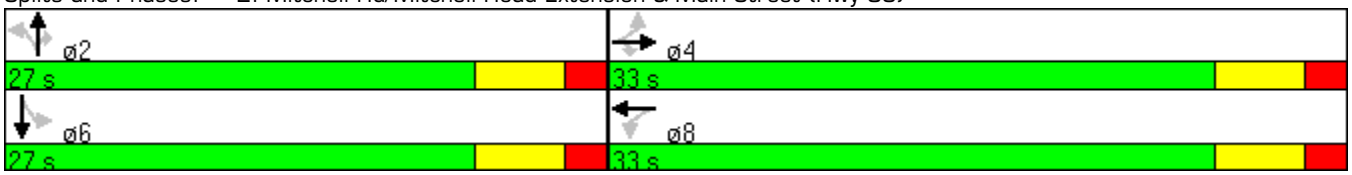


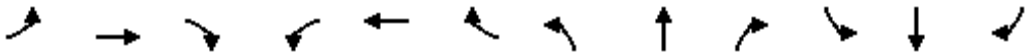
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	237	78	158	123	108	65	50	262	109	55	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		12.0	50.0		0.0	15.0		12.0	15.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.930				0.850		0.965	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1696	1455	1656	1622	0	1583	1863	1404	1770	1798	0
Flt Permitted	0.603			0.600			0.706			0.722		
Satd. Flow (perm)	1123	1696	1455	1046	1622	0	1177	1863	1404	1345	1798	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85		95				285		18	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		710.1			361.2			490.6			354.4	
Travel Time (s)		51.1			26.0			35.3			25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	12%	11%	9%	15%	2%	14%	2%	15%	2%	2%	2%
Adj. Flow (vph)	16	258	85	172	134	117	71	54	285	118	60	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	258	85	172	251	0	71	54	285	118	78	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0		22.0	22.0	22.0	22.0	22.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		27.0	27.0	27.0	27.0	27.0	
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%		45.0%	45.0%	45.0%	45.0%	45.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	
Act Effct Green (s)	36.3	36.3	36.3	36.3	36.3		11.7	11.7	11.7	11.7	11.7	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60		0.20	0.20	0.20	0.20	0.20	
v/c Ratio	0.02	0.25	0.09	0.27	0.25		0.31	0.15	0.57	0.45	0.21	
Control Delay	5.8	6.8	2.1	7.6	4.4		23.8	20.1	7.9	26.7	17.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	5.8	6.8	2.1	7.6	4.4		23.8	20.1	7.9	26.7	17.2	
LOS	A	A	A	A	A		C	C	A	C	B	
Approach Delay		5.6			5.7			12.2			22.9	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	0.6	11.2	0.0	7.6	6.3		7.3	5.4	0.0	12.5	6.0	
Queue Length 95th (m)	3.0	26.3	4.9	20.4	18.4		16.0	12.3	16.1	23.9	14.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		686.1			337.2			466.6			330.4	
Turn Bay Length (m)			12.0	50.0			15.0		12.0	15.0		
Base Capacity (vph)	680	1027	915	633	1020		412	652	677	471	641	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.02	0.25	0.09	0.27	0.25		0.17	0.08	0.42	0.25	0.12	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 52.0%		ICU Level of Service A	
Analysis Period (min) 15			

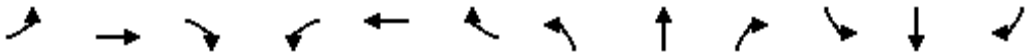
Splits and Phases: 2: Mitchell Rd/Mitchell Road Extension & Main Street (Hwy 86)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	0	78	1	25	8	346	48	170	301	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850		0.993	
Flt Protected		0.968			0.953		0.950			0.950		
Satd. Flow (prot)	0	1839	0	0	1663	1524	1805	1696	1509	1752	1610	0
Flt Permitted		0.968			0.953		0.950			0.950		
Satd. Flow (perm)	0	1839	0	0	1663	1524	1805	1696	1509	1752	1610	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	9%	0%	6%	0%	12%	7%	3%	18%	0%
Adj. Flow (vph)	2	1	0	85	1	27	9	376	52	185	327	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	3	0	0	86	27	9	376	52	185	342	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1	0	78	1	25	8	346	48	170	301	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	0	85	1	27	9	376	52	185	327	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1126	1150	335	1091	1105	376	342			428		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1126	1150	335	1091	1105	376	342			428		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.2			2.2		
p0 queue free %	99	99	100	47	99	96	99			84		
cM capacity (veh/h)	153	166	712	161	176	662	1228			1126		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	86	27	9	376	52	185	342
Volume Left	2	85	0	9	0	0	185	0
Volume Right	0	0	27	0	0	52	0	15
cSH	157	162	662	1228	1700	1700	1126	1700
Volume to Capacity	0.02	0.53	0.04	0.01	0.22	0.03	0.16	0.20
Queue Length 95th (m)	0.5	21.3	1.0	0.2	0.0	0.0	4.7	0.0
Control Delay (s)	28.5	50.1	10.7	8.0	0.0	0.0	8.8	0.0
Lane LOS	D	F	B	A			A	
Approach Delay (s)	28.5	40.6		0.2			3.1	
Approach LOS	D	E						

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	43.6%	ICU Level of Service	A	
Analysis Period (min)	15			

ARCADY 7

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Report generation date: 14/09/2012 5:07:09 PM

Summary of roundabout performance

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	(Default Analysis Set) - 2022			
Arm 1	0.19	3.87	0.16	A
Arm 2	0.46	5.05	0.32	A
Arm 3	0.60	5.78	0.38	A
Arm 4	0.50	4.60	0.33	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

2022 - AM runs from 08:00:00 to 09:00:00
2022 - PM runs from 16:30:00 to 17:30:00

File summary

File Description

Title	Main Street (Perth Line 86) & Mitchell Road (Highway 23)
Location	Listowel
Site Number	2
Date	14/09/2012
Version	
Status	Alternative
Identifier	
Client	
Jobnumber	120810
Enumerator	MattPTSL3\Matt
Description	

Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
	Order	Ascending	Numerical	By Exit	Absolute Time

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	s	-Min	perMin

A1 - (Default Analysis Set) - D2 - 2022, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)		Yes		(D1)		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
2022, AM	2022	AM			Yes			08:00	09:00	60	15	FLAT

Roundabout Network

Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	(untitled)	1,2,3,4	Standard			

Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Right	Normal/unknown	((Mini-roundabouts only))	

Arms

Arms

ID	Name	Description
1	Mitchell Road Extension North Leg	
2	Main Street West Leg	
3	Mitchell Road South Leg	
4	Main Street East Leg	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00

2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	4.50	30.00	20.00	40.00	25.00	
2	3.50	4.50	30.00	20.00	40.00	25.00	
3	3.50	4.50	30.00	20.00	40.00	25.00	
4	3.50	4.50	30.00	20.00	40.00	25.00	

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None

Arm Slope/ Intercept and Capacity

Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		((calculated))	((calculated))	0.579	1357.445
2		((calculated))	((calculated))	0.579	1357.445
3		((calculated))	((calculated))	0.579	1357.445
4		((calculated))	((calculated))	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		Yes	Yes	HV Percentages	2.00				Yes	Yes

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
1	FLAT	Yes	181.00	100.000	1.00
2	FLAT	Yes	330.00	100.000	1.00
3	FLAT	Yes	377.00	100.000	1.00
4	FLAT	Yes	389.00	100.000	1.00

Turning Proportions

Turning Counts or Proportions (Veh/hr) - Roundabout 1 (for whole period)

	To			

		1	2	3	4
From	1	0.000	17.000	55.000	109.000
	2	15.000	0.000	78.000	237.000
	3	50.000	65.000	0.000	262.000
	4	108.000	123.000	158.000	0.000

Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.09	0.30	0.60
	2	0.05	0.00	0.24	0.72
	3	0.13	0.17	0.00	0.69
	4	0.28	0.32	0.41	0.00

Vehicle Mix

Average PCU Per Vehicle - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.020	1.020	1.020
	2	1.020	1.000	1.110	1.120
	3	1.020	1.140	1.000	1.150
	4	1.020	1.150	1.090	1.000

Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	2.000	2.000	2.000
	2	2.000	0.000	11.000	12.000
	3	2.000	14.000	0.000	15.000
	4	2.000	15.000	9.000	0.000

Results

Results Summary

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (s)	Slope	Intercept (PCU/hr)
1	0.16	3.87	0.19	A	181.00	181.00	11.58	3.84	0.19	11.58	3.84	0.579	1357.445
2	0.32	5.05	0.46	A	330.00	330.00	27.41	4.98	0.46	27.42	4.99	0.579	1357.445
3	0.38	5.78	0.60	A	377.00	377.00	35.76	5.69	0.60	35.78	5.69	0.579	1357.445
4	0.33	4.60	0.50	A	389.00	389.00	29.48	4.55	0.49	29.49	4.55	0.579	1357.445

Overview: Standard Roundabout Geometry

Standard Geometry

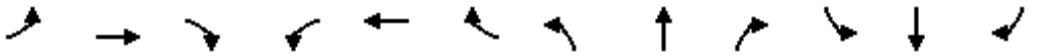
Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only	Final Slope	Final Intercept (PCU/hr)
1	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445
2	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445
3	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445

4	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445

Overview: Time Segment Results

Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (s)
1	1	181.00	1111.97	0.163	0.00	0.00	0.19	2.84	(0.02)	3.860
1	2	330.00	1043.83	0.316	0.00	0.00	0.46	6.67	(0.01)	5.019
1	3	377.00	1000.68	0.377	0.00	0.00	0.60	8.66	(0.01)	5.728
1	4	389.00	1171.78	0.332	0.00	0.00	0.49	7.19	(0.02)	4.577
2	1	181.00	1110.81	0.163	0.00	0.19	0.19	2.91	(0.02)	3.871
2	2	330.00	1043.01	0.316	0.00	0.46	0.46	6.90	(0.01)	5.048
2	3	377.00	999.64	0.377	0.00	0.60	0.60	9.01	(0.01)	5.781
2	4	389.00	1171.31	0.332	0.00	0.49	0.50	7.42	(0.02)	4.601
3	1	181.00	1110.81	0.163	0.00	0.19	0.19	2.91	(0.02)	3.871
3	2	330.00	1043.00	0.316	0.00	0.46	0.46	6.92	(0.01)	5.048
3	3	377.00	999.64	0.377	0.00	0.60	0.60	9.04	(0.01)	5.781
3	4	389.00	1171.31	0.332	0.00	0.50	0.50	7.43	(0.02)	4.601
4	1	181.00	1110.80	0.163	0.00	0.19	0.19	2.92	(0.02)	3.871
4	2	330.00	1043.00	0.316	0.00	0.46	0.46	6.93	(0.01)	5.048
4	3	377.00	999.64	0.377	0.00	0.60	0.60	9.05	(0.01)	5.781
4	4	389.00	1171.31	0.332	0.00	0.50	0.50	7.44	(0.02)	4.601

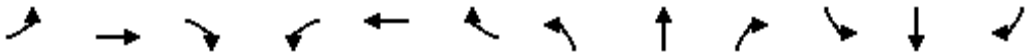


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	230	68	352	303	136	119	69	309	106	51	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		12.0	50.0		0.0	15.0		12.0	15.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850		0.968	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1776	1429	1703	1684	0	1687	1863	1509	1770	1803	0
Flt Permitted	0.453			0.604			0.711			0.708		
Satd. Flow (perm)	844	1776	1429	1083	1684	0	1263	1863	1509	1319	1803	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			74		58				336		15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		710.1			361.2			490.6			351.1	
Travel Time (s)		51.1			26.0			35.3			25.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	7%	13%	6%	10%	2%	7%	2%	7%	2%	2%	2%
Adj. Flow (vph)	12	250	74	383	329	148	129	75	336	115	55	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	250	74	383	477	0	129	75	336	115	70	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0		22.0	22.0	22.0	22.0	22.0	
Total Split (s)	38.0	38.0	38.0	38.0	38.0		22.0	22.0	22.0	22.0	22.0	
Total Split (%)	63.3%	63.3%	63.3%	63.3%	63.3%		36.7%	36.7%	36.7%	36.7%	36.7%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	
Act Effct Green (s)	35.7	35.7	35.7	35.7	35.7		12.3	12.3	12.3	12.3	12.3	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60		0.20	0.20	0.20	0.20	0.20	
v/c Ratio	0.02	0.24	0.08	0.59	0.47		0.50	0.20	0.58	0.42	0.18	
Control Delay	6.4	7.1	2.3	13.4	8.3		27.4	20.0	7.1	25.1	16.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	6.4	7.1	2.3	13.4	8.3		27.4	20.0	7.1	25.1	16.5	
LOS	A	A	A	B	A		C	B	A	C	B	
Approach Delay		6.0			10.6			13.8			21.8	
Approach LOS		A			B			B			C	
Queue Length 50th (m)	0.5	11.2	0.0	22.9	21.5		13.6	7.4	0.0	12.0	5.4	
Queue Length 95th (m)	2.6	25.8	4.8	58.7	49.8		25.9	15.5	17.0	23.2	13.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		686.1			337.2			466.6			327.1	
Turn Bay Length (m)	15.0		12.0	50.0			15.0		12.0	15.0		
Base Capacity (vph)	502	1056	880	644	1025		337	497	649	352	492	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.02	0.24	0.08	0.59	0.47		0.38	0.15	0.52	0.33	0.14	

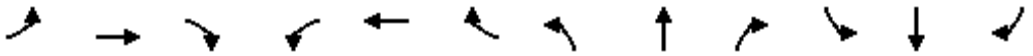
Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 11.8		Intersection LOS: B	
Intersection Capacity Utilization 60.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Mitchell Rd/Mitchell Road Extension & Main Street (Hwy 86)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	4	10	168	2	38	0	408	40	148	402	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	40.0		40.0	40.0		0.0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963				0.850			0.850			
Flt Protected		0.970			0.953					0.950		
Satd. Flow (prot)	0	1775	0	0	1811	1615	1900	1759	1568	1805	1792	0
Flt Permitted		0.970			0.953					0.950		
Satd. Flow (perm)	0	1775	0	0	1811	1615	1900	1759	1568	1805	1792	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		139.7			181.3			229.3			490.6	
Travel Time (s)		10.1			13.1			16.5			35.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	8%	3%	0%	6%	0%
Adj. Flow (vph)	25	4	11	183	2	41	0	443	43	161	437	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	185	41	0	443	43	161	437	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.3%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	4	10	168	2	38	0	408	40	148	402	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	4	11	183	2	41	0	443	43	161	437	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1245	1246	437	1215	1202	443	437			487		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1245	1246	437	1215	1202	443	437			487		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
pO queue free %	80	97	98	0	99	93	100			85		
cM capacity (veh/h)	125	149	624	136	159	619	1134			1087		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	40	185	41	0	443	43	161	437
Volume Left	25	183	0	0	0	0	161	0
Volume Right	11	0	41	0	0	43	0	0
cSH	163	136	619	1700	1700	1700	1087	1700
Volume to Capacity	0.25	1.36	0.07	0.00	0.26	0.03	0.15	0.26
Queue Length 95th (m)	7.4	95.2	1.7	0.0	0.0	0.0	4.2	0.0
Control Delay (s)	34.2	262.0	11.2	0.0	0.0	0.0	8.9	0.0
Lane LOS	D	F	B				A	
Approach Delay (s)	34.2	216.2		0.0			2.4	
Approach LOS	D	F						

Intersection Summary				
Average Delay	38.2			
Intersection Capacity Utilization	53.3%	ICU Level of Service		A
Analysis Period (min)	15			

ARCADY 7

File: C:\Paradigm\Projects\120810 Listowel\Synchro\2022 Remedial Main & Mitchell.arc7
Report generation date: 14/09/2012 5:07:43 PM

Summary of roundabout performance

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	(Default Analysis Set) - 2022			
Arm 1	0.25	5.24	0.20	A
Arm 2	0.47	5.45	0.32	A
Arm 3	0.85	6.20	0.46	A
Arm 4	2.14	9.82	0.68	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

2022 - AM runs from 08:00:00 to 09:00:00
2022 - PM runs from 16:30:00 to 17:30:00

File summary

File Description

Title	Main Street (Perth Line 86) & Mitchell Road (Highway 23)
Location	Listowel
Site Number	2
Date	14/09/2012
Version	
Status	Alternative
Identifier	
Client	
Jobnumber	120810
Enumerator	MattPTSL3\Matt
Description	

Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
	Order	Ascending	Numerical	By Exit	Absolute Time

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	s	-Min	perMin

A1 - (Default Analysis Set) - D3 - 2022, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)		Yes		(D1)		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
2022, PM	2022	PM			Yes			16:30	17:30	60	15	FLAT

Roundabout Network

Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	(untitled)	1,2,3,4	Standard			

Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Right	Normal/unknown	((Mini-roundabouts only))	

Arms

Arms

ID	Name	Description
1	Mitchell Road Extension North Leg	
2	Main Street West Leg	
3	Mitchell Road South Leg	
4	Main Street East Leg	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00

2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	4.50	30.00	20.00	40.00	25.00	
2	3.50	4.50	30.00	20.00	40.00	25.00	
3	3.50	4.50	30.00	20.00	40.00	25.00	
4	3.50	4.50	30.00	20.00	40.00	25.00	

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None

Arm Slope/ Intercept and Capacity

Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		((calculated))	((calculated))	0.579	1357.445
2		((calculated))	((calculated))	0.579	1357.445
3		((calculated))	((calculated))	0.579	1357.445
4		((calculated))	((calculated))	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		Yes	Yes	HV Percentages	2.00				Yes	Yes

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
1	FLAT	Yes	171.00	100.000	1.00
2	FLAT	Yes	309.00	100.000	1.00
3	FLAT	Yes	497.00	100.000	1.00
4	FLAT	Yes	791.00	100.000	1.00

Turning Proportions

Turning Counts or Proportions (Veh/hr) - Roundabout 1 (for whole period)

	To			

		1	2	3	4
From	1	0.000	14.000	51.000	106.000
	2	11.000	0.000	68.000	230.000
	3	69.000	119.000	0.000	309.000
	4	136.000	303.000	352.000	0.000

Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.08	0.30	0.62
	2	0.04	0.00	0.22	0.74
	3	0.14	0.24	0.00	0.62
	4	0.17	0.38	0.45	0.00

Vehicle Mix

Average PCU Per Vehicle - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.020	1.020	1.020
	2	1.020	1.000	1.130	1.070
	3	1.020	1.070	1.000	1.070
	4	1.020	1.100	1.060	1.000

Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	2.000	2.000	2.000
	2	2.000	0.000	13.000	7.000
	3	2.000	7.000	0.000	7.000
	4	2.000	10.000	6.000	0.000

Results

Results Summary

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (s)	Slope	Intercept (PCU/hr)
1	0.20	5.24	0.25	A	171.00	171.00	14.73	5.17	0.25	14.73	5.17	0.579	1357.445
2	0.32	5.45	0.47	A	309.00	309.00	27.64	5.37	0.46	27.65	5.37	0.579	1357.445
3	0.46	6.20	0.85	A	497.00	497.00	50.38	6.08	0.84	50.40	6.08	0.579	1357.445
4	0.68	9.82	2.14	A	791.00	791.00	124.52	9.44	2.08	124.63	9.45	0.579	1357.445

Overview: Standard Roundabout Geometry

Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only	Final Slope	Final Intercept (PCU/hr)
1	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445
2	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445
3	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445

4	3.50	4.50	30.00	20.00	40.00	25.00		0.579	1357.445

Overview: Time Segment Results

Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (s)
1	1	171.00	862.47	0.198	0.00	0.00	0.25	3.58	(0.02)	5.191
1	2	309.00	972.45	0.318	0.00	0.00	0.46	6.70	(0.02)	5.395
1	3	497.00	1079.14	0.461	0.00	0.00	0.84	12.13	(0.02)	6.115
1	4	791.00	1158.07	0.683	0.00	0.00	2.08	28.90	(0.02)	9.393
2	1	171.00	857.83	0.199	0.00	0.25	0.25	3.71	(0.02)	5.240
2	2	309.00	969.89	0.319	0.00	0.46	0.47	6.96	(0.02)	5.446
2	3	497.00	1077.98	0.461	0.00	0.84	0.85	12.71	(0.02)	6.195
2	4	791.00	1157.31	0.683	0.00	2.08	2.12	31.61	(0.02)	9.813
3	1	171.00	857.78	0.199	0.00	0.25	0.25	3.72	(0.02)	5.241
3	2	309.00	969.86	0.319	0.00	0.47	0.47	6.98	(0.02)	5.446
3	3	497.00	1077.97	0.461	0.00	0.85	0.85	12.76	(0.02)	6.195
3	4	791.00	1157.31	0.683	0.00	2.12	2.13	31.94	(0.02)	9.821
4	1	171.00	857.76	0.199	0.00	0.25	0.25	3.73	(0.02)	5.241
4	2	309.00	969.86	0.319	0.00	0.47	0.47	6.99	(0.02)	5.446
4	3	497.00	1077.97	0.461	0.00	0.85	0.85	12.78	(0.02)	6.195
4	4	791.00	1157.31	0.683	0.00	2.13	2.14	32.07	(0.02)	9.823

APPENDIX D

PLANNING DOCUMENTS

SCHEDULE "A"
KEY MAP LEGEND

	ROADS
	RAILWAYS
	TRAILS
	WATERCOURSES
	LOT LINES
	ZONE BOUNDARY
C1	ZONE SYMBOL
*	MINOR VARIANCES

ZONE LEGEND

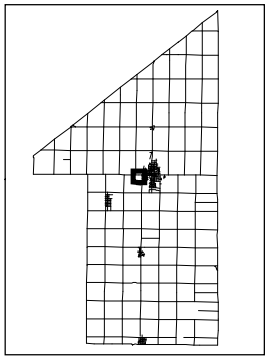
ZONE CLASSIFICATION	ZONE SYMBOL
AGRICULTURAL	A
RESIDENTIAL ZONE ONE	R1
RESIDENTIAL ZONE TWO	R2
RESIDENTIAL ZONE THREE	R3
RESIDENTIAL ZONE FOUR	R4
RESIDENTIAL ZONE FIVE	R5
RESIDENTIAL ZONE SIX	R6
RESIDENTIAL ZONE SEVEN	R7
HAMLET / VILLAGE RESIDENTIAL ZONE	HVR
RURAL RESIDENTIAL ZONE	RR
MOBILE / MODULAR HOME PARK ZONE	MH
DOWNTOWN COMMERCIAL ZONE 1	C1
DOWNTOWN COMMERCIAL ZONE 2	C2
HIGHWAY COMMERCIAL ZONE	C3
LOCAL CONVENIENCE COMMERCIAL ZONE	C4
SPECIAL COMMERCIAL ZONE	C5
HAMLET / VILLAGE COMMERCIAL ZONE	HVC
AGRICULTURAL COMMERCIAL / INDUSTRIAL ZONE	ACM
LIGHT INDUSTRIAL ZONE	M1
GENERAL INDUSTRIAL ZONE	M2
MINERAL AGGREGATE RESOURCES ZONE	MAR
INSTITUTIONAL ZONE	IN
PARK AND RECREATION ZONE	PR
FUTURE DEVELOPMENT ZONE	FD
NATURAL RESOURCES / ENVIRONMENT ONE	NRE1
NATURAL RESOURCES / ENVIRONMENT TWO	NRE2
FLOOD PLAIN ZONE	FP
HOLDING ZONE	(-h)
ADJACENT LAND OVERLAY	
FLOOD AND FILL CONSTRAINT AREA OVERLAY	

THIS IS SCHEDULE "A" TO BY-LAW NO. 6-ZB-1999 OF THE CORPORATION OF THE TOWN OF NORTH PERTH PASSED ON THE 23rd DAY OF MAY, 1999

Julie Behrns, Mayor

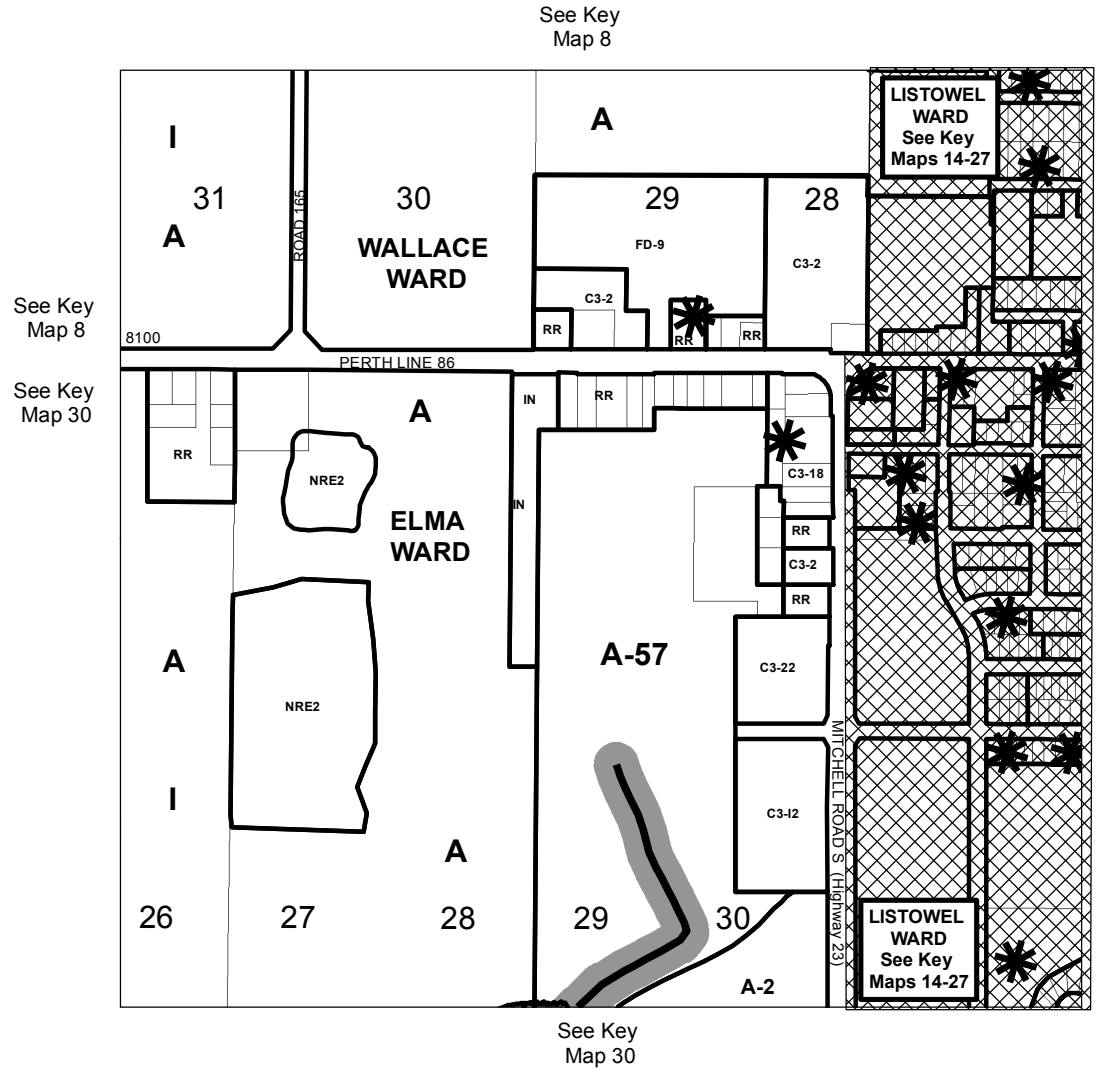
Patricia Berfelz,Clerk

THIS IS *KEY MAP 13*
OF SCHEDULE "A" TO BY-LAW NO. 6-ZB-1999
OF THE MUNICIPALITY OF NORTH PERTH
PASSED THE 3rd DAY OF MAY, 1999



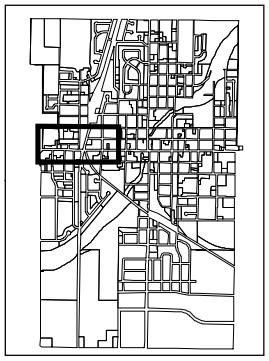
Key Map of North Perth
West of Listowel

Metres
0 70 140 280
0 245 490 980
Feet



Date: March, 2014
Projection: NAD 1983 UTM Zone 17N
Absolute Scale: 1:10,000

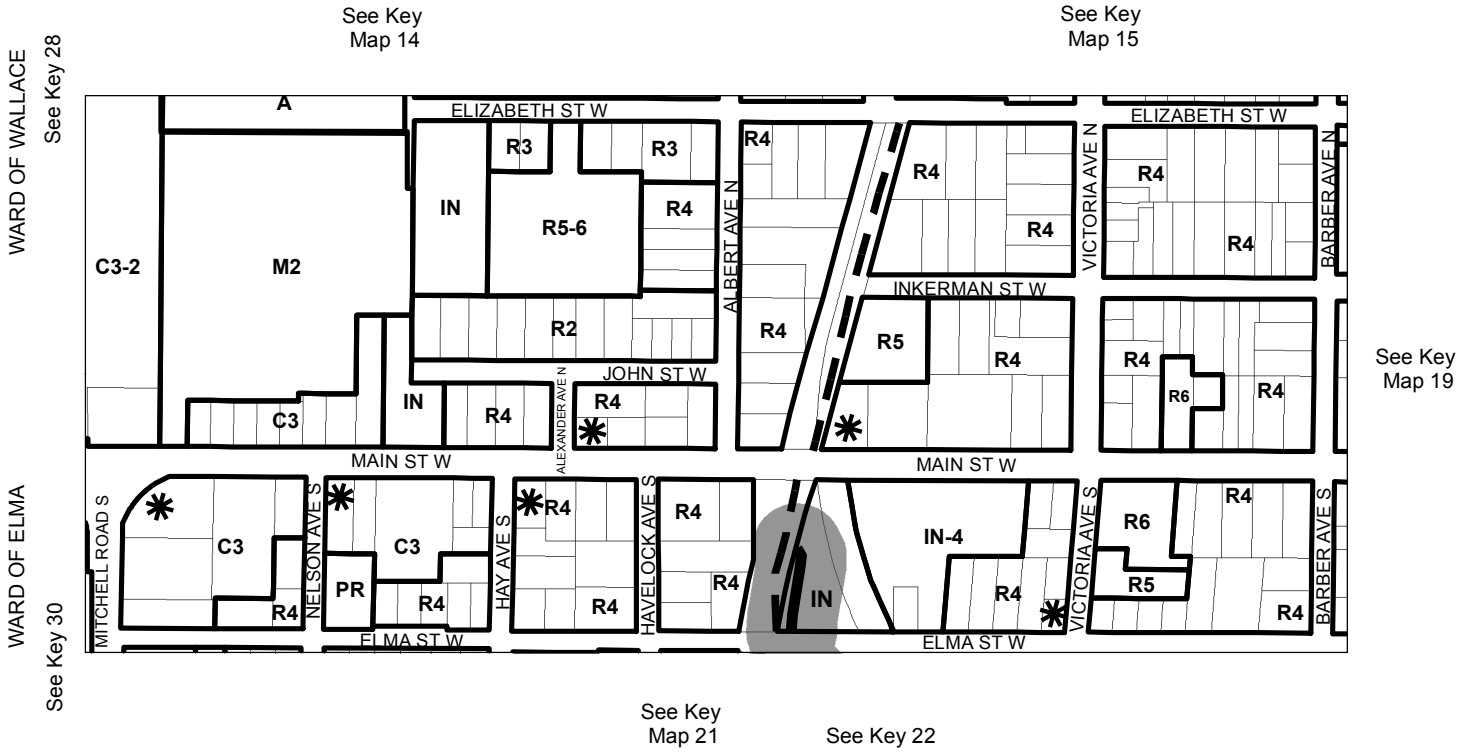
THIS IS *KEY MAP 18*
OF SCHEDULE "A" TO BY-LAW NO. 6-ZB-1999
OF THE MUNICIPALITY OF NORTH PERTH
PASSED THE 3rd DAY OF MAY, 1999



Key Map of North Perth

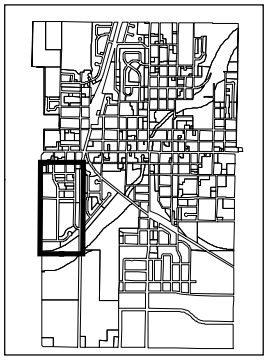
LISTOWEL WARD

Metres
0 35 70 140
0 120 240 480
Feet



Date: March, 2014
Projection: NAD 1983 UTM Zone 17N
Absolute Scale: 1:5,000

THIS IS *KEY MAP 21*
OF SCHEDULE "A" TO BY-LAW NO. 6-ZB-1999
OF THE MUNICIPALITY OF NORTH PERTH
PASSED THE 3rd DAY OF MAY, 1999



Key Map of North Perth

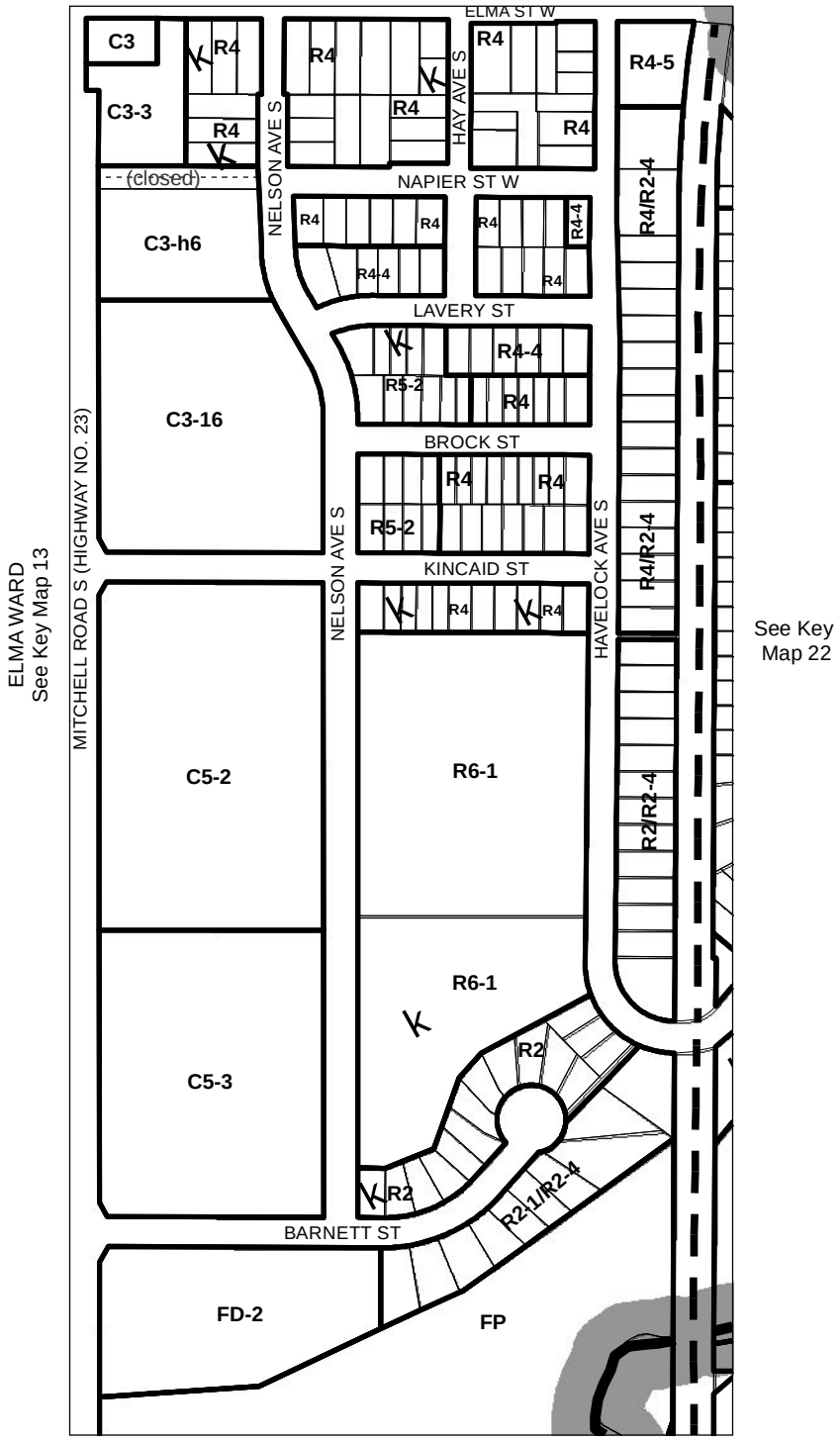
LISTOWEL WARD

Metres
0 50 100 200

0 100 200 400
Feet

AMENDED BY
BY-LAW NO.:

36-ZB-2001
102-ZB-2001
9-ZB-2002
18-ZB-2002
21-ZB-2002
5-ZB-2003
97-2008
2-2009
91-2012
106-2012



Date: January 2013
Projection: NAD 1983 UTM Zone 17N
Absolute Scale: 1:5,000

THE MUNICIPALITY OF NORTH PERTH

BY-LAW NO. 90-2009

REPEALS BY-LAW 80-2009
BEING A BY-LAW TO AUTHORIZE THE SIGNING OF A LETTER OF UNDERTAKING WITH THE MINISTRY OF TRANSPORTATION

WHEREAS it is considered desirable to enter into a Letter of Undertaking between the Municipality of North Perth and the Ministry of Transportation regarding highway improvements and related matters associated with the property owned by the Otis Group of Companies adjacent to Highway 23 at the intersection of Highway 23 and Kincaid Street in the Municipality of North Perth.

NOW THEREFORE the Council of the Municipality of North Perth enacts as follows:

1. The Mayor and the Clerk are hereby authorized to sign a Letter of Undertaking with the Ministry of Transportation

2. A copy of the said agreement is attached hereto and designated as Schedule "A" to this By-law.

3. This By-law shall come into force and takes effect on the day of the final passing thereof.

READ A FIRST AND SECOND TIME this 6th day of July, 2009.

READ A THIRD TIME AND FINALLY PASSED this 6th day of July, 2009.

Ed Hollinger

Ed Hollinger MAYOR

Patricia Berfelz

Patricia Berfelz CLERK

Letter of Undertaking

The Municipality of North Perth and the MTO
Highway 23 at Kincaid Street – Municipality of North Perth
Highway 23 Improvements

This is to serve as a Letter of Undertaking ("Undertaking") between The Municipality of North Perth ("Municipality") and Her Majesty the Queen in Right of the Province of Ontario, represented by the Minister of Transportation for the Province of Ontario ("MTO"), regarding highway improvements and related matters associated with the property (the "Land") adjacent to the west limit of MTO Highway 23 and north of the intersection of Highway 23 and Kincaid Street in the Municipality of North Perth. In consideration of the terms of this Undertaking and the sum of one dollar paid by each of the parties to the other, the receipt of which is hereby acknowledged, the parties undertake and agree as follows.

1 General

1.1 On the Land, there is an intent to construct an office building on the Land (the "Development"), generally described as being on the west side of Highway 23 in Part of Lot 30, Concession 1, in the Municipality of North Perth, in the County of Perth, which site location is shown on Schedule "A" attached.

1.2 The Municipality owns property on the west side of Highway 23 identified as Part 2 on Reference Plan 44R-3689, the purpose of which was to address OMB Decision No. 0619 which in part stipulates that access to Highway 23 from the Land must be available via a public road which is developed to acceptable standards and which is maintained on a year-round basis. Schedule "B" attached shows the said Part 2 and its interconnection to adjacent Highway 23.

1.3 The Municipality agrees and recognizes that as the Development requires access to Highway 23 via a new municipal road opposite Kincaid Street ("Extension of Kincaid Street"), the Municipality is the proponent of any associated highway improvements as a result of the Development.

1.4 The MTO has reviewed a traffic impact study prepared by F. R. Berry and Associates dated November 2008 in support of the Development. In addition to the construction of the Extension of Kincaid Street, the associated Highway 23 improvements required at the intersection of Highway 23 and Extension of Kincaid Street shall at a minimum include:

(a) Northbound left-turn lane with 15 m storage, 60 m parallel lane, and 145 m taper length; and
(b) Southbound left-turn lane with 30 m storage, 60 m parallel lane, and 145 m taper length.

1.5 Notwithstanding the stated Section 1.4 highway improvements required as a result of the Development, the Municipality shall at their cost, revise the Section 1.4 F. R. Berry and Associates November 2008 traffic impact study to

determine additional highway improvements exceeding the Section 1.4 highway improvements that may be required based on impending development of adjacent properties not limited to Part 1 on Reference Plan 44R-3689 (Appendix "B"). A revised report shall be provided to MTO for review and approval prior to June 1, 2010. Despite any other terms and conditions contained within this Undertaking, all costs associated with a revised traffic impact study and any identified highway improvements shall be the financial responsibility of the Municipality.

1.6 The Municipality agrees to undertake a detailed engineering design for the construction of the highway improvements warranted from MTO's review and analysis of the Section 1.4 and 1.5 traffic impact study approved by MTO. The detailed engineering design shall be to MTO standards and subject to approval of the MTO.

1.7 The Municipality agrees that the MTO in allowing the Development to proceed, without a standard MTO formal legal agreement being entered into between the Municipality and MTO, which is to be executed later as per the terms of Section 3.5, the parties are also accepting a reduction in the level of service along the highway, for which the MTO and the public shall be compensated. This compensation is outlined in Section 2.

1.8 The Municipality agrees that as a condition of the MTO releasing its entrance, building/land use, encroachment and sign permits for the Development in advance of entering into the said formal legal agreement for the Section 1.4 and 1.5 highway improvements, that the Municipality shall abide by the conditions outlined in this Undertaking.

2 Highway Improvements and Funding

2.1 The Municipality agrees that it will be financially responsible for all costs (design, construction, construction administration, utility relocations, property, etc.) associated with the Section 1.4 and 1.5 highway improvements based on the MTO's review and analysis of the F. R. Berry November 2008 traffic impact study, as it may be amended, and approved by MTO.

2.2 The Municipality agrees that it will be financially responsible for all costs associated with the requirements of the Ministry of Transportation Class Environmental Assessment for Provincial Transportation Facilities (Class EA), which are related to the Section 1.4 and 1.5 highway improvements.

2.3 The Municipality shall be financially responsible for all costs associated with the permanent signing and pavement markings in connection with the Section 1.4 and 1.5 highway improvements.

3.0 MTO Permit Requirements

3.1 Section 116 of the *Public Transportation and Highway Improvement Act*, R.S.O. 1990, Chapter P. 50, as amended (PTHIA), allows the Minister to enter into agreements for the purposes of the PTHIA, including agreements related to the safety and mobility of people and goods.

3.2 The Municipality shall be subject to the MTO's permit approval process as specified under the PTHIA.

3.3 The Municipality agrees to apply to the MTO for an entrance permit, which will permit access to the Development over the Section 1.2 property to Highway 23. Provided the Municipality is in compliance with this Undertaking, the MTO agrees to issue to the Municipality an entrance permit which will stipulate the use as being commercial, and for the sole benefit of the Section 1.1 Development.

3.4 The Municipality agrees to have in place a registered site plan agreement with the registered owners of the Land prior to the MTO issuing a building/land use permit in connection with the Development. The MTO shall require a draft copy of the site plan agreement for review and approval prior to registration.

3.5 Together with signed copies of this Undertaking, the Municipality agrees to provide to the MTO a Council Resolution to enter into this Undertaking and into a formal legal agreement with the MTO containing standard MTO terms and conditions for the construction of the Section 1.4 and 1.5 highway improvements. The legal agreement shall be executed by the Municipality and MTO prior to October 31, 2010.

3.6 The Municipality and MTO shall make best efforts to bring to completion the Section 1.4 and 1.5 highway improvements no later than November 30, 2011.

3.7 A copy of this Undertaking is to be attached to any MTO permit issued pursuant to this Undertaking.

3.8 The Municipality shall save harmless and indemnify the MTO from all claims, demands, proceedings, obligations, costs, costs that are inclusive of solicitor and client costs, and interest, that the MTO may suffer or incur because of the effecting or not effecting by the Municipality any term or matter of this Undertaking.

3.9 Upon the completion of the Section 1.4 and 1.5 highway improvements, the Municipality agrees to make application for Consent of the Minister for the opening of the new municipal road. The Municipality in making application for the Consent of the Minister must submit the following documentation:

(a) MTO Entrance Permit Application;
(b) 4 copies of the road opening bylaw; and
(c) 4 copies of the deposited reference plan illustrating the new road allowance.

Upon receipt of the Section 3.10 documents, MTO shall issue a new entrance permit to the Municipality for the said Extension of Kincaid Street.

3.10 The Municipality agrees to submit all site plans, site servicing plans, stormwater management plans, contract documents, schedules, cost estimates, etc.

to the MTO for review and approval for any and all items related to this Undertaking.

IN WITNESS WHEREOF the MTO has duly executed below and the Municipality has affixed its corporate seal under the hands of its proper officers duly authorized in that behalf.

SIGNED and SEALED this 6th **day of** July **, 2009.**

THE MUNICIPALITY OF NORTH PERTH

Ed Hallinger **c.s**

Authorized Signing Officer

Authorized Signing Officer

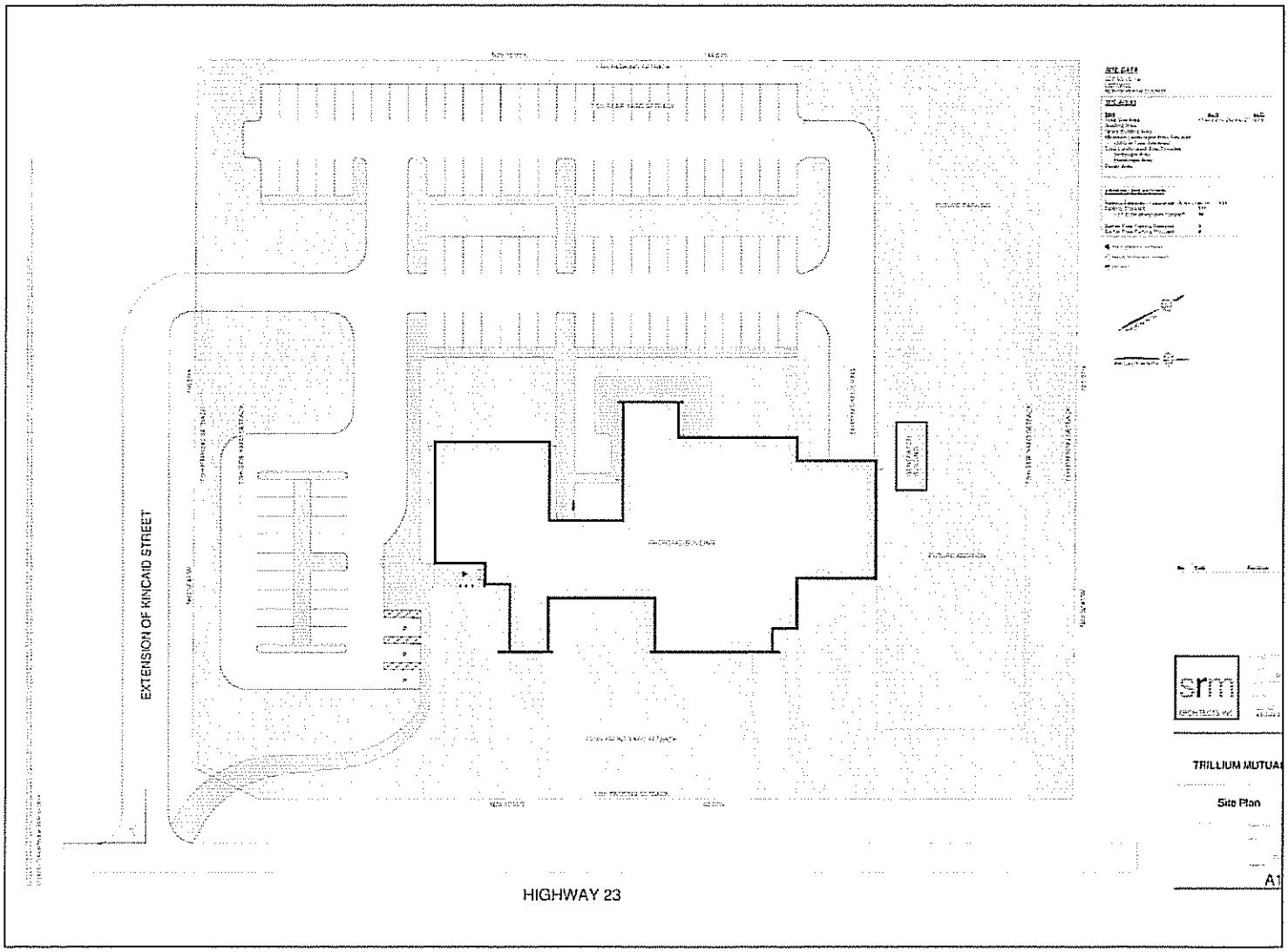
SIGNED this 28th **day of** July **, 2009.**

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF ONTARIO, REPRESENTED BY THE MINISTER OF TRANSPORTATION FOR THE PROVINCE OF ONTARIO

Steven McInnis, Head – West Region Corridor Management Section

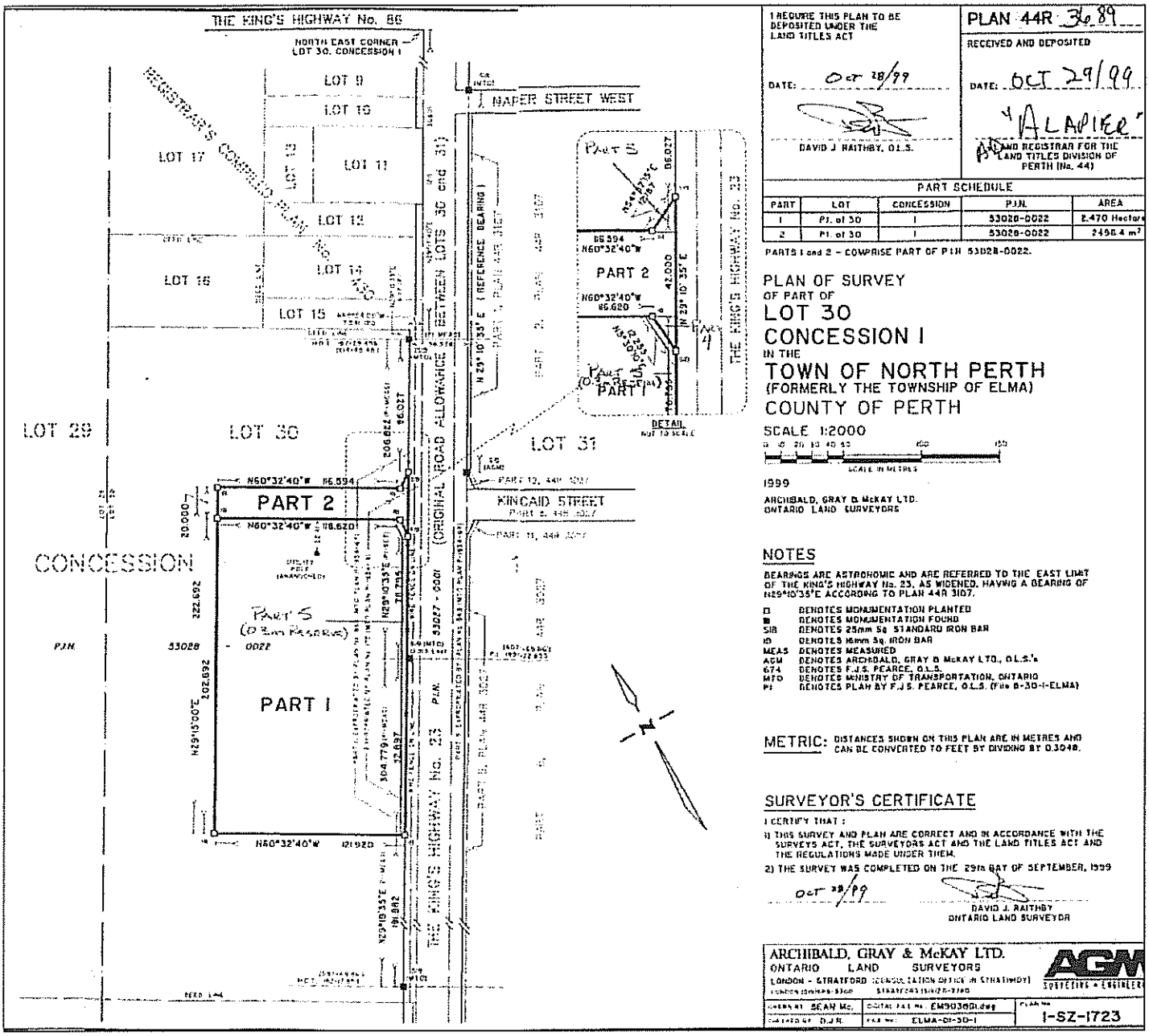
Schedule "A"

Letter of Undertaking between The Municipality of North Perth and the MTO
Highway 23 at Kincaid Street – Municipality of North Perth
Highway 23 Improvements



Schedule "B"

Letter of Undertaking between The Municipality of North Perth and the MTO
Highway 23 at Kincaid Street – Municipality of North Perth
Highway 23 Improvements



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT

DATE: Oct 28/99

DAVID J RAITHBY, O.L.S.

PLAN 44R 3689

RECEIVED AND DEPOSITED

DATE: OCT 29/99

ALAPIER

LAND REGISTRAR FOR THE LAND TITLES DIVISION OF PERTH (No. 44)

PART SCHEDULE

PART	LOT	CONCESSION	P.I.N.	AREA
1	Pt. of 30	I	53028-0022	2.470 Hectares
2	Pt. of 30	I	53028-0022	2498.4 m²

PARTS 1 and 2 – COMPRISE PART OF P.I.N. 53028-0022.

PLAN OF SURVEY
OF PART OF
LOT 30
CONCESSION I
IN THE
TOWN OF NORTH PERTH
(FORMERLY THE TOWNSHIP OF ELMA)
COUNTY OF PERTH

SCALE 1:2000

SCALE IN METRES

1999

ARCHIBALD, GRAY & McKAY LTD.
ONTARIO LAND SURVEYORS

NOTES

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE EAST LIMIT OF THE KING'S HIGHWAY No. 23, AS WIDENED, HAVING A BEARING OF N29°10'35"E ACCORDING TO PLAN 44R 3107.

□	DENOTES MONUMENTATION PLANTED
■	DENOTES MONUMENTATION FOUND
SIB	DENOTES 25mm Sq. STANDARD IRON BAR
IB	DENOTES 16mm Sq. IRON BAR
MEAS	DENOTES MEASURED
AGM	DENOTES ARCHIBALD, GRAY & McKAY LTD., O.L.S.'s
674	DENOTES F.J.S. PEARCE, O.L.S.
MTO	DENOTES MINISTRY OF TRANSPORTATION, ONTARIO
P1	DENOTES PLAN BY F.J.S. PEARCE, O.L.S. (File B-30-I-ELMA)

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2) THE SURVEY WAS COMPLETED ON THE 29th DAY OF SEPTEMBER, 1999

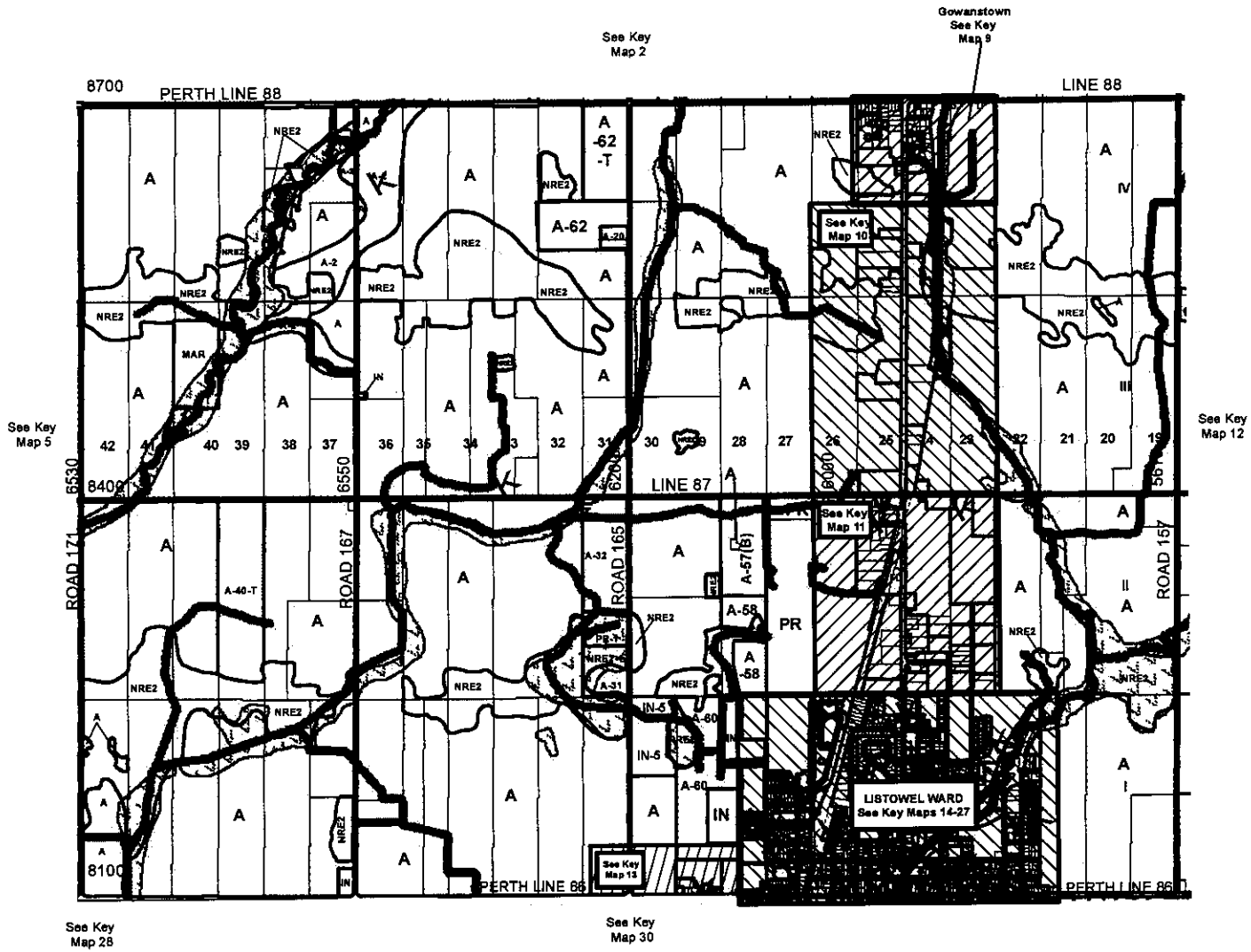
Oct 28/99

DAVID J. RAITHBY
ONTARIO LAND SURVEYOR

ARCHIBALD, GRAY & McKAY LTD.
ONTARIO LAND SURVEYORS
LONDON – STRATFORD (CONSOLIDATION OFFICE IN STRATHROY)

SURVEYING • ENGINEERING

CHECKED BY: SEAN Mc.	DIGITAL FILE No.: EM90360I.dwg	PLAN No. 1-SZ-1723
DRAWN BY: D.J.R.	FILE No.: ELMA-01-30-1	


Gowanstown
See Key Map 9
See Key Map 2
8700
PERTH LINE 88
LINE 88
See Key Map 5
See Key Map 12
6530
6400
6550
6600
LINE 87
ROAD 171
ROAD 167
ROAD 165
ROAD 157
See Key Map 10
See Key Map 11
See Key Map 13
LISTOWEL WARD
See Key Maps 14-27
8100
PERTH LINE 86
PERTH LINE 86
See Key Map 28
See Key Map 30

NOTICE OF RECEIPT OF COMPLETE APPLICATION AND
NOTICE OF A PUBLIC MEETING CONCERNING A PROPOSED OFFICIAL PLAN AMENDMENT

TAKE NOTICE that the Council of the Corporation of the County of Perth will hold a Public Meeting on **MAY 3, 2012 at 9:00 a.m.** in the Council Chambers at the County Court House (1 Huron St., Stratford) to consider an Amendment to the County of Perth Official Plan. The Amendment is being considered pursuant to the provisions of the Ontario Planning Act.

The proposed Official Plan Amendment (OPA) application (which the County has deemed to be complete) affects property in the Municipality of North Perth (Wallace Ward) described as Part of Lots 28, 29 and 30, Concession 1. The subject property is owned by the Municipality of North Perth. The proposed Official Plan Amendment will not change the land use designation of the subject property (shown in hatching on the attached map) from its current "Agriculture" designation but rather will provide an exception to these policies to permit a new institutional use (i.e. new elementary school) on a 7.37 ha (18.2 ac.) parcel of land. The area shown in hatching on the map below is approximately 15.33 ha (37.89 ac.) in size to allow the Avon Maitland District School Board some flexibility in the siting of the proposed school property.
It should be noted that on March 14, 2012 the Municipality of North Perth commenced a Class Environmental Assessment to consider intersection improvements at Highway 23 (Mitchell Road S.) and Perth Line 86 (Main St. W.), as well as proposed road extensions of Mitchell Road and Binning St. W. This proposed OPA will also amend "Schedule 'B' - Transportation and Cultural Heritage" of the County Official Plan to show the locations of the future municipal roads.

The proposed OPA is being considered by County Council on the basis of an application submitted by the property owner. The Municipality is considering extensions of Mitchell Road and Binning St. W. The Avon Maitland District School Board wishes to construct a new elementary school on the property. If the proposed OPA is approved, applications to the Municipality of North Perth for a Zoning By-law amendment, and a Site Plan Agreement will also be required.

ANY PERSON may attend the Public Meeting and/or make written or verbal representation either in support of, or in opposition to, the proposed Official Plan Amendment.

If you wish to be notified of the adoption of the proposed Official Plan Amendment, or of the refusal of a request to amend the Official Plan Amendment, you must make a written request to the Clerk of the County of Perth (Kerri Ann O'Rourke).

If a person or public body does not make oral submissions at a Public Meeting or make written submissions to the Council of the Corporation of the County of Perth before the by-law is passed, the person or public body is not entitled to appeal the decision of the Council of the Corporation of the County of Perth to the Ontario Municipal Board (OMB).

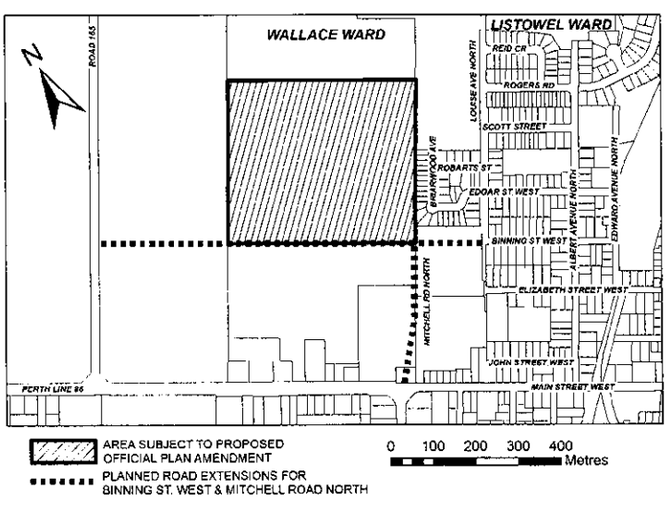
If a person or public body does not make oral submissions at a Public Meeting or make written submissions to the Council of the Corporation of the County of Perth before the by-law is passed, the person or public body may not be added as a party to the hearing of an appeal before the OMB unless, in the opinion of the Board, there are reasonable grounds to do so.

ADDITIONAL INFORMATION relating to the proposed Official Plan Amendment is available for inspection during office hours at the County of Perth Planning and Development Department located in the County Court House in Stratford.

DATED AT THE CITY OF STRATFORD THIS 12th DAY OF APRIL, 2012.

Mr. Dave Hanly, Planning Director
County Court House, 1 Huron St. Stratford, ON N5A 5S4
Email: dhanly@perthcounty.ca
Telephone:(519) 271-0531 (ext. 410)

**See below for a map showing the location of the property affected by the proposed Official Plan Amendment.



NOTICE OF THE ADOPTION OF AN OFFICIAL PLAN AMENDMENT BY THE CORPORATION OF THE COUNTY OF PERTH

TAKE NOTICE that the Council of the Corporation of the County of Perth adopted Amendment No. 121 to the County of Perth Official Plan by By-law No. 3298-2012 under the provisions of Sections 17 and 21 of the Planning Act, R.S.O. 1990 at a meeting of Council on the 3rd day of May, 2012.

Official Plan Amendment (OPA) No. 121 affects property described as part of Lots 28, 29 and 30, Concession 1 in the Wallace Ward of the Municipality of North Perth.

OPA No. 121 does not change the land use designation of the subject property (shown in hatching on the attached Schedule "A-119" map) from its current "Agriculture" designation but rather provides an exception to these policies to permit a new institutional use (i.e. new elementary school) on a 7.4 ha (18.2 ac.) parcel of land. The area shown in hatching on the map is approximately 15.33 ha (37.89 ac.) in size to allow the Avon Maitland District School Board some flexibility in the siting of the proposed 7.37 hectare (18.2 acre) school property.

OPA No. 121 also amends "Schedule 'B' - Transportation and Cultural Heritage" of the County Official Plan to show the locations of the future road extensions of Mitchell Road and Binning St. W.

OPA No. 121 has been adopted by County Council following its review and consideration of an Official Plan Amendment application submitted by the owner of the subject property.

AND TAKE NOTICE that any person or agency may appeal the County's decision to approve Amendment No. 121 to the County of Perth Official Plan to the Ontario Municipal Board by filing with the Clerk of the County of Perth not later than the **23rd day of May, 2012** a notice of appeal setting out the objection to the Official Plan Amendment and the reasons in support of the objection and accompanied by the proper fee.

Amendment No. 121 to the County of Perth Official Plan is exempt from the approval by the Ministry of Municipal Affairs and Housing. The decision of the Council of the Corporation of the County of Perth to adopt Amendment No. 121 to the County's Official Plan is final if a notice of appeal is not received before or on the last day for filing a notice of appeal.

A copy of Amendment No. 121 is available for review at the Perth County Planning and Development Department (County Court House, 1 Huron Street, Stratford) during normal office hours.

DATED AT THE CITY OF STRATFORD THIS 3rd DAY OF MAY, 2012.

Dave Hanly, Director of Planning and Development for the County of Perth
County Court House, 1 Huron St. Stratford, ON N5A 5S4
Tel: (519) 271-0531 ext. 410 Fax: (519) 273-5967 Email: dhanly@perthcounty.ca

NOTES:

1. Only individuals, corporations and public bodies may appeal a by-law to the Ontario Municipal Board. A notice of appeal may not be filed by an unincorporated association or group. However, a notice of appeal may be filed in the name of an individual who is a member of the association or the group on its behalf.
2. No person or public body shall be added as a party to the hearing of the appeal unless, before the By-law was passed, the person or public body made oral submissions at a public meeting or written submissions to the Council or, in the opinion of the Ontario Municipal Board, there are reasonable grounds to add the person or public body as a party.

PART B - THE AMENDMENT

All of this document entitled "Part B - The Amendment" consisting of the following text and attached Map, designated Schedule "A-119" (Land Use Plan), constitutes Amendment No. 121 to the County of Perth Official Plan.

DETAILS OF THE AMENDMENT

The County of Perth Official Plan is hereby amended as follows:

Item 1:

By adding a new Schedule, entitled Schedule "A-119" - Land Use Plan, which shall form part of Schedule "A" - Land Use Plan for the County of Perth.

Item 2:

By adding a new clause to Section 5.5.20 - New Site Specific Amendments of the County of Perth Official Plan as follows:

"(38) Part of Lots 28 and 29, Concession 1, Wallace Ward, Municipality of North Perth (Schedule "A-119):

A use described as a school (including school building, parking area, playground, soccer and baseball fields, and accessory uses) shall be permitted on a 7.4 hectare (18.2 acre) parcel of land at part of Lots 28 and 29, Concession 1, Wallace Ward, Municipality of North Perth (Schedule "A-119) subject to the following:

(i) That the development occurs on full municipal services;
(ii) An amendment to the Municipality of North Perth Zoning By-law; and
(iii) A site plan agreement.

Item 3:

By amending Schedule "B" - Transportation and Cultural Heritage as follows:

The location of the Mitchell Road extension on the land described as part of Lot 28, Concession 1, Wallace Ward, Municipality of North Perth and shown on the attached map "A-119" shall be added to Schedule "B".

The location of the Binning Street West extension on the land described as part of Lots 28, 29 and 30 Concession 1, Wallace Ward, Municipality of North Perth and shown on the attached map "A-119" shall be added to Schedule "B".

Item 4:

By adding a new paragraph to the end of Section 17.2.2.3 - Township Roads of the County of Perth Official Plan which reads as follows:

SCHEDULE 'A-119' - LAND USE PLAN
AMENDMENT NO. 121 TO
THE PERTH COUNTY OFFICIAL PLAN

Perth County
Cultivating Opportunity

PHOTO DATE: 2010
April-26-12

WATERBODY
WATERCOURSE
ADJACENT LAND OVERLAY
LAND SUBJECT TO OPA 121 (Subject to Section 5.5.20(38))
NATURAL RESOURCES / ENVIRONMENT
PROPOSED BINNING STREET EXTENTION AREA
PROPOSED MITCHELL ROAD EXTENTION AREA

Meters
0 75 150 300
0 250 500 1,000
Feet

N

Coordinate System: NAD 1983 UTM Zone 17N
Projection: Transverse Mercator

G:\GIS\PROJECTS\North Perth\2012-04-13 OPA 121 SCHEDULE A.mxd

County of Perth Official Plan

Schedule 'A'
Land Use Plan

Legend

NOTE: Schedules should be read in conjuction with applicable policies of the Plan

Land Use Designations
- Agriculture
- Earth Science ANSI (overlay)
- Potential Future Dev. Area (overlay)

Settlement Areas
- Serviced Urban Area
- Village
- Hamlet

(A2-7 Refer to Detailed Map)
- Mobile / Modular Home Park
- Urban Fringe
- Infilling Area

Mineral Aggregates
- Lic. Pit or Quarry / Limestone Resource
- Primary or Secondary Aggregate Resource
- Potential Limestone Resource
- Natural Resources / Environment
- Adjacent Land
- Recreation
- Flood Plain

Other Features
- Sewage Lagoon
- Airstrip
- Municipal Airport
- Conservation Authority Boundary
- Municipal Boundary
- Watercourse
- Provincial Highway
- County Road
- Local Road
- Railway Line
- Former Railway Right of Way
- Transmission Line
- Active Landfill Site
- Closed Landfill Site
- Official Plan Amendment

DETAILED MAPS	VILLAGE
Schedule 'A1-1'	Gowanstown
Schedule 'A1-2'	Trowbridge
Schedule 'A1-3'	Atwood
Schedule 'A1-4'	Monkton
Schedule 'A1-5'	Newton
Schedule 'A1-6'	Millbank
Schedule 'A1-7'	Brunner
Schedule 'A1-8'	Rostock
Schedule 'A1-9'	Gads Hill
Schedule 'A1-10'	Wartburg
Schedule 'A1-11'	Sebringville
Schedule 'A1-12'	Shakespeare
Schedule 'A1-13'	Nithburg
Schedule 'A1-14'	Kirkton
Schedule 'A1-15'	Dublin
Schedule 'A1-16'	Staffa

DETAILED MAPS	MOBILE HOME PARK
Schedule 'A3-1'	Crystal Lake

DETAILED MAPS	URBAN FRINGE
Schedule 'A4-1'	North of Listowel
Schedule 'A4-2'	East of Listowel
Schedule 'A4-3'	West of Listowel
Schedule 'A4-4'	West of Palmerston
Schedule 'A4-5'	South of Milverton
Schedule 'A4-6'	West of Stratford
Schedule 'A4-7'	North of Stratford
Schedule 'A4-8'	East of Stratford
Schedule 'A4-9'	East of St. Marys
Schedule 'A4-10'	West of St. Marys
Schedule 'A4-11'	South of St. Marys
Schedule 'A4-12'	North of Mitchell
Schedule 'A4-13'	East of Mitchell
Schedule 'A4-14'	South of Mitchell

DETAILED MAPS	HAMLET
Schedule 'A2-1'	Kurtzville
Schedule 'A2-2'	Milesworth
Schedule 'A2-3'	Britton
Schedule 'A2-4'	Newry
Schedule 'A2-5'	Donegal
Schedule 'A2-6'	Carthage
Schedule 'A2-7'	Hesson
Schedule 'A2-8'	Poole
Schedule 'A2-9'	Kinkora
Schedule 'A2-10'	Amulree
Schedule 'A2-11'	Lisbon
Schedule 'A2-12'	Sebastopol
Schedule 'A2-13'	Avonton
Schedule 'A2-14'	St. Pauls
Schedule 'A2-15'	Rannoch
Schedule 'A2-16'	Woodham
Schedule 'A2-17'	Brodhagen
Schedule 'A2-18'	Bornholm
Schedule 'A2-19'	St. Columban
Schedule 'A2-20'	Cromarty
Schedule 'A2-21'	Russeldale
Schedule 'A2-22'	Fullarton
Schedule 'A2-23'	Carlingford

DETAILED MAPS	INFILLING AREA
Schedule 'A5-1'	Brotherston
Schedule 'A5-2'	Wallace
Schedule 'A5-3'	Trecastle
Schedule 'A5-4'	West of Listowel
Schedule 'A5-5'	East of Listowel (Lot 48, Con.1, Elma)
Schedule 'A5-6'	East of Listowel (Lot 56, Con.1, Elma)
Schedule 'A5-7'	North of North of Atwood
Schedule 'A5-8'	North of Atwood
Schedule 'A5-9'	Lot 9, Con.4 Elma
Schedule 'A5-10'	Dorking
Schedule 'A5-11'	North of Millbank
Schedule 'A5-12'	East of Millbank
Schedule 'A5-13'	East of Milverton
Schedule 'A5-14'	Topping
Schedule 'A5-15'	Harmony
Schedule 'A5-16'	Conroy
Schedule 'A5-17'	Dunn's Bridge
Schedule 'A5-18'	Science Hill
Schedule 'A5-19'	Prospect Hill
Schedule 'A5-20'	Kennicott
Schedule 'A5-21'	North of Dublin

0 2.5 5 10 Km

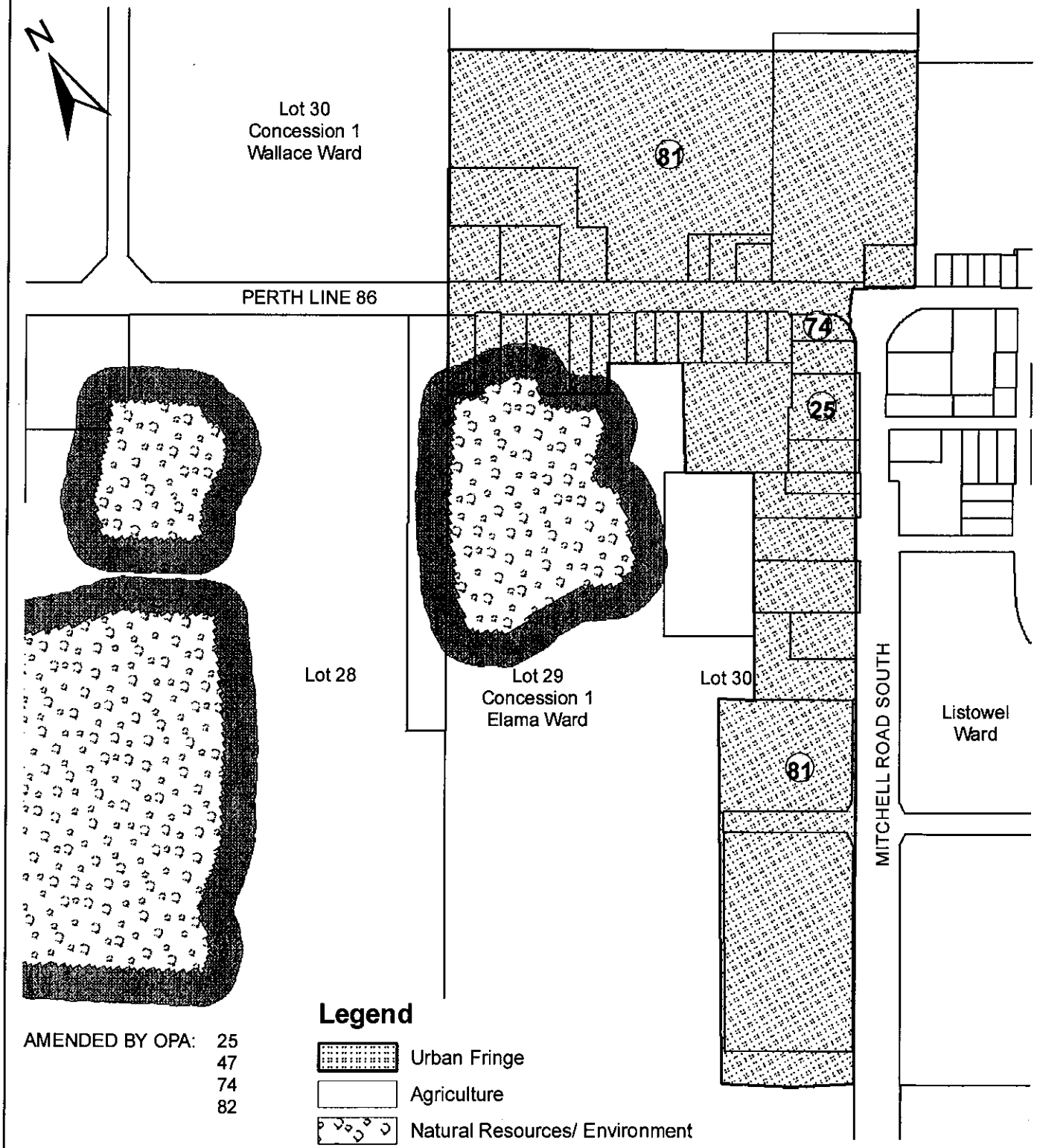
The ink used to generate this map are light sensative. Do not expose to direct sunlight. Prolonged exposure to artificial light may cause some fading.

APRIL 2008

Schedule 'A4- 3'

West of Listowel

Municipality of North Perth - Elma and Wallace Wards



AMENDED BY OPA: 25
47
74
82

Legend

- Urban Fringe
- Agriculture
- Natural Resources/ Environment
- NRE Adjacent Land/ Buffer Area

0 75 150 Metres

0 250 500 Feet

April 2008

County of Perth Planning & Development Department

APPENDIX E

PUBLIC CONSULTATION

MUNICIPALITY OF NORTH PERTH

(COMMUNITY OF LISTOWEL)

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

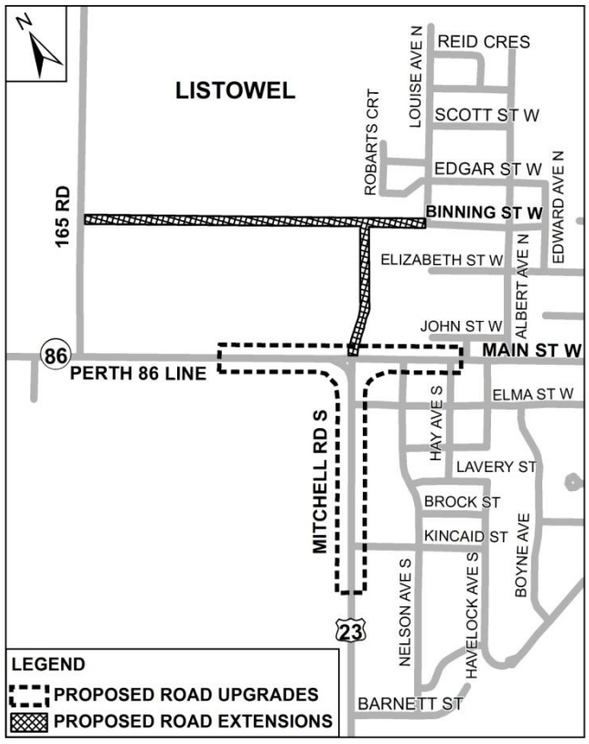
NOTICE OF COMMENCEMENT

THE PROJECT:

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Highway 23 (Mitchell Road S.) and Perth County Road 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades (refer to attached key plan). The key components of the proposal are outlined below.

Primary Components:

- Perform traffic study to identify traffic signal warrants and turning lane requirements.
- Road improvements to Highway # 23 and Perth County Road # 86 including road resurfacing, widening and construction of dedicated turning lanes.
- Extension of municipal sanitary sewers and watermains to project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Road, north from the intersection of Hwy. # 23 and C.R. # 86.
- Extension of Binning Street West to Road 165 to service future development lands along the west boundary of Listowel.



ENVIRONMENTAL ASSESSMENT PROCESS:

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'B' activities under the Municipal Class Environmental Assessment (Class EA). The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project. A Public Information Centre (PIC) is planned to display and seek input on the proposed improvements. This project has the potential to be "stepped down" to a Group 'C' project subject to screening for significant environmental issues. Following the PIC, MTO will decide if it is appropriate for the project to be "stepped down". A notice will be issued providing a 30-day public review period of MTO's decision to "step down" the project.

Minor modifications to the intersection of Hwy. # 23 and C.R. # 86 will be undertaken in 2012 to provide improved access to a new commercial development located adjacent to the southwest corner of the intersection. These alterations are temporary in nature and are not part of planned upgrades associated with the above noted Class Environmental Assessment.

For further information on this project, or to review the Class Environmental Assessment process, please contact the project engineers: B.M. Ross and Associates, 62 North Street, Goderich, Ontario, N7A 2T4. Telephone (519) 524-2641. Fax (519) 524-4403. Attention: Kelly Vader, Environmental Planner. (e-mail: kvader@bmross.net).

Kriss Snell, CAO
Municipality of North Perth

This Notice first issued March 7, 2012

Kelly Vader

From:
Sent: May-22-12 4:57 PM
To: kvader@bmross.net
Cc: Kriss Snell
Subject: Environmental Assessment for Hwy 23 & Perth Line 86

Mrs. Vader,

As per the recent Notice of Commencement issued by the Municipality of North Perth for the Detailed Design and Class Environmental Assessment of Hwy 23 & Perth Line 86, I am writing to advise you of our interests in the project. We presently own property on the East side of Hwy 23 S within the designated project area, specifically, 202 and 220 Mitchell Rd S. In the coming months we will also finalize the purchase of the property adjacent to us, 500 Mitchel Rd S.

Currently, 500 Mitchell Rd S is 2 acres of vacant land with no access to Highway 23 S. It is our intention to eventually develop a national retail outlet(s) at this location. In order to do so, we will require an entrance/access to Highway 23 from this property. As part of the facets of your project, please give consideration to our intentions and kindly keep me informed of any developments that would impact us specifically. Please also add me to the project mailing list.

If, at any time, you have any questions, please feel free to contact me directly.

Best regards,

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

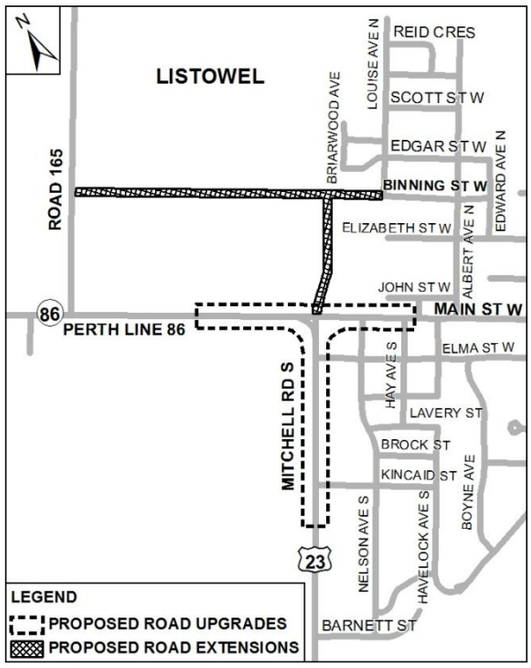
NOTICE OF PUBLIC INFORMATION CENTRE

THE PROJECT:

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Highway 23 (Mitchell Road S.) and Perth County Road 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. A preliminary design plan has been developed (refer to key plan) which identifies the planned upgrades as outlined below.

Primary Components:

- Complete traffic study to identify traffic signal warrants and turning lane requirements.
- Road improvements to Highway #23 and Perth County Road #86 including road resurfacing, widening and construction of dedicated turning lanes.
- Extension of municipal sanitary sewers and watermains to portions of project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Road, north from the intersection of Hwy. #23 and C.R. #86.
- Extension of Binning Street West to Road 165 to service future development lands along the west boundary of Listowel.



ENVIRONMENTAL ASSESSMENT PROCESS:

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA) process. The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project. This project has the potential to be "stepped down" to a Group 'C' project subject to screening for significant environmental issues. Following the Public Information Centre, MTO will decide if it is appropriate for the project to be "stepped down". A notice will be issued providing a 30-day public review period of MTO's decision to "step down" the project.

PUBLIC INFORMATION CENTRE:

A Public Information Centre (PIC) is planned to provide further information to the public on the results of study investigations and to receive input and feedback from interested persons:

Date:	**Thursday November 15th, 2012**
Time:	**2:00 p.m. – 4:00 p.m. & 5:00 p.m. – 7:00 p.m.**
Location:	**North Perth Municipal Office, 330 Wallace Avenue North, Listowel**

Following the PIC, comments are invited for incorporation into the planning and design of this project, and will be received until December 21st, 2012. For further information on this project, or to review the Class EA process, please contact the project engineers: B.M. Ross and Associates, 62 North Street, Goderich, Ontario, N7A 2T4. Telephone (519) 524-2641. Fax (519) 524-4403. Attention: Kelly Vader, Environmental Planner (e-mail: kvader@bmross.net).

Kriss Snell, CAO
Municipality of North Perth

This Notice first issued October 31st, 2012

MUNCIPALITY OF NORTH PERTH

DETAILED DESIGN & CLASS EA FOR HWY 23 AND COUNTY ROAD 86 IMPROVEMENTS AND CLASS EA FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

WELCOME

PUBLIC INFORMATION CENTRE

November 15th, 2012

BMROSS
engineering better communities

PUBLIC INFORMATION CENTRE

Welcome to the 1st public information meeting being held in conjunction with the Class Environmental Assessment process for roadway improvements near the intersection of Hwy. 23 & C.R. 86.

The Municipality of North Perth initiated a study under the Ontario *Environmental Assessment Act* in March 2011 to examine the need for intersection improvements and proposed road extensions within the project study area.

The purpose of this meeting is to advise the public of the status of study investigations; present a range of road extension and design alternatives for public comment and review; and to review other road design elements for public feedback and input.

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

SUMMARY OF CLASS EA PROCESS:

- PLANNING AND DESIGN PROCESS FOR MUNICIPAL WATER, WASTE WATER AND ROAD PROJECTS
- CONDUCTED TO EVALUATE THE POTENTIAL IMPACTS OF THE PROJECT ON THE NATURAL, CULTURAL, SOCIAL, ECONOMIC, AND BUILT ENVIRONMENTS

STUDY PHASES:

SCOPE OF THIS STUDY:

- CONSTRUCTION OF NEW ROADS OR OTHER LINEAR PAVED FACILITIES (> 2.4 M) CLASSIFIED AS A SCHEDULE 'C' ACTIVITY
  - SCHEDULE 'C' PROJECTS ARE APPROVED SUBJECT TO COMPLETION OF ALL FIVE PHASES OF CLASS EA PROCESS

- GENERAL STUDY COMPONENTS:
  - DEFINE PROBLEM / OPPORTUNITY
  - IDENTIFICATION OF ALTERNATIVE SOLUTIONS
  - CONSULTATION WITH THE PUBLIC / REVIEW AGENCIES
  - EVALUATION OF ALTERNATIVES / IMPACT MITIGATION
  - SELECTION OF A PREFERRED ALTERNATIVE
  - IDENTIFICATION OF ALTERNATIVE DESIGN CONCEPTS / IMPACT MITIGATION
  - DOCUMENTATION OF THE PROCESS
  - FINAL PUBLIC NOTIFICATION

MTO CLASS EA FOR PROVINCIAL TRANSPORTATION FACILITIES

SUMMARY OF CLASS EA PROCESS:

- PLANNING AND DESIGN PROCESS FOR PROVINCIAL HIGHWAYS AND FREEWAYS, TRANSITWAYS AND FERRY BOATS
- GOAL IS TO PROVIDE A SAFE AND EFFECTIVE TRANSPORTATION SYSTEM WHILE AVOIDING OR MINIMIZING NEGATIVE ENVIRONMENTAL EFFECTS

STUDY STAGES:

- PLANNING
- PRELIMINARY DESIGN
- DETAIL DESIGN; AND
- CONSTRUCTION

SCOPE OF THIS STUDY:

- HIGHWAY AND FREEWAY IMPROVEMENTS THAT PROVIDE A SIGNIFICANT MODIFICATION IN TRAFFIC ACCESS TO AND FROM EXISTING HIGHWAYS/ FREEWAYS, OR THAT INTRODUCE MUNICIPAL ROAD ACCESS TO LOCAL AREAS, SUCH AS:
  - MODIFICATION OF INTERCHANGES THAT INTRODUCE OR ELIMINATE MOVES TO OR FROM ANY DIRECTION;
  - OPENING OR CLOSING OF INTERSECTIONS WITH MUNICIPAL ROADS; INTRODUCING OR ELIMINATING MUNICIPAL ROAD ACCESS TO LOCAL AREAS.
- THIS TYPE OF ACTIVITY IS CLASSIFIED AS A GROUP ‘B’ ACTIVITY

STEP-DOWN PROCESS FOR GROUP ‘B’ PROJECTS

- FOR GROUP ‘B’ PROJECTS THAT ARE SHOWN TO HAVE NO SIGNIFICANT ENVIRONMENTAL EFFECTS, AN OPPORTUNITY TO STEP-DOWN THE PROJECT TO A GROUP ‘C’ PROJECT IS AVAILABLE. THE FOLLOWING MUST BE CONSIDERED IN DECIDING WHETHER TO STEP-DOWN A PROJECT:
  - ARE THERE ANY SIGNIFICANT ENVIRONMENTAL ISSUES?
  - ARE THERE ANY SIGNIFICANT PROPERTY ISSUES?
  - IS THERE ANY NEED TO PROVIDE PUBLIC DOCUMENTATION OF ANY ISSUES WHICH HAVE BEEN IDENTIFIED?
  - IS THERE A LIKELIHOOD OF A BUMP-UP REQUEST?

MEA CLASS EA PROCESS

PHASE 1

- IDENTIFY PROBLEM OR OPPORTUNITY
- BACKGROUND REVIEW

PHASE 2

- EVALUATE PROBLEMS AND IDENTIFY ALTERNATIVE SOLUTIONS
- IDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES
- CONSULT WITH THE PUBLIC AND REVIEW AGENCIES TO IDENTIFY ANY ISSUES OR CONCERNS WITH DEFINED PROBLEMS AND ALTERNATIVE SOLUTIONS

← **PRESENT**

- EVALUATE ALTERNATIVE SOLUTIONS: IDENTIFY RECOMMENDED SOLUTIONS
- SELECT PREFERRED SOLUTION

PHASE 3

- IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
- IDENTIFY IMPACT OF ALTERNATIVE DESIGNS ON ENVIRONMENT, AND MITIGATING MEASURES
- CONSULT REVIEW AGENCIES/STAKEHOLDERS

PHASES 4 & 5

- PREPARE ENVIRONMENTAL STUDY REPORT AND PUBLISH NOTICE OF COMPLETION
- ADDRESS OUTSTANDING CONCERNS
- FINALIZE ESR AND PROCEED TO FINAL DESIGN

LISTOWEL • ELMA • WALLACE
NORTH PERTH
EST 1998

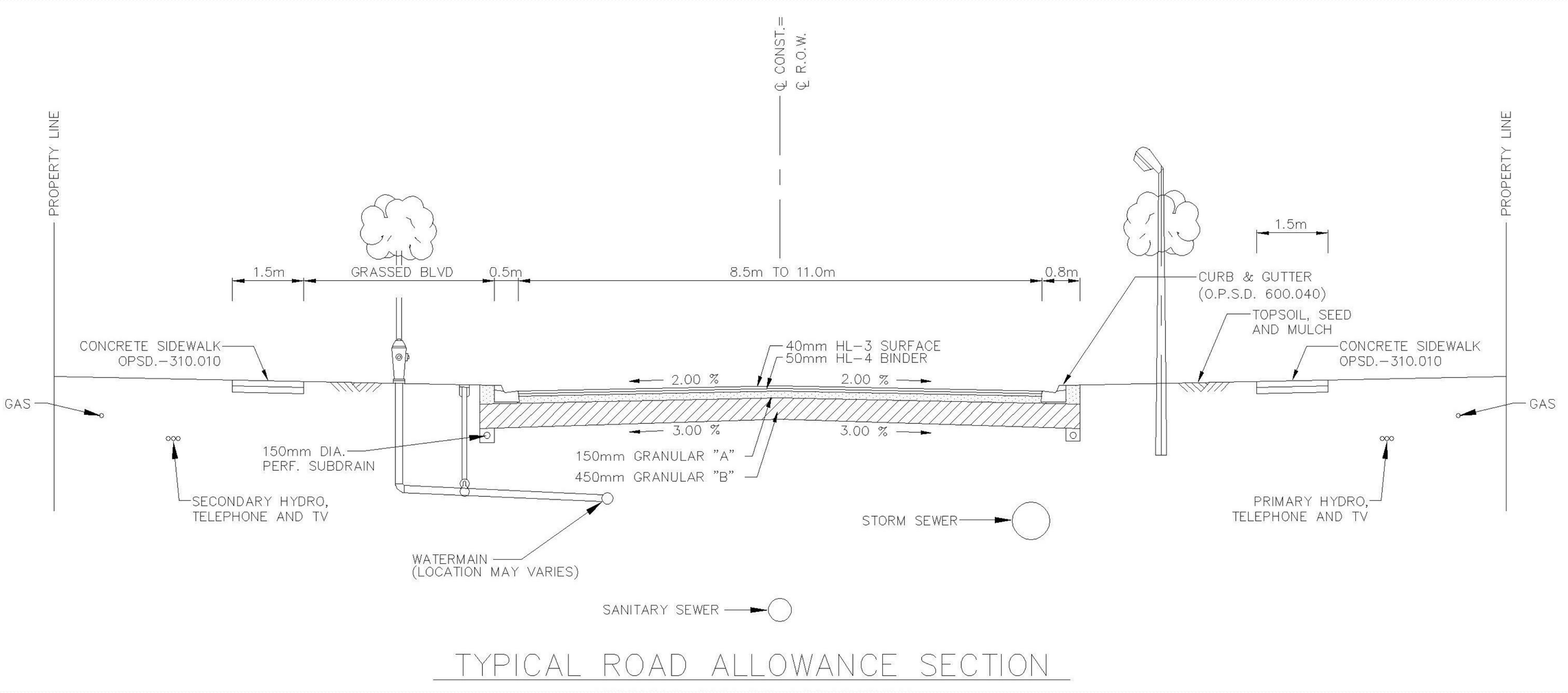
BMROSS
engineering better communities

PROPOSED UPGRADES

- Road and access improvements to Highway # 23 and County Road # 86 including road resurfacing, widening and construction of dedicated turning lanes.

- Intersection improvements at Mitchell Road and County Road 86 (traffic signals or roundabout)
- Extension of municipal watermains and sanitary sewers to project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Road, north from the intersection of Hwy. # 23 and C.R. # 86.
- Extension of Binning Street West to Road 165 to service future development lands.
- Installation of sidewalks and other pedestrian-friendly features throughout the study area to improve safety and accessibility.

MITCHELL ROAD NORTH & BINNING STREET WEST CROSS-SECTIONS



Additional Considerations

- Sidewalk Width
- Trees
- Lane Width
- # of Lanes
- Bike Lanes

View of Binning Street Extension

▼

TRANSPORTATION STUDY

PURPOSE

- ANALYSE TRAFFIC OPERATIONS ALONG PERTH ROAD 86 AND MITCHELL AVE SOUTH (CURRENT AND 10-YEAR HORIZON)
- IDENTIFY CURRENT OPERATIONAL AND SAFETY DEFICIENCIES
- ANALYSE IMPACTS ASSOCIATED WITH PROPOSED MITCHELL AVE AND BINNING STREET EXTENSIONS
- PROVIDE INPUT TO PROJECT TEAM REGARDING ALTERNATIVES

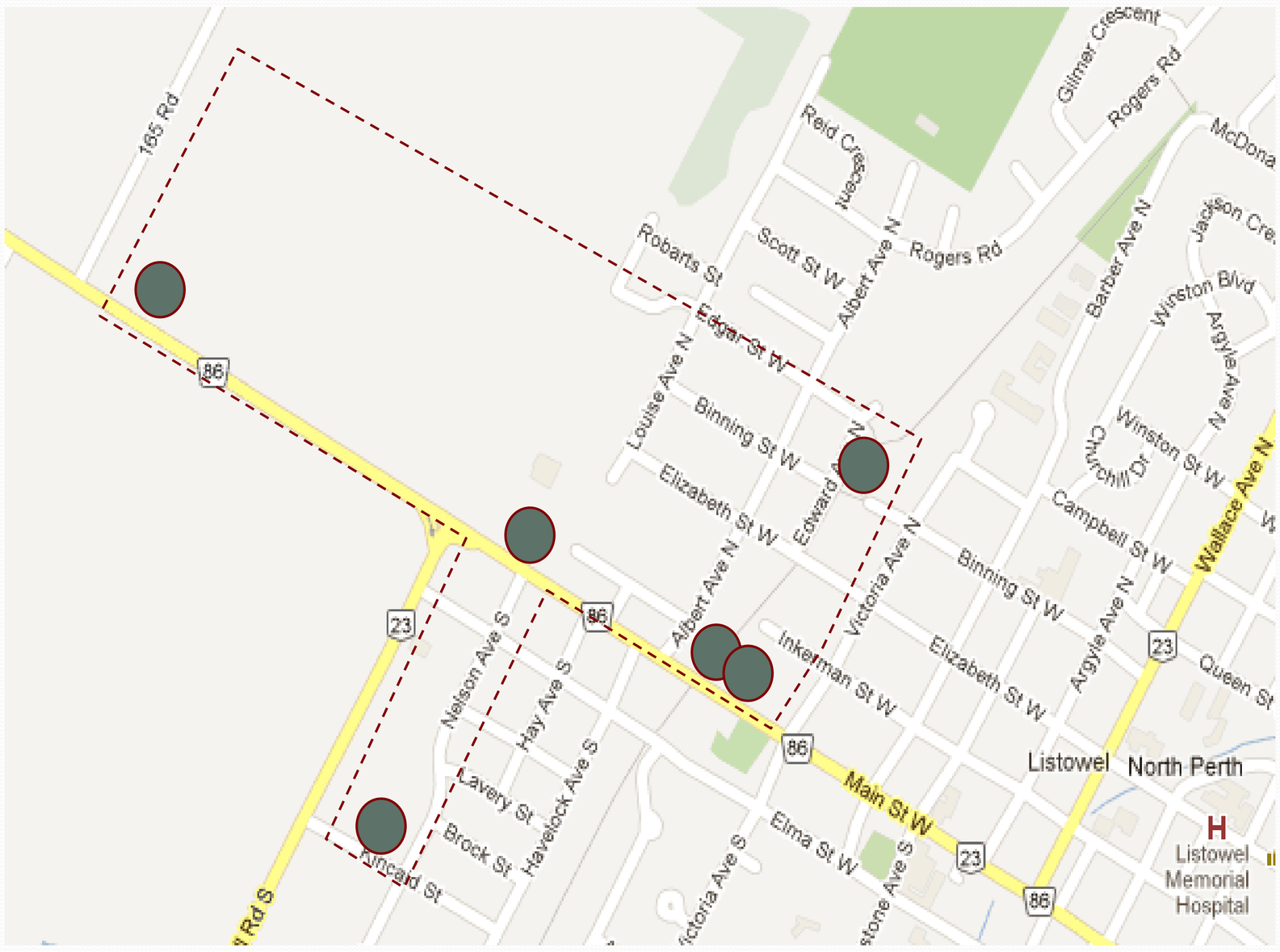
METHODOLOGY

- CONDUCT SITE VISITS
- CONDUCT COMPREHENSIVE TRAFFIC COUNTING PROGRAM IN VICINITY OF INTERSECTION
- PERFORM OPERATIONAL ANALYSIS
- REVIEW PROJECTED DEVELOPMENT AND GROWTH PATTERNS FOR NORTHWEST LISTOWEL AREA
- PREPARE DEMAND FORECASTS FOR A 10 YEAR HORIZON
- COMPLETE TRAFFIC SIGNAL WARRANTS FOR HIGHWAY 23 AND COUNTY ROAD 86 INTERSECTION
- EVALUATE ALTERNATIVES AS NECESSARY
- DOCUMENT STUDY

TRANSPORTATION STUDY

EXISTING CONDITIONS (2012)

- ALL INTERSECTIONS EXAMINED AS PART OF THE STUDY GENERALLY OPERATE WITHIN ACCEPTABLE PARAMETERS UNDER CURRENT CONDITIONS WITH THE EXCEPTION OF WESTBOUND MOVEMENTS ON KINCAID AT MITCHELL RD



ANTICIPATED TRAFFIC OPERATIONS (2022)

- INTERSECTION OF HWY 23 AND COUNTY ROAD 86 WILL OPERATE POORLY DURING AM AND PM PEAK HOURS
- A TRAFFIC CONTROL SIGNAL IS NOT WARRANTED (AS OUTLINED IN THE ONTARIO TRAFFIC MANUAL REQUIREMENTS) AT THE INTERSECTION BASED ON FORECAST VOLUMES AND ASSUMED DEVELOPMENT DENSITIES
- A ROUNDABOUT WOULD OPERATE WELL AT THE INTERSECTION AND RESULT IN FEWER AVERAGE DELAYS
- SOUTHBOUND MOVEMENTS ON ALBERT ST. AT MAIN AND WESTBOUND MOVEMENTS ON KINCAID AT MITCHELL RD WILL BE POOR, HOWEVER TRAFFIC SIGNALS ARE NOT WARRANTED AT EITHER INTERSECTION

TRANSPORTATION STUDY

RECOMMENDATIONS

- A WESTBOUND RIGHT TURN LANE BE PAINTED ON KINCAID AT MITCHELL ROAD TO ALLOW WESTBOUND RIGHT TURNING VEHICLES TO AVOID DELAYS CAUSED BY LEFT TURNING OR THROUGH TRAFFIC

- THAT THE MUNICIPALITY OF NORTH PERTH UNDERTAKE NECESSARY STEPS TO OBTAIN LAND AT THE INTERSECTION OF HWY 23 AND COUNTY ROAD 86 FOR A FUTURE ROUNDABOUT OR SIGNALIZED INTERSECTION

- THAT TRAFFIC VOLUMES AT HWY 23 AND COUNTY ROAD 86 BE MONITORED ON A REGULAR BASIS SO THAT WHEN VOLUMES ARE WITHIN 10% OF REQUIRED VOLUMES, STEPS CAN BE TAKEN TO IMPLEMENT THE NECESSARY ROUNDABOUT OR TRAFFIC SIGNAL

- THAT THE BINNING STREET AND MITCHELL ROAD EXTENSIONS BE DESIGNED TO SUPPORT ALL MODES OF TRANSPORT INCLUDING PEDESTRIANS AND CYCLISTS

- THAT TRAFFIC CALMING MEASURES SUCH AS SPEED HUMPS, RAISED PEDESTRIAN CROSS WALKS AND PEDESTRIAN REFUGE ISLANDS BE CONSIDERED WHEN DESIGNING THE BINNING STREET AND MITCHELL ROAD EXTENSIONS

PROJECT TIMELINES

March 2012 – Consultation with Federal/ Provincial Review Agencies

March 2012 – Notice of Study Commencement

Summer/Fall 2012 – On-site Investigations (Traffic study, Archaeological Assessment, Site Surveys, Preliminary Engineering)

November 2012 – Initial Public Meeting

Fall 2012 – Select Preliminary Preferred Alternative

Winter 2012/13 – Finalize Preliminary Design

Winter 2013 – 2nd Public Meeting

Winter 2013 – Confirm Preferred Alternative

Spring 2013 – Finalize Class EA Process

Summer 2013 – Construction of Binning St. Extension

2014 – Construction of Mitchell Road Extension

PUBLIC INPUT

- PUBLIC INPUT INTO THE DESIGN OF THE BINNING STREET AND MITCHELL ROAD EXTENSIONS IS BEING SOUGHT
- PLEASE TELL US WHAT CONCERNS YOU MAY HAVE WITH THE PROJECT AND WHAT FEATURES YOU WOULD LIKE TO SEE INCLUDED IN THE PROPOSED ROAD EXTENSIONS AND INTERSECTION IMPROVEMENTS
- COMMENT SHEETS ARE PROVIDED NEAR THE EXIT

NEXT STEPS

- A SECOND PUBLIC MEETING IS PLANNED FOR THE WINTER OF 2013 TO PRESENT THE PRELIMINARY ENGINEERING DESIGN TO THE PUBLIC AND PROJECT STAKEHOLDERS
- A DECISION WILL BE MADE WHETHER TO STEP-DOWN THE GROUP ‘B’ MTO CLASS EA TO A GROUP ‘C’ CATEGORY
- ADDITIONAL INPUT WILL BE SOUGHT FROM FEDERAL AND PROVINCIAL REVIEW AGENCIES AS WELL AS PROJECT STAKEHOLDERS
- THE CLASS EA PROCESS IS SCHEDULED FOR COMPLETION IN 2013 SO THAT CONSTRUCTION OF THE BINNING STREET EXTENSION CAN BEGIN TO PROVIDE ACCESS FOR NEW SCHOOL CONSTRUCTION IN NORTHWEST LISTOWEL

PROJECT CONTACT INFORMATION

62 NORTH STREET
GODERICH, ON
N7A 2T4

KELLY VADER
ENVIRONMENTAL PLANNER
kvader@bmross.net
PHONE: 519-524-2641
TOLL FREE: 1-888-524-2641
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330 Wallace Ave. N.,
Listowel, ON,
N4W 1L3

KRISS SNELL
CHIEF ADMINSTRATIVE OFFICER
ksnell@northperth.ca
TOLL FREE: 1-888-714-1993
PHONE: 519-291-2950
FAX: 519-291-5611

File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

November 15, 2012

COMMENTS

Name: _____

Address: _____

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PLEASE HAND IN, MAIL, OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of North Perth will assist in decision making pertaining to the Environmental Assessment study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of North Perth will remain confidential unless prior consent is obtained.

File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

November 15, 2012

COMMENTS

Name: _____

Address: _____

We are very much in favour of a roundabout at the intersection of Hwys 23 and 86. If facilities for pedestrians are also addressed, a roundabout would move traffic all directions with maximum efficiency.

PLEASE HAND IN, MAIL, OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of North Perth will assist in decision making pertaining to the Environmental Assessment study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of North Perth will remain confidential unless prior consent is obtained.

Kelly Vader

From: [redacted]
Sent: November-17-12 12:11 PM
To: 'Kelly Vader'
Cc: Kriss Snell; [redacted]
Subject: RE: Environmental Assessment for Hwy 23 & Perth Line 86

Hi Kelly, nice to meet you at the open house on Thursday and thanks for your input.

As per our previous email exchanges, below is a summarized version of our plans as they pertain to Hwy 23 S...

As per the completion of the Detailed Design and Class Environmental Assessment of Hwy 23 & Perth Line 86, I am writing to advise you of our interests in the project. We own the properties on the East side of Hwy 23 S within the designated project area, specifically, 202 and 220, and 500 Mitchell Rd S. (the land from the South side of Elma St up to the Canadian Tire property). Currently, the third lot, 500 Mitchell Rd S, is 2 acres of vacant land with no access to Highway 23 S. It is our intention to develop a national retail outlet(s) at this location. In order to do so, we will require an entrance/access to Highway 23 from this property. As part of the facets of your project, please give consideration to our intentions and kindly keep me informed of any developments that would impact us specifically.

Please reiterate our intentions to all necessary parties as the Hwy 23/Line 86 development progresses. If possible, please also add my comments into the official records and kindly keep me informed as the proceedings unfold. Of course, feel free to contact me directly at any time.

Kind regards,

Listowel, Ontario N4W 3L2

December 21, 2012

BM ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Attention: Kelly Vader, Environmental Planner

Re: File 11240
Municipality of North Perth
Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road & Binning Street West

Kelly:

Thank you for the opportunity to comment on the information presented at the November 15, 2012 Public Information Center on this project, as well as the promise of future opportunities as the project progresses.

We apologize for the length of these comments, however without specific proposals there are so many possibilities on the table.

We look forward to the opportunity to refine our comments in future phases of this project.

With the extension of Mitchell Road we will need to make substantial changes to our operations and facilities. For planning purposes it is important that we know as soon as possible the options being considered, the dimensions and anticipated traffic of the proposed extension.
Eg: The eastward curve as marked for archeological investigation is more gradual than we expected, requiring more land. Why does the road not reach our eastern property line sooner? (We assume the road will eventually align with the east edge of our property.) Please provide a drawing showing the alignment of the extension of Mitchell Road so that we can properly assess the impacts to our operations.

<u>Intersection of Hwy 23 and CR 86</u>

We are concerned that that analysis (see Traffic Study below) suggests our already busy intersection does not warrant signalization.

Are the criteria different for traffic activated traffic lights?

Even now, local drivers tend to detour through residential side streets to avoid traffic delays at the intersection. This results is an understatement of the traffic at this corner and the need for signalization, as well as potentially creating traffic problems on these side streets.

We note that the commercial property at the southwest corner is already being used as a detour to avoid the intersection.

Other poor driving habits also impact congestion and safety at this corner.

Vehicle roadside parking has become worse with the opening of that new commercial property, negatively affecting visibility and safety at the corner. We therefore suggest you recommend parking should be prohibited within 100 meters of the intersection and official signs installed.

Traffic Study

As noted at the November 15 Public Information Center, we are concerned that your traffic consultant did not interview us before drafting their report. We have a "bird's eye view" of traffic patterns and driving habits at this intersection of Hwy 23 (Mitchell Road) and CR 86, and also represent the special needs of the heavy trucking sector that appears to have been ignored in the report. This is in spite of the fact that heavy truck movement through this intersection is recognized as relatively high and there are 2 trucking companies directly affected by the proposed changes (ourselves being one).

The use of 2 separate data sets (March 2011 and May 2012) is confusing at best and perhaps misleading. It also appears strange that the traffic volumes for the Hwy 23 and CR 86 intersection add up quite nicely considering the data was collected on 2 occasions over a year apart.

It is also disturbing that the study does not appear to address existing traffic turning north at the intersection or southbound entering the intersection (i.e. to / from ourselves and the neighbouring trucking operation / repair shop.)

What do they consider the am rush hour & pm rush hour? Is this truly the peak period of traffic for that corner? Additional counts during the summer commute to the cottage on Friday afternoons would be interesting.

Services like Tim Hortons seem to always be overflowing with traffic and make projections seem to be invalid....Is the same true for schools, etc particularly the rush when school starts or gets out, or a game ends?

Although the traffic study recognizes the need to analyse pedestrian and cyclist movement (see also below), it does not address the added burden such traffic will place on the intersection and the increased need for traffic control.

The recommendation is to redo the traffic analysis at that corner every 2 years. It is not clear if this means March 2011 – Spring 2013? or May / November 2014?

How long would the new Tim Hortons need to be established before the novelty would not be considered to impact traffic counts. What about other changes eg: the new WalMart?

We expect public grumbling "If they've gone to the expense of building the School & Rec Center, they should have updated the road system from the outset."
Although it was communicated that the cost of traffic light retrofit would be not that much more than doing it from the beginning, we note the indirect costs associated with a public grumble factor might be high.

Traffic Circle

We do not support the idea of a traffic circle.

- We do not believe it will provide the safety required by elementary student pedestrians and cyclist.
- Even with skirting, we do not believe a single lane traffic circle to be heavy-truck friendly.
- Compared to traffic lights, we expect that it would take longer to implement the changes for a traffic circle when it is finally realized that more control is required at this corner. How long?
- It might limit the road access to our property.

Road Extensions

Please clarify the expected car traffic to / from the School and Rec Complex on the proposed Mitchell Road extension.
Although numbers appear in Table 3.1 of the traffic study, are these correct?
For example, how can you have 254 trips to/from the school in the morning and only 85 in the evening (even considering half day kindergarten)? Also, if 3 soccer fields were in use at the same time would there only be 62 trips per hour?

Because of the impact on our operations and our need to plan accordingly, we will be interested to learn the proposed dimension and configuration of the Mitchell Road extension as soon as possible.

The road should be wide enough with appropriate turning lanes to minimize the potential conflict between trucks trying to turn off / onto the road and pre-occupied drivers late for School or a game at the Rec Center.

Please provide more details on potential traffic calming measures. It will be a challenge to incorporate such measures while still being truck friendly for the existing commerce using this as an access road. We request that no traffic calming measures be installed on all roads that we will use to access our property.

Bullet 4 of the "Transportation Study Recommendations" board notes that "the Binning Street and Mitchell Road Extensions be designed to support all modes of transport including pedestrians and cyclists."
It also needs to specifically address heavy truck traffic to ensure that others are not misled by its absence.

As previously discussed with the Municipality, we ask that occasional heavy truck traffic be permitted on the Binning Street extension. We would only use this access to CR 165 on exception eg: when County Road 86 is declared closed but the side roads and other county roads remain open.

Also based on previous discussions with the Municipality, we are under the impression that the Mitchell Road extension will be a priority for winter road maintenance. We recognize that access to the School and Rec Center is usually needed even if the busses do not run, and appreciate the Municipality's attention to our business needs. (Currently our earliest Drivers start at about 2 am and the last ones return to the Depot at about 11:00 pm). We look forward to working with the Municipality on this.

What is the intention of the "future road extension" north of Binning Street noted on one of the Presentation Boards, and are further extensions possible. If this becomes a route to bypass downtown, traffic past our front door would increase substantially beyond the projections of the traffic study.

Road Access

As discussed we are concerned that the changes in elevation, curves and turning requirements in proximity to the curve will place undue stress on our expensive equipment.

Our normal operation will already be negatively affected by the loss of a substantial portion of our east yard. We therefore request two road access points to our property from the proposed road extension to facilitate vehicle flow within our yard. This is in addition to keeping our western access to our lower yard to facilitate possible future development. (i.e. opposite the access to the commercial development on the south side of CR 86).

The proposed road extension is already eliminating a substantial amount of our existing employee and heavy truck parking. It is therefore important that other areas identified as possibilities for parking (eg: north edge of our property) are not compromised by the road access point.

Our road access must meet or exceed the Yards and Lanes requirements of the Dairy Farmers of Ontario (DFO).

Pedestrians / Cyclists

We have a number of questions regarding an anticipated increase in Pedestrian / Cyclist traffic with the proposed School and Rec Complex.
Given the prevalence of electronic medium we are concerned that this would in fact be distracted pedestrian / cyclist traffic requiring greater control.

We ask that you consider a separate bike path, not bike lanes for safety, particularly given the age group of these children.

Please clarify the expected traffic to / from the School and Rec Complex.

- School Bus traffic (# students). We understand from meetings with the Municipality that Wallace busses would access the school from the side road, and that there would be about 6 – 8 busses via the N-S access road twice a day. Does this information remain valid?
- Number of Students walking to school
  – using Binning Street extension
  – using Mitchell Road extension.
- Number of Students expected to cross the intersection of Hwy 23 and CR 86. Will there be a crossing guard? What is the speed limit in areas with crossing guards?
- Extra traffic (car & pedestrian) to & from the fast food outlets south of CR 86 (TH, DQ, Roadhouse Restaurant).

We do appreciate your cooperation & efforts to understand our needs as a major stakeholder at the corner, and note the importance of timeliness of information so we can make appropriate plans.

We look forward to participating in the next public meeting which we noted would take place in Winter 2013. Do you have a more firm idea for the timing of this meeting?
Also, based on our understanding of the EA process, will you be presenting alternative designs and identifying the recommended design at this meeting? We understand that the preferred design (the one that will likely be built) will be selected based on comments received at the 2nd open house.

As you can imagine we need a clear understanding of options that may present themselves. Two options with no material difference to the Municipality might have a great impact on our operations.

Yours truly,

Transportation Planning

Transit Planning

Traffic Engineering

Parking Planning

Philip E. Grubb
B.A.Sc., P.Eng.
President

James J.L. Mallett
M.A.Sc., P.Eng., PTOE
Vice President

Stewart K. Elkins
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43 Forest Road
Cambridge ON N1S 3B4

Email: jmallett@ptsl.com
Phone: 519-896-3163
905-381-2229
Fax: 1-866-722-5117

February 6, 2013
Project: 110500

Kelly Vader
Environmental Planner
BM Ross and Associates
62 North Street
Goderich ON N7A 2T4

Dear Ms. Vader:

Re: Hwy 23 and Perth Line 86 Class EA Transportation Study Comments Response to ,

We are writing to you in response to your request related to the comments provided by . I regarding Transportation Study that was prepared in support of the Highway 23 and Perth Line 86 Class EA.

We have reviewed the comments and provide our response in the order they are made in the letter.

Intersection of Highway 23 and CR 86

Implementation of Traffic Control Signals on Provincial Highways and municipal roads in Ontario are governed by the Ontario Traffic Manual Book 12 procedures. In it, there are a number of justification criteria that dictate when a traffic control signal can be justified. These are based on consistent hourly volumes of traffic over the busiest 8 hours of the day. Based on current and projected volumes, there is insufficient volume to meet these requirements. The criteria for signalization are consistent regardless of the form of traffic signal function (actuated, semi-actuated or fixed time)

With regard to congestion and delay, the critical movement is the northbound movement from Highway 23 to CR 86. Operational analyses contained in the report indicate that this approach currently operates at Level of Service C, during the PM peak hour with and average delay of 21 seconds. It operates at about 57% of the capacity that approach. This level of congested and delay is considered very good.

The author notes that a parking ban should be implemented in the vicinity of

the intersection. It our understanding that no parking is allowed on provincial highways. However, if local by-laws supersede jurisdiction in this area, we would support a parking ban.

Traffic Study

The traffic study is a technical report that relies on traffic engineering expertise and provides input into the Class EA process. The Class EA process affords affected and interested parties to become involved in it. Therefore the input being provided by Allan Johnston Limited is most appropriate in the EA process.

The existing trucking operations do not have direct access to the intersection; rather they have commercial driveways adjacent to the intersection (similar to the plazas on the south side of the intersection). Any volumes generated via these driveways and using the intersection would have been collected in the traffic counts at the intersection.

AM peak hour and PM peak hours are the busiest hours of traffic of the day. Typically, the AM peak hour occurs between 8:00 AM and 9:00 AM while the PM peak hour occurs between 5:00 PM and 6:00 PM. Analysis of these hours is standard traffic engineering practice. It is noted however, that there is some fluctuation in this condition from intersection to intersection.

Traffic data collected on summer weekends would not affect the need for a traffic control signal, as it requires 8 consistent hours of volumes to be present. Further, weekend peak summer volumes are rarely used to justify traffic control signals.

It is common for traffic data to be collected over different years, as it rare that all intersections would have been counted concurrently. It is also common to make adjustments to the flows to ensure reasonable consistency between intersections. This is standard traffic engineering practice.

The traffic projections for the Tim Horton's site were used directly from the approved Transportation Impact Study prepared for that development. With regard to school arrival and departure times, these have been considered in the development of the traffic forecasts. Peak events such as "games" typically occur outside the peak hour and with a high degree of infrequency and as such are not typically considered in the peak hour analyses.

The amount of pedestrian traffic is often very difficult to forecast. It is however, recognized in the Ontario Traffic Manual that pedestrian flows make up part of the intersection demand and is considered in the traffic signal justification process. This in part is motivation to ensure that conditions at the intersection are revisited on a regular basis.

The timing of the traffic count update is subject to municipal decision makers. Typically traffic counts are conducted in the spring and fall as these best represent average conditions and will include schoolchildren in the pedestrian flows. It is expected that the first re-count will be conducted in 2014.

The determination of the need for a traffic control signal is a technical process supported by objective traffic data. The Ministry of Transportation does permit the installation of unwarranted traffic control signals on its facilities.

Traffic Circle (sic Roundabout)

There is a significant difference in traffic engineering between a traffic circle and a roundabout. Most important is that modern roundabouts are more compact, have "yield on entry" control and have much lower design speeds.

There is significant research regarding the implementation of roundabouts near schools and the associated safety. Further, there is substantial empirical evidence that roundabouts are overall a much safer form of traffic control and provide for enhanced pedestrian safety. I have attached samples of literature for your reference.

The design of the single-lane roundabout will be subject to a standard design vehicle used by MTO on its provincial highway system. This vehicle must be able to safely pass through any intersection. The attached diagrams illustrate the left-turn movements of a wb-20 tractor-trailer (53' trailer) through the roundabout concept. These are subject to detailed engineering design.

The timing either a traffic control signal or a modern roundabout can typically be construction in a single construction season, subject to other engineering requirements, such servicing and utilities.

Access limitations would be similar in either the modern roundabout or traffic control signal cases. With the extension of Mitchell Road, it is expected that access to the properties on the north side of Main Street will be provided in some fashion.

Road Extensions

Traffic projections are based on the information available from the municipality and from trip generation rates published by the Institute of Transportation Engineers. With respect to the school and soccer field generation, the values depicted are those that would occur in the PM peak hour of the roadway (typically 5:00 PM to 6:00 PM). Given that the peak activity levels at both these uses occur outside this hour, the volumes are lower for these uses.

The dimensions of the Mitchell Road extension are being prepared by your office.

The location and design of the traffic calming features is the subject of further study. Typically these devices follow the design parameters detailed in the Canadian Guide to Neighbourhood Traffic Calming published by CITE and the Transportation Association of Canada. These are subject to local refinements and design criteria.

We oppose the use of Binning Street by heavy truck traffic. We would recommend that truck traffic be restricted from using Mitchell Road north of the industrial sites.

We trust that this confirmation is acceptable. Please do not hesitate to contact me should you have any questions, or require additional information.

Yours very truly,
PARADIGM TRANSPORTATION SOLUTIONS LIMITED

James J.L. Mallett
M.A.Sc., P.Eng., PTOE
Vice President

cc: Bruce Potter, BM Ross

Municipality of North Perth

Detailed Design and Class EA for Hwy. 23 & C.R. 86 Upgrades

Council Information Meeting

February 11th, 2013

Agenda

- Background
- Class EA Process
- November 15th Public Meeting Review
- Public/Agency Input
- Specialized Studies
- Proposed Road Extensions
- Intersection Alternatives
- Next Steps

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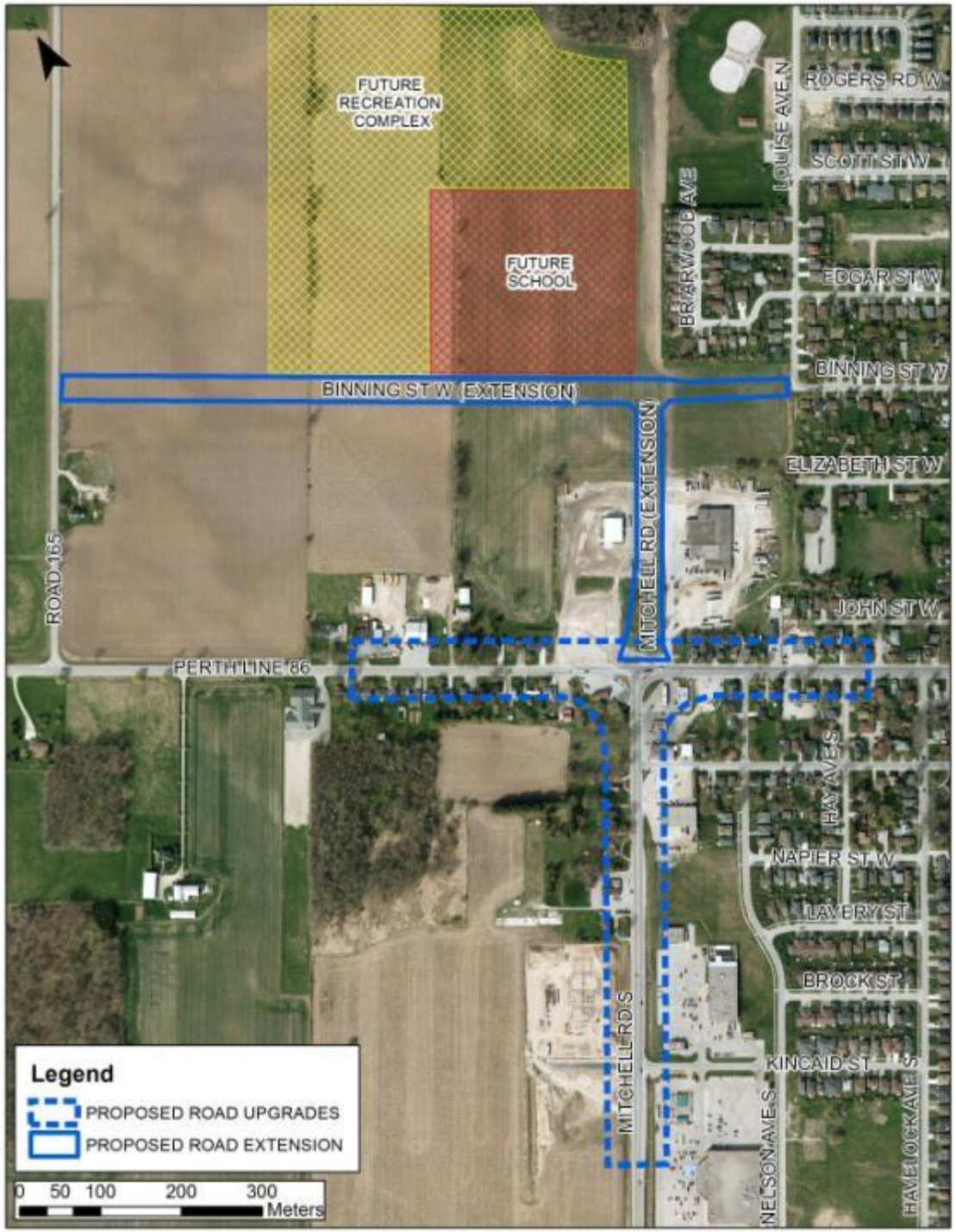

March 7/12 – Notice of Commencement

March 15/12 – Agency Letters Mailed

April 2012 – Aboriginal Consultation

July 2012 – Archaeological Assessment

Nov. 12/12 – Draft Transportation Study

Nov. 15/12 – Public Information Centre

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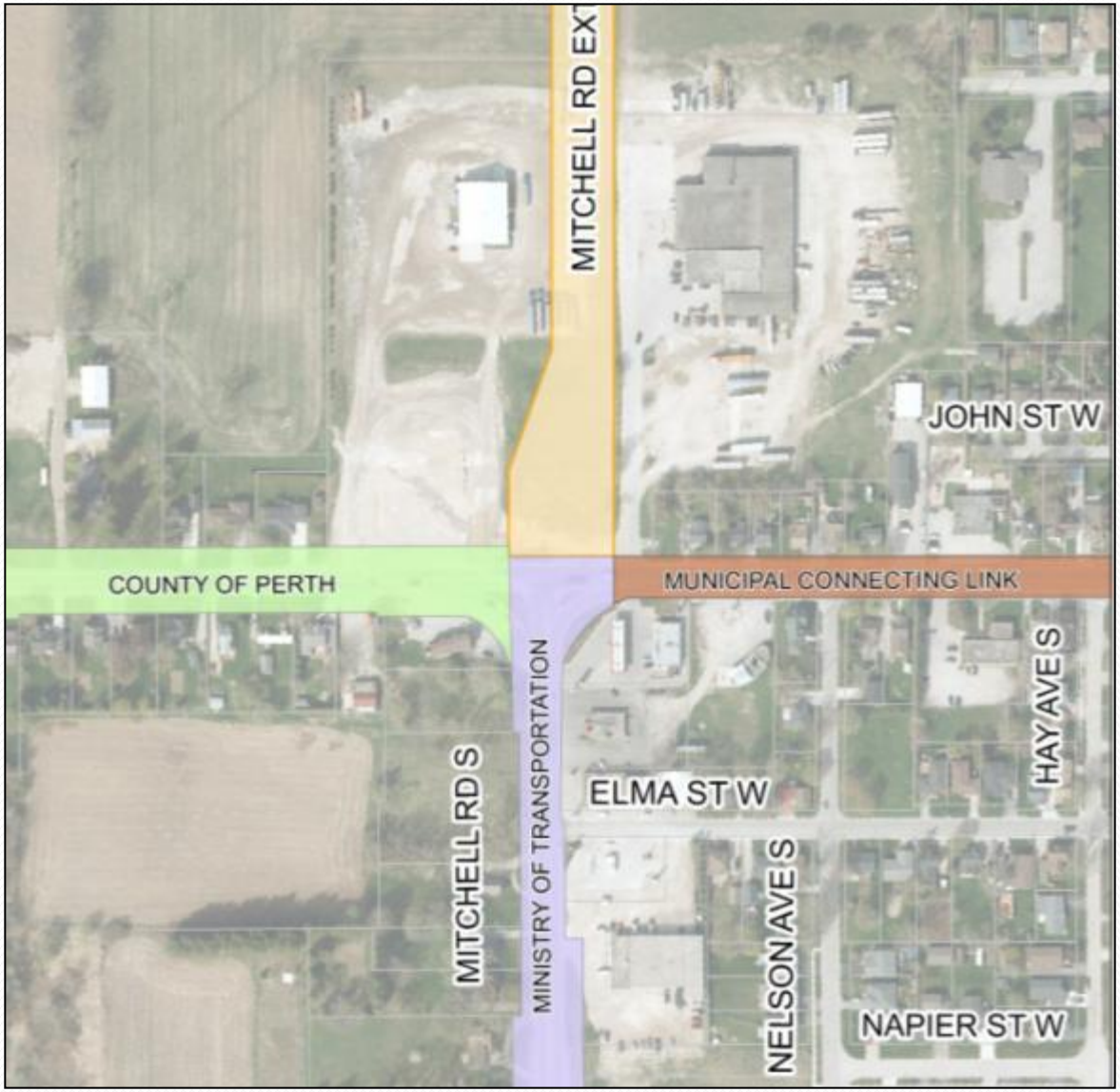
Road Jurisdictions



LEGEND

- MINISTRY OF TRANSPORTATION
- COUNTY OF PERTH
- MUNICIPAL CONNECTING LINK
- PROPOSED ROAD EXTENSIONS
- FUTURE ROAD EXTENSION
- BMROSS_2012-02-06_NP_PARCELS

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MEA Class EA Process

- PLANNING AND DESIGN PROCESS FOR MUNICIPAL WATER, WASTE WATER AND ROAD PROJECTS;
- PROPOSED ROAD EXTENSIONS ARE A SCHEDULE ‘C’ ACTIVITY;
- CONDUCTED TO EVALUATE THE POTENTIAL IMPACTS OF THE PROJECT ON THE NATURAL, CULTURAL, SOCIAL, ECONOMIC, AND BUILT ENVIRONMENTS;

MTO Class EA for Provincial Transportation Facilities

- PLANNING AND DESIGN PROCESS FOR PROVINCIAL HIGHWAYS AND FREEWAYS, TRANSITWAYS AND FERRY BOATS;
- OPENING OR CLOSING OF INTERSECTIONS WITH MUNICIPAL ROADS; INTRODUCING OR ELIMINATING MUNICIPAL ROAD ACCESS TO LOCAL AREAS;
- GOAL IS TO PROVIDE A SAFE AND EFFECTIVE TRANSPORTATION SYSTEM WHILE AVOIDING OR MINIMIZING NEGATIVE ENVIRONMENTAL EFFECTS;
- PROJECT IS CLASSIFIED AS A GROUP ‘B’ ACTIVITY;

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MEA CLASS EA STUDY PHASES

PROBLEM/OPPORTUNITY DEFINITION

↓

IDENTIFICATION OF ALTERNATIVES

↓

CONSULTATION WITH PUBLIC AND REVIEW AGENCIES

↓

EVALUATION OF ALTERNATIVES

↓

SELECTION OF PREFERRED ALTERNATIVE

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MTO Class EA Process

STUDY STAGES:

- Planning
- Preliminary Design
- Detail Design; AND
- Construction

STEP-DOWN PROCESS FOR GROUP 'B' PROJECTS

FOR GROUP 'B' PROJECTS THAT ARE SHOWN TO HAVE NO SIGNIFICANT ENVIRONMENTAL EFFECTS, AN OPPORTUNITY TO STEP-DOWN THE PROJECT TO A GROUP 'C' PROJECT IS AVAILABLE. THE FOLLOWING MUST BE CONSIDERED IN DECIDING WHETHER TO STEP-DOWN A PROJECT:

- Are there any Significant Environmental Issues?
- Are there any Significant Property Issues?
- Is there any need to Provide Public Documentation of any Issues which have been Identified?
- Is there a likelihood of a Bump-up Request?

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Public Information Centre Review

- November 15, 2012 – 2 - 4 p.m. & 5 - 7 p.m.
- North Perth Municipal Council Chambers
- Approximately 40 Attendees
- Provided details on MEA and MTO Class EA Process
- Presented two Primary Intersection Options
  - Signalized Intersection
  - Roundabout
- Presented results of Draft Transportation Study

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Input Received

- Public Input
  - Details regarding current operation of #23 & #86 intersection
  - Questions regarding the extent of servicing extensions
  - Support for a roundabout at #23 & #86
  - Concern over impacts to adjacent areas from road extensions
- Agency/Stakeholder Input
  - Interested in the timing of the upgrades
  - Wanting details on the extent and type of upgrades proposed
  - Concerned with future operation of intersection
  - Concerns over pedestrian safety and truck use of a possible roundabout option

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Traffic Analysis

Paradigm Transportation Solutions

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Traffic Study - Paradigm

- Analyzed current and future (10 year) traffic operations
  - Using Traffic Counts
  - Growth Projections
- Completed traffic signal warrant for intersection
- Identified current operational and safety deficiencies

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Traffic Study - Paradigm

RESULTS

- Intersections generally operate well under current conditions
- Hwy. #23 & C.R. 86 will operate poorly during peak hours
- Traffic signal not warranted at #23 & #86

RECOMMENDATIONS

- That traffic volumes be monitored on a regular basis at Intersection of Hwy. 23 & 86
- That a westbound right turn lane be painted on Kincaid at Mitchell Road
- That the Binning Street and Mitchell Road extensions be designed to support all modes of Transport including cyclists & pedestrians

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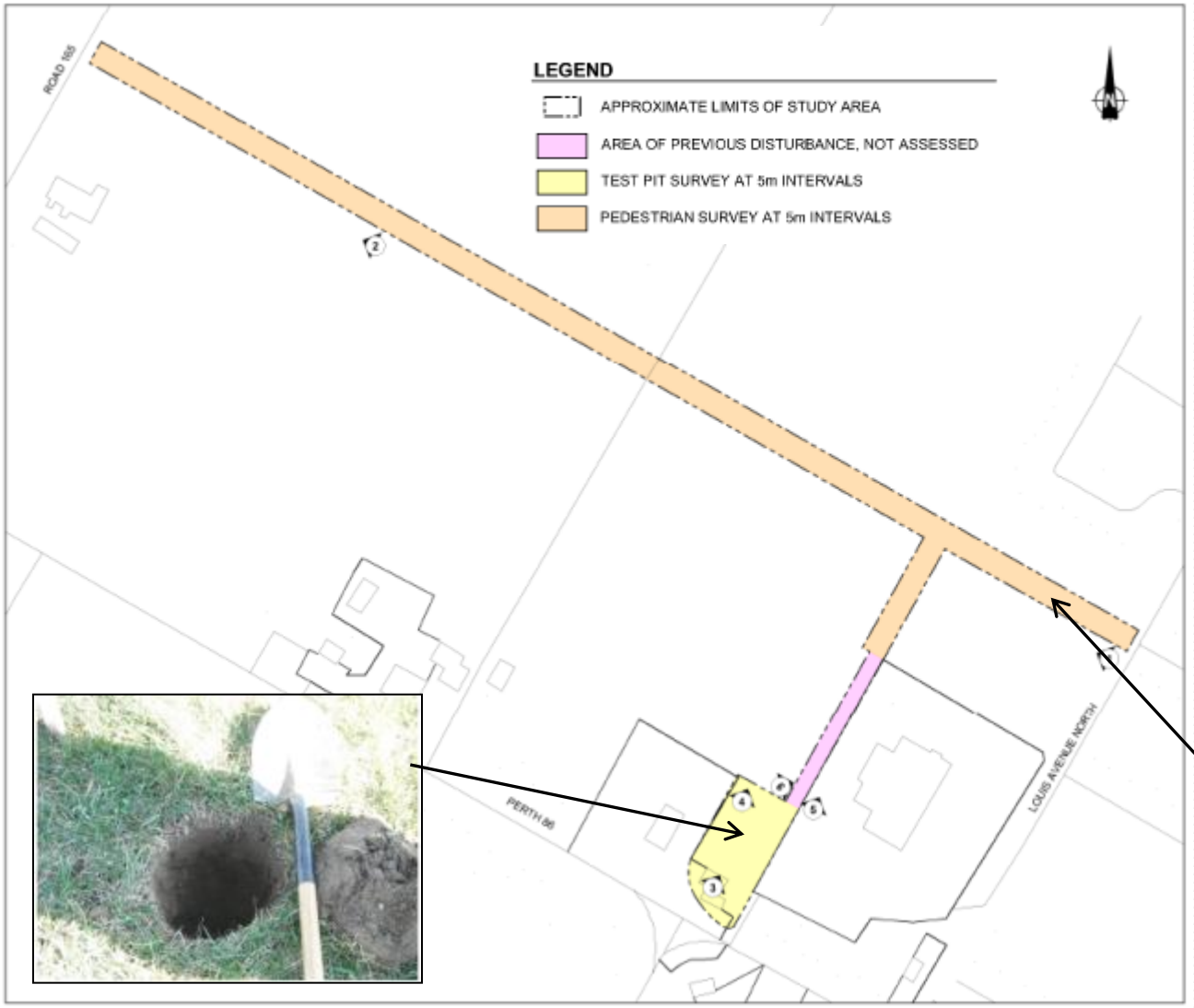
Archaeological Assessment



Stage 1: Background Review

Stage 2: Field Review

No artefacts recovered during Stage 2 field work

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Proposed Road Extensions

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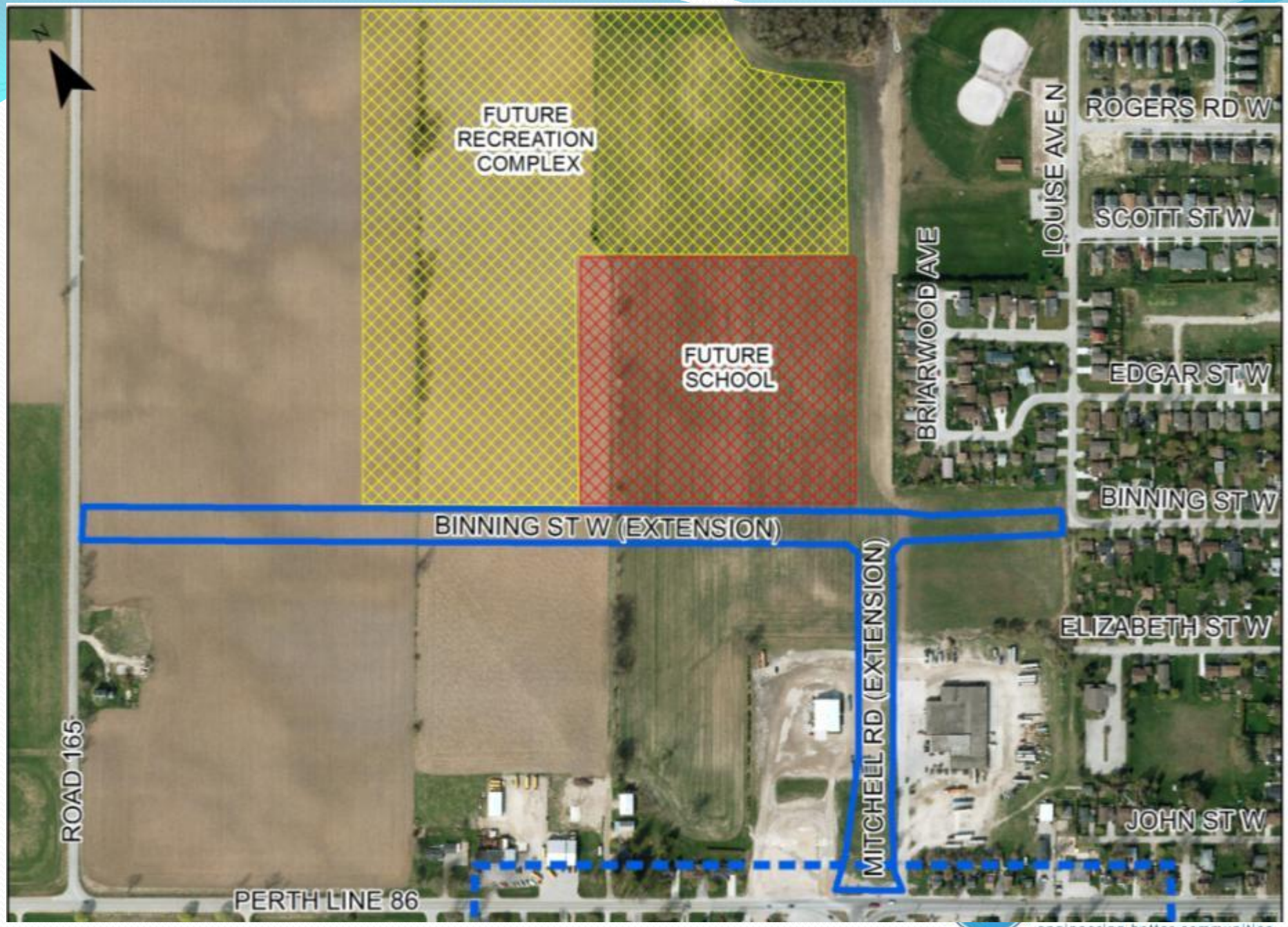
N
FUTURE RECREATION COMPLEX
FUTURE SCHOOL
ROGERS RD W
LOUISE AVE N
SCOTT ST W
BRIARWOOD AVE
EDGAR ST W
BINNING ST W
BINNING ST W (EXTENSION)
ELIZABETH ST W
MITCHELL RD (EXTENSION)
ROAD 165
JOHN ST W
PERTH LINE 86
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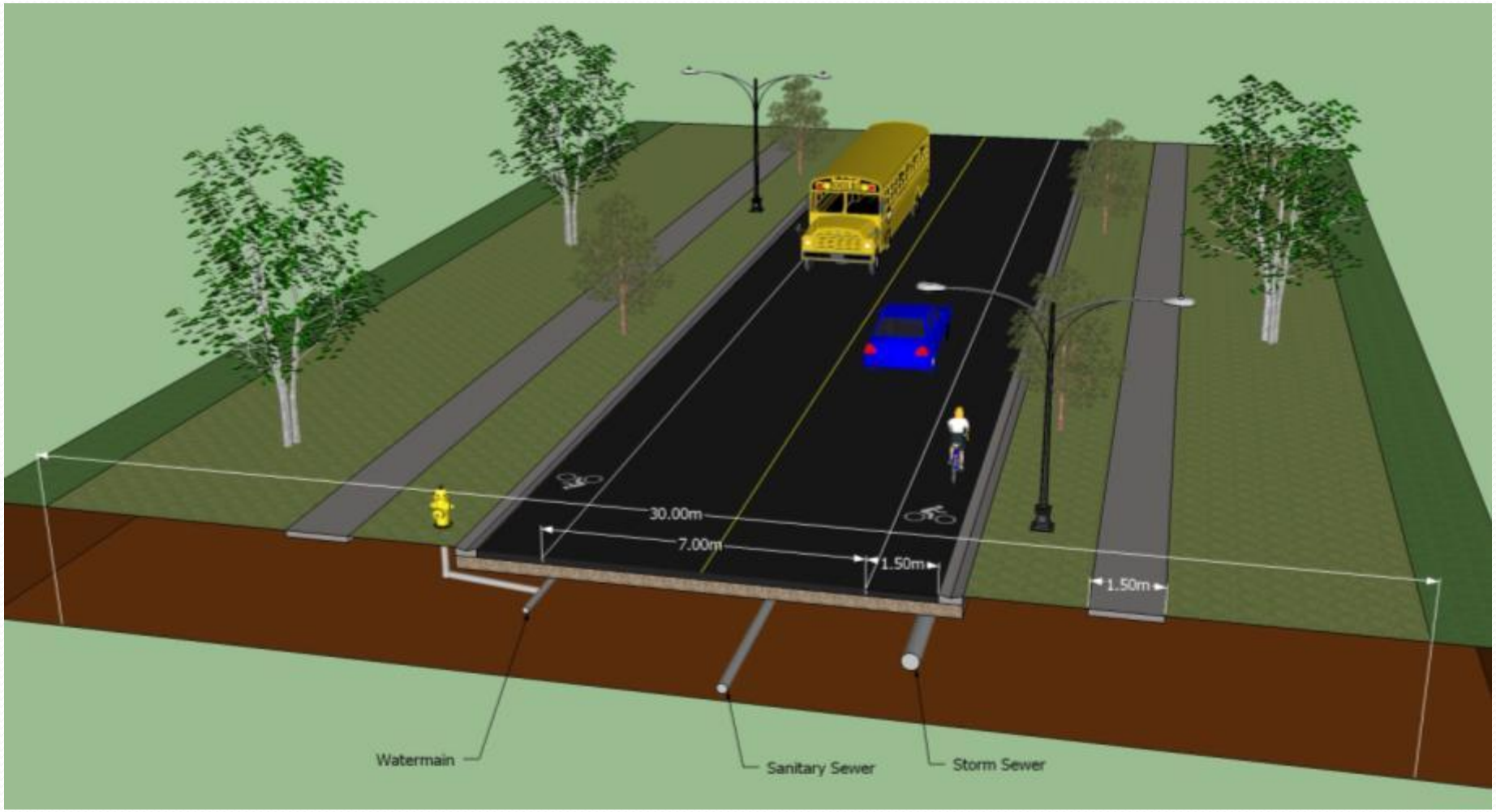
Binning Extension – Bike Lanes



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Binning Extension - Combined Path

Binning Extension – Separate Bike Path

INTERSECTION ALTERNATIVES

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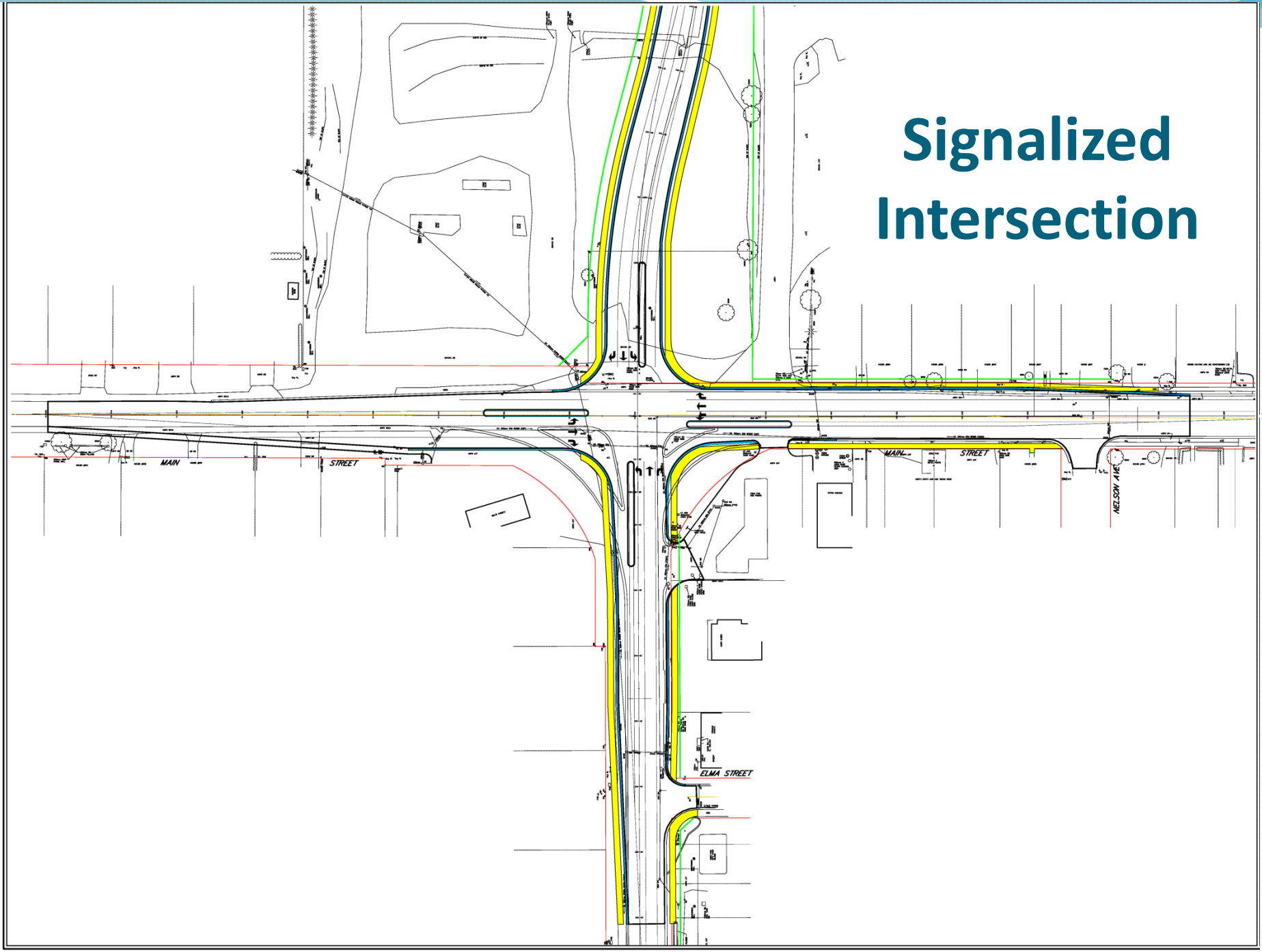
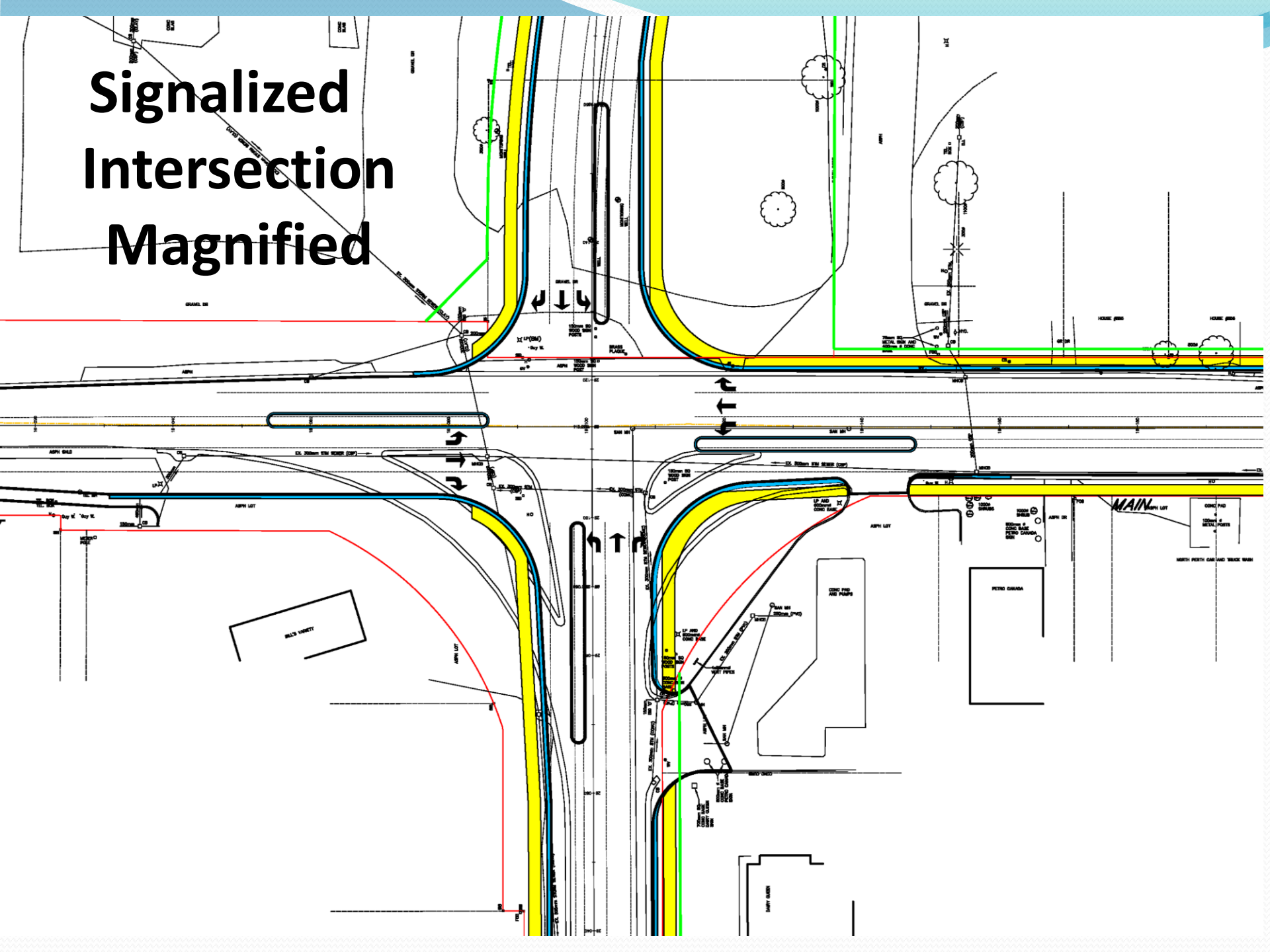
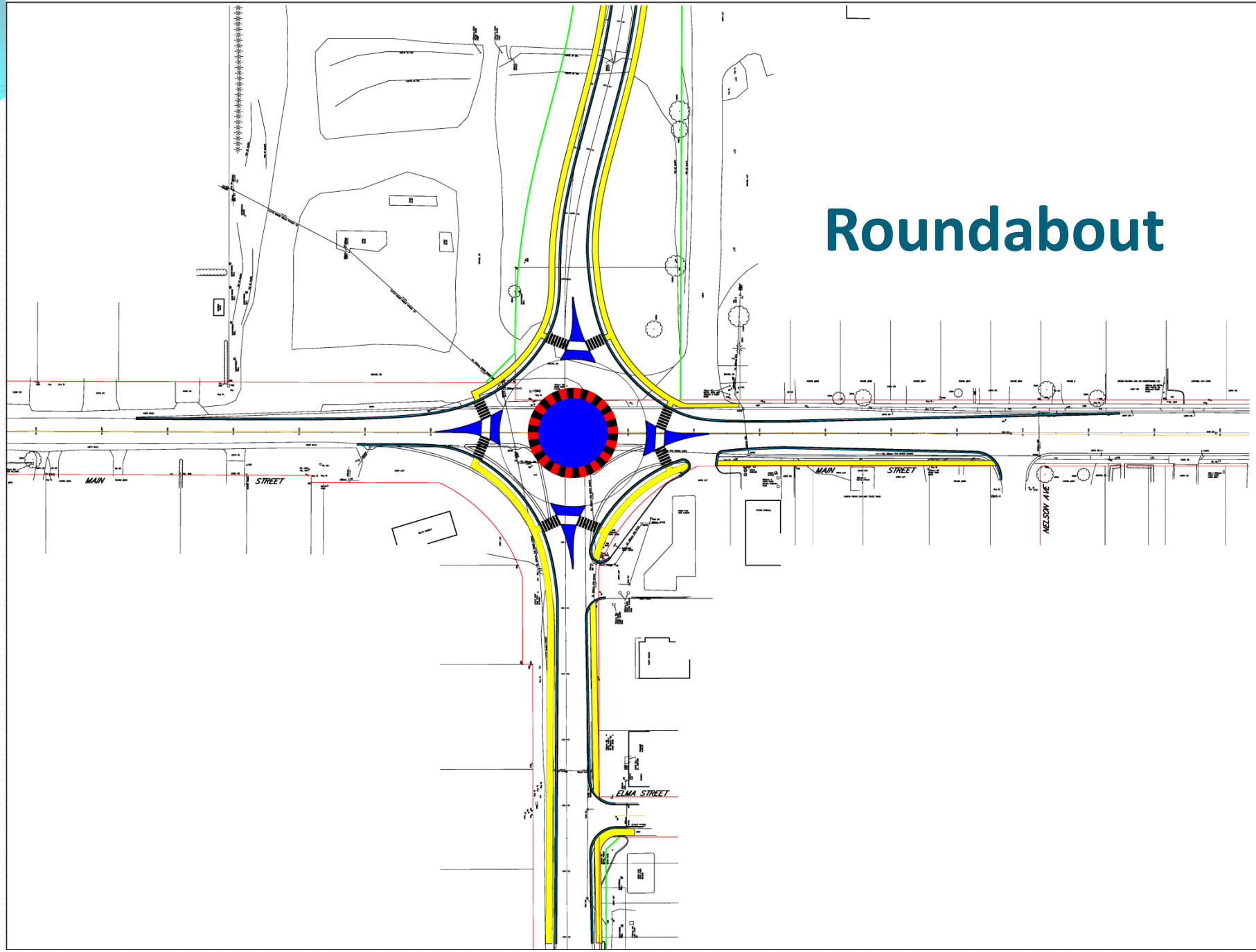
Signalized Intersection



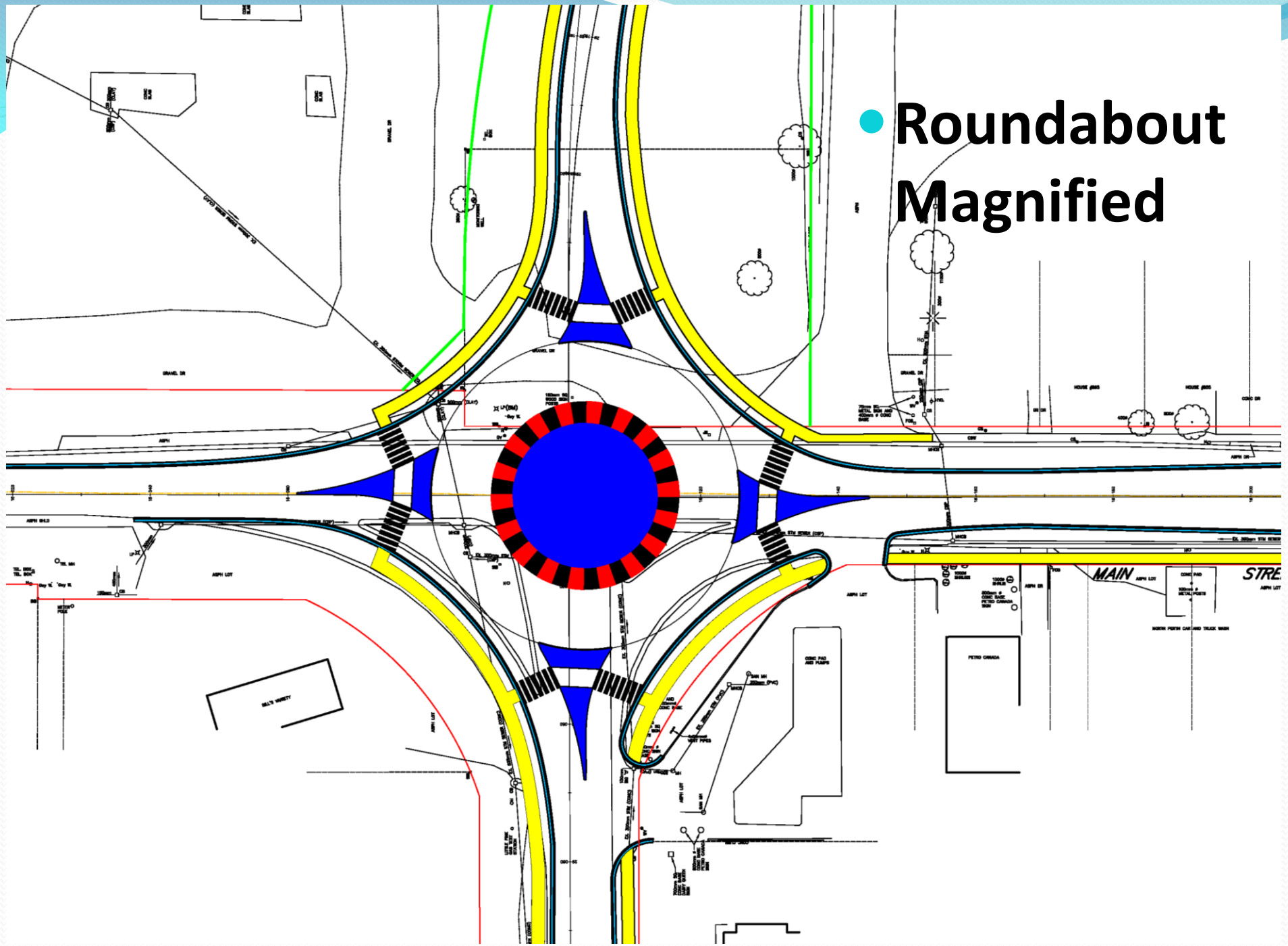
Signalized Intersection Magnified



Roundabout



- **Roundabout Magnified**



Review of Alternatives

Alternative	Advantages	Disadvantages
Signalized Intersection	▪ More familiar for Pedestrians ▪ Provides break in Traffic allowing access to highway ▪ Familiarity for drivers ▪ Easier to access some properties immediately adjacent to intersection	▪ Lane widening required to accommodate queuing at intersection ▪ Potential for more severe collisions ▪ Can be difficult to access some properties near intersection
Roundabout	▪ Provides for a continuous flow of traffic with fewer delays ▪ Less lane widening required to accommodate design ▪ No energy demands; functions during power outages ▪ Less ongoing maintenance ▪ Collisions are typically less severe	▪ Unfamiliar to pedestrians ▪ Can be difficult for longer trucks ▪ Unfamiliarity for drivers ▪ Can be difficult to access properties near intersection

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Preliminary Cost Analysis

- **Signalized Intersection**
  - Construction $1,723,000.00

- **Roundabout**
  - Construction $1,327,000.00

* **Cost estimates include anticipated roadwork and construction of sidewalks to the same limit for each option, but do not include costs associated with the replacement/extension of services, power line relocations, property acquisition, engineering or taxes.**

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Next Steps

- Council Selection of Preliminary Preferred Alternative
- Prepare for the Second Public Meeting
  - Tentatively planned for April 2013
- Obtain feedback from MTO on the Traffic Study and Preliminary Preferred
- Seek input on Preliminary Preferred Alternative from Public and Directly Affected Stakeholders

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Questions?

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THE MUNICIPALITY OF NORTH PERTH
COUNCIL MEETING

Agenda Number: 5.1.1
Date: Monday, March 11, 2013
Resolution No.: 121.03/13

Moved By Paul Horn

Seconded By Ken Buchanan

THAT: The Council of the Municipality of North Perth shall proceed with the Roundabout option as the preliminary preferred option for the intersection of Hwy #23 and Perth Line 86 as part of the Detailed Design and Class Environmental Assessment for the Highway #23 and Perth Line 86 road improvements.

CARRIED

MAYOR OR OTHER ELECTED OFFICIAL

Municipality of North Perth

330 Wallace Ave North

Listowel, Ontario

N4W 1L5

Attention: Mr. Kriss Snell and North Perth Municipal Council

This letter is in response to the article in the Listowel Banner dated Wednesday March 13, 2013 as stated the North Perth council has chosen a new roundabout as the preliminary option for proposed upgrades at the intersection of Highway 23 and 86.

We strongly oppose the roundabout in question for the following reasons:

1. This corner represents a hub for both industry and as a gateway to weekend destinations.
2. Volume of traffic at this corner has increased with the new commercial expansions and will increase again once development of the new school and proposed arena are complete.
3. Amount of space required for optimal truck friendly maneurability.

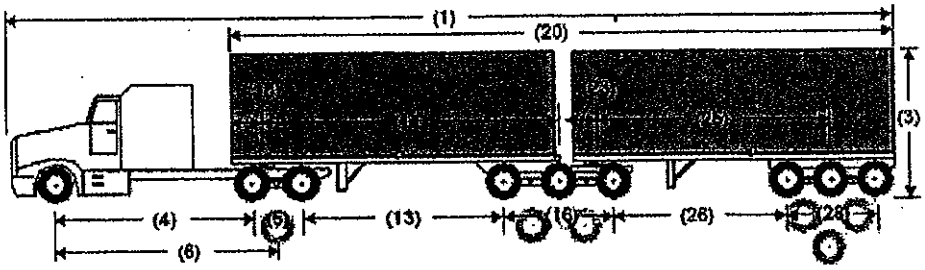
Although truck aprons are generally used to provide extra room in roundabout applications we are concerned about the impact it will have on truck tire wear and tear constantly travelling over uneven surfaces as our equipment could be up to eighty five feet long with multiple trailers. I have attached a diagram of our motor carrier compliance for Canada dimensions for your review.

We would like to be involved in the ongoing discussions leading up to the final decision of this intersection.

Yours truly

Feature	Weight Limit	
Other Axle Maximums: (lowest of a, b and c)		
a) by manufacturer's axle rating or default	i. GAWR (if verified), or	
	ii. If GAWR not verified, the sum of the maximum tire load ratings	
b) by tire width	10 kg × combined tire widths in mm	
c) by axle unit description	Other Tractor Axles and Trailer Axles:	
	Single Axle (Single Tires)	9,000 kg
	Single Axle (Dual Tires)	10,000 kg
	Tandem Axle - by axle spread:	
	- 1.2 < 1.8m	18,000 kg
	- 1.8 to 1.85m (Single Tires)	18,000 kg
	- 1.8 to 1.85m (Dual Tires)	19,100 kg
Allowable Gross Vehicle Weight: (lower of i and ii)	i. actual weight on the front axle plus other axle maximums	
	ii.	
	1. Until December 31, 2020,	
	A. if long combination or one of its trailers was built after 2005, maximum weight based on number of axles:	
	Number of axles	Maximum
	5	41,900 kg
	6	49,800 kg
	7 or 8	53,500 kg
	B. if not long combination and both trailers are built before 2006, AGVW is amount shown in appropriate Vehicle Weight Tables 3 to 29	
	2. After 2020, maximum weight based on number of axles:	
	Number of axles	Maximum
	5	41,900 kg
	6	49,800 kg
	7 or 8	53,500 kg

Designated Tractor-Trailer Combination 12 — Tractor B-Train Double Trailers



Configuration Description

Designated Tractor-Trailer Combination 12 is a B-train double. The front axle of the tractor is a single axle with single tires. The drive axle of the tractor is a single or tandem axle. The lead semi-trailer has one axle unit that is a tandem or tridem axle. The second semi-trailer has one axle unit that is a single, tandem or tridem axle.

Qualifying Preconditions

Equipment and components, see ss. 5, 6, 8

MOTOR CARRIER COMPLIANCE FOR CANADA

DIMENSIONAL LIMIT CHART

	Ref	Feature	Dimensional Limit
Overall	(1)	Overall Length	Max. 25.0m
	(2)	Width	Max. 2.6m
	(3)	Height	Max. 4.15m
Tractor	(4)	Inter-axle Spacing	Min. 3.0m
	(5)	Tandem Axle Spread	1.2 to 1.85m
	(6)	Wheelbase	Max. 6.2m if tractor built after 2005
	(6)	Wheelbase - (long combination)	Max. 6.2m
Lead Semi-Trailer	(10)	Swing Radius	Max. 2.0m
	(11)	Wheelbase	Min. 6.25m
	(13)	Inter-vehicle-unit Distance	
		- single to tandem or tridem	Min. 3.0m
		- tandem to tandem	Min. 5.0m
		- tandem to tridem	Min. 5.5m
	(16)	Tandem Spread	1.2 to 1.85m
	(16)	Tridem Spread	2.4 to 3.1m
	(19)	Track Width	
		- trailer with single tires built before 2010	2.3 to 2.6m
		- trailer with single tires built after 2009	2.45 to 2.6m
		- all other trailers	2.5 to 2.6m
Combination	(20)	Box Length	Max. 20.0m
	(11)+(25)	Sum of Trailer Wheelbases	Max. 17.0m
Second Trailer	(23)	Swing Radius	Max. 2.0m
	(24)	Kingpin behind rearmost axle of lead trailer	Max. 0.3m
	(25)	Wheelbase	Min. 6.25m
	(26)	Inter-vehicle-unit Distance	
		- single to tandem or tridem	Min. 3.0m
		- tandem to tandem	Min. 5.0m
		- tandem to tridem	Min. 5.5m
		- tridem to tridem	Min. 6.0m
	(28)	Tandem Spread	1.2 to 1.85m
	(28)	Tridem Spread	2.4 to 3.1m
	(29)	Track Width	
		- trailer with single tires built before 2010	2.3 to 2.6m
		- trailer with single tires built after 2009	2.45 to 2.6m
		- all other trailers	2.5 to 2.6m

WEIGHT LIMIT CHART

Feature	Weight Limit	
Front Axle Maximum: (lowest of a, b and c)		
a) by manufacturer's axle rating or default	i. GAWR (if verified), or	
	ii. If GAWR not verified, the lower of:	
	1. 5,000 kg, and	
	2. the sum of the maximum tire load ratings	
b) by tire width	11 kg x combined tire widths in mm	
c) by axle unit description	Single Axle	7,700 kg

Transportation Planning

Transit Planning

Traffic Engineering

Parking Planning

Philip E. Grubb
B.A.Sc., P.Eng.
President

James J.L. Mallett
M.A.Sc., P.Eng., PTOE
Vice President

Stewart K. Elkins
BES, MITE
Vice President

43 Forest Road
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905-381-2229
Fax: 1-866-722-5117

April 11, 2013
Project: 120810

Kelly Vader
Environmental Planner
BM Ross and Associates
62 North Street
Goderich ON N7A 2T4

Dear Ms. Vader:

Re: Hwy 23 and Perth Line 86 Class EA Transportation Study Comments Response to

We are writing to you in response to your request related to the comments provided by . regarding Transportation Study that was prepared in support of the Highway 23 and Perth Line 86 Class Environmental Assessment.

We have reviewed the comments and provide our response in the order they are made in the letter. The letter stated that the author strongly opposed the roundabout option at the intersection of Highway 23 (Mitchell Road) and Perth Line 86 (Main Street) and listed three specific reasons:

1. "This corner represents a hub for both industry and as a gateway to weekend destinations."

There is little empirical evidence to support this position. It is much more likely that the presence of a roundabout supports this intersection as a gateway and a hub for industry.

In terms of being a hub for business, all current access to area businesses would be expected to remain with the implementation of the roundabout. In the case of a traffic control signal, access management policies might restrict access to local businesses, potentially affecting their business operations.

In terms of traffic operations, with the implementation of a modern roundabout, traffic would be able to move through the intersection safely and efficiently. Pedestrian movements would be accommodated. In addition,

average delays would be lower compared to a traffic control signal.

In terms of a "gateway", a roundabout could actually enhance the gateway function of the intersection as it would serve as a very noticeable transition point from a higher-speed rural road to a lower-speed urban street. This feature is becoming more commonly used in rural areas to protect the urban core of rural municipalities from speeding highway traffic entering these areas.

In addition, the central island of a roundabout can be used as a landscaping opportunity.

Please see attached report on the use of roundabouts.

2. "Volume of traffic at this corner has increased with the new commercial expansions and will increase again once development of the new school and proposed arena are complete."

We agree that the volumes at this intersection have increased with the new commercial development on the southwest corner of Main Street and Mitchell Road. The operational analyses that we have conducted gave full consideration to the traffic that has been projected to emanate from that development through the information contained in the Traffic Impact Study report prepared in support of the development application. We also agree that the volumes will further increase as the developments proposed to the north of Main Street proceed. Again, the expected traffic generated from the development of these lands has been accounted for in our work, the details of which are available in our report.

Roundabouts are capable of accommodating more traffic per lane than a signalized intersection and, as has been shown, will operate with lower average delays than a traffic control signal.

3. "Amount of space required for optimal truck friendly maneurability (sic)."

Roundabouts are designed to accommodate all traffic that can reasonably be expected to use the intersection, including large trucks. In the case of Main Street and Mitchell Road, the assumed design vehicle has been the largest wheelbase tractor-single trailer combination legal in the province of Ontario (WB-20 TAC). This vehicle requires the largest turning radius.

At this stage of the design process, conceptual designs have been prepared and used to determine the feasibility of the potential for a roundabout at Main Street and Mitchell Road. The concepts show that a single-lane roundabout with an inscribed circle diameter (ICD) of 45 metres along with a mountable apron along the central island is sufficient to allow larger trucks to manoeuver successfully through the roundabout. The use of a truck apron is common design practice not only at roundabouts but in other cases where mixed traffic occurs.

Attached to the letter sent by WSC Transport Inc. were the specifications and dimensions for "Designated Tractor-Trailer Combination 12 – Tractor B-Train Double Trailers". This type of truck has two trailers and a maximum combined length of 25 metres. It should be noted that while this vehicle has a longer overall length compared to the WB-20 TAC truck used in the assessment, it also has two articulation points, reducing the overall required turning radius.

Using a 45 metre ICD roundabout concept design, a truck turning simulation was performed using AutoTurn, which is a program that runs within AutoCAD which shows the area needed by various

types of vehicles to be able to make turning movements. A truck with two trailers with a total length of 25 metres was used to show a "left-turn" movement within the roundabout. A turning speed of 20 km/h was assumed. **Figure 1** shows how this size of truck would use the space available within the roundabout. The cyan coloured area represents the area of road that would be used by the truck. The red and black circle represents the mountable apron and the dark blue areas show the raised, curbed areas. The simulation shows that a truck would be able to navigate the roundabout without the use of the truck apron.

It must be stressed that, to date, only preliminary functional concepts have been prepared. The purpose of the current EA process is to determine the preferred form of intersection control and to identify sufficient detail to permit the identification of possible impacts and benefits. However, the EA process and the Municipalities' own requirements also require that detailed engineering design be undertaken prior to final implementation. As such, the numerous engineering details that require further investigation will be undertaken in due course, prior to implementation. This will include, but not be limited to, the final size and location of the roundabout, the curb locations, sidewalk and crosswalk locations, truck apron design, landscaping and drainage details, lighting details, signage, etc.

We trust that these responses and explanations are acceptable. Please do not hesitate to contact me should you have any questions, or require additional information.

Yours very truly,
PARADIGM TRANSPORTATION SOLUTIONS LIMITED

James J.L. Mallett
M.A.Sc., P.Eng., PTOE
Vice President

cc: Bruce Potter, BM Ross
Kriss Snell, Municipality of North Perth

Figure 1

Tractor B-Train Double Trailer Turning Envelope

Listowel Transportation Study

Paradigm
www.ptsl.com

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Job No. 11240

MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN AND CLASS EA FOR HWY. 23 & C.R. 86 UPGRADES AND CLASS EA FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST (COMMUNITY OF LISTOWEL)

Stakeholder Meeting Notes
May 30, 2013

Group:
Location: North Perth Municipal Office
Time Started: 9:30 a.m. **Time Ended:** 10:30 a.m.

In Attendance: Kriss Snell (North Perth)
Jamie Morgan (North Perth)
Pat Berfelz (North Perth)

Bruce Potter (BMROSS)
Kelly Vader (BMROSS)

Meeting Details:

Kriss Snell began the meeting by thanking everyone for attending and then briefly discussed the purpose of the meeting; to review details to be presented at the June 4th Public Open House and to review in more detail the preliminary designs for the proposed road extensions. He then asked the representatives from BMROSS to begin the discussion.

Kelly Vader explained what information would be presented at the public open house and showed the group preliminary designs for the proposed road extensions. A drawing had been prepared showing the road section which will pass along the easterly extent of the Johnson lands. Bruce potter explained the general design details shown on the drawing.

l if a bicycle path was proposed for the Mitchell Road extension.

Kriss Snell indicated that although a bike path was proposed for the Binning Extension, there were no plans at present to extend it along Mitchell Road. Sidewalks would be installed along both sides of the road to accommodate pedestrian traffic.

asked if he could receive copies of the preliminary entrance designs in order to review the grades and design. Bruce said he would forward a copy.

Kelly explained that the north entrance was situated at the crest of the hill to allow good sight lines in both directions. It also lines up with a future extension of Elizabeth Street, should it ever be extended to the west in the future.

asked if it would be possible to adjust the curve off of the roundabout further to the east so that less of their property is affected. Bruce indicated that he would forward the request to the roundabout designer. He explained that there are certain design components of the roundabout that are included to reduce speed entering and exiting the intersection that may not be able to be altered.

asked if it would be possible to include another entrance to their lower property off of Mitchell Road. Bruce indicated that it was unlikely that the Ministry would allow another entrance so close to the intersection however it may be possible to shift the south entrance further to the south so that it can service both properties.

Kelly asked about the monitoring wells located on the south property. Susan indicated that they were associated with the previous use of the property and could be removed.

Kelly explained the remaining steps in the Class EA process and indicated that the road extensions would be completed through a separate Class EA than the roundabout and other Highway No. 23 upgrades. She indicated that the road extension EA process would likely be completed first so that construction of the road could move forward to allow access to the school site for construction.

asked if a truck access would be permitted off of Perth Line 86. Kriss indicated that they would need to consult with the County of Perth, but thought it would probably be permitted.

The group discussed the design of the road in front of their property along the County Road frontage. Bruce indicated that a curb would be installed and other features that would prevent the public from using it as a parking area.

asked if they could receive a copy of the presentation boards from the public meeting. Kelly agreed to forward them to her immediately following the meeting.

asked about the speed limit through the roundabout. Bruce explained that roundabouts are designed to slow people down as they enter, and then accelerate as they depart. He indicated that the final report would explain more fully.

asked if there would be a driver education program implemented in Listowel to educate people on how to use a roundabout. Kriss agreed that an education program was required.

asked if the roundabout was design so that trucks always use the apron. Bruce explained that it depended on the speed. If you were going slow enough, you wouldn't need the apron, but if the speed increased, you may need the apron.

The meeting concluded at 10:30 p.m.

Meeting Notes Prepared by:

Kelly Vader, Environmental Planner
B. M. ROSS AND ASSOCIATES LIMITED

KV:

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MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN AND CLASS EA FOR HWY. 23 & C.R. 86 UPGRADES AND CLASS EA FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST (COMMUNITY OF LISTOWEL)

Stakeholder Meeting Notes
May 30, 2013

Group:
Location: North Perth Municipal Office
Time Started: 10:40 a.m. **Time Ended:** 11:25 a.m.

In Attendance:
Kriss Snell (North Perth)
Jamie Morgan (North Perth)
Pat Berfelz (North Perth)

(Owner)

Bruce Potter (BMROSS)
Kelly Vader (BMROSS)

Meeting Details:

Kriss Snell began the meeting by thanking [illegible] for attending and then briefly discussed the purpose of the meeting; to review details to be presented at the June 4th Public Open House and to review in more detail the preliminary designs for the proposed intersection improvements. He then asked the representatives from BMROSS to begin the discussion.

Kelly Vader explained the Class EA process and what additional steps were needed to complete the EA for the proposed road extensions and intersection improvements. She explained that the Municipality was meeting with all of the property owners directly impacted by the proposed project to seek their input before presenting the information to the public. Copies of the information would be presented at the public open house. She then showed the preliminary design for the roundabout showing the proposed intersection in front of the Variety Store. Bruce potter explained the general design details shown on the drawing.

indicated that he was concerned about pedestrian traffic.

Bruce described how pedestrians would be accommodated on the roundabout. Kriss added that an education campaign was also proposed to teach residents the proper way to drive on a roundabout.

The group then discussed access to the Variety Store once the roundabout is constructed. Bruce acknowledged that at present it is essentially unrestricted access to the site. Following construction of the roundabout there will be an entrance off of Perth Line 86 and an exit to Hwy. 23 near the southeast corner of the property.

Bruce said that we would provide Mr. . with drawings of the entrances once the roundabout design is finalized. Mr. indicated that he would prefer paper copies of the design.

Mr. said that the Petro Canada property had recently sold. Kriss Snell indicated that the Municipality hoped to meet with the new owner to review the proposed design as well.

Mr. asked why a roundabout had been selected for the intersection over a signalized intersection. Bruce explained that traffic signals could not be installed for a number of years, due to the traffic warrants required at the intersection. He also explained that a roundabout was less expensive to construct because there were fewer road widenings needed.

The meeting concluded at 11:25 a.m.

Meeting Notes Prepared by:

Kelly Vader, Environmental Planner
B. M. ROSS AND ASSOCIATES LIMITED

KV:

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Stakeholder Meeting Notes
May 30, 2013

Group:
Location: North Perth Municipal Office
Time Started: 1:00 p.m. **Time Ended:** 1:50 p.m.

In Attendance:
Kriss Snell (North Perth)
Jamie Morgan (North Perth)
Pat Berfelz (North Perth)

Bruce Potter (BMROSS)
Kelly Vader (BMROSS)

Meeting Details:

Kriss Snell began the meeting by thanking the s for attending and then briefly discussed the purpose of the meeting; to review details to be presented at the June 4th Public Open House and to review in more detail the preliminary designs for the proposed intersection improvements. He then asked the representatives from BMROSS to begin the discussion.

Kelly Vader explained the Class EA process and what additional steps were needed to complete the EA for the proposed road extensions and intersection improvements. She explained that the Municipality was meeting with all of the property owners directly impacted by the proposed project to seek their input before presenting the information to the public. Copies of the information would be presented at the public open house. She then referred to the preliminary design for the roundabout showing the proposed intersection in front of his Store.

Bruce potter described the general design details shown on the drawing and explained that because the roundabout was the preferred alternative, no road widening would be needed in front of their property. He also noted that a sidewalk is proposed along the east side of Highway No. 23 in front of their business.

ined that they had purchased the vacant property located south of their business and would like to develop it in the future. However the property has no access to the Highway. They would like to see a joint access developed for both of the properties, in conjunction with the planned upgrades.

Kelly explained that a Class EA process for the road extension would probably be concluded first and then the MTO Class EA would be finalized, which would include the roundabout. The Municipality needs to seek input from MTO before moving forward with finalizing the Class EA.

asked what components of the EA would be included in the MTO Class EA.

Kelly explained that the MTO EA would include the roundabout, improvements to Highway No. 23 south of the intersection, as well as some servicing improvements in the vicinity of the intersection.

asked about timing for completion of the Class EA's and the improvements.

Bruce provided details on the anticipated timelines for completion of the two EA's and for the proposed upgrades.

indicated that they have not been successful in requesting a new access for their property from MTO in the past. Kriss Snell suggested that they might be able to discuss access issues with MTO as part of the Class EA process.

The group discussed the possibility of altering the current unrestricted access in front of the business in exchange for a new shared access at the south end of the property which would serve both parcels.

asked how quickly the proposed upgrades would occur in front of their property.

Kriss indicated that the upgrades planned for Kincaid Street would need to proceed first, because the Municipality committed to completing those in conjunction with a previous development. The rest of the Highway upgrades would likely not occur until the roundabout is constructed, which could be 2-3 years away.

Kelly said that she would forward a copy of the presentation material from the public meeting to as soon as it was finalized.

The meeting concluded at 1:50 p.m.

Meeting Notes Prepared by:

Kelly Vader, Environmental Planner
B. M. ROSS AND ASSOCIATES LIMITED

KV:

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Stakeholder Meeting Notes
May 30, 2013

Group:
Location: North Perth Municipal Office
Time Started: 2:30 p.m. **Time Ended:** 3:20 p.m.

In Attendance: Kriss Snell (North Perth)
Jamie Morgan (North Perth)
Pat Berfelz (North Perth)

(Owner)

Bruce Potter (BMROSS)
Kelly Vader (BMROSS)

Meeting Details:

Kriss Snell began the meeting by thanking for attending and then briefly discussed the purpose of the meeting; to review details to be presented at the June 4th Public Open House and to review in more detail the preliminary designs for the proposed intersection improvements. He then asked the representatives from BMROSS to begin the discussion.

Kelly Vader explained the Class EA process and what additional steps were needed to complete the EA for the proposed road extensions and intersection improvements. She explained that the Municipality was meeting with all of the property owners directly impacted by the proposed project to seek their input before presenting the information to the public. Copies of the information would be presented at the public open house. She then showed Mr. Hamilton the preliminary design for the roundabout showing the proposed intersection in front of his Store.

Bruce potter described the general design details shown on the drawing and explained that because the roundabout was the preferred alternative, no road widening would be needed in front of his property.

explained that his in-laws owned the land located kitty corner to the . fronting on Main Street directly east of the Petro Canada property. He indicated that they want to develop the property, but he is unsure what will happen with the lands at the back of their lot, where it abuts his property.

He indicated that he would like to see a better defined entrance and exit from the property, rather than the unrestricted access which is currently in place.

He said that he prefers the roundabout option and has no major concerns with the proposed plans.

Bruce said that we would provide . with drawings of the final design in front of the property once the design is finalized and input is received from the Ministry of Transportation.

Kelly explained that a Class EA process for the road extension would probably be concluded first and then the MTO Class EA which would include the roundabout. The Municipality needs to seek input from MTO before moving forward with finalizing the Class EA.

The meeting concluded at 3:20 p.m.

Meeting Notes Prepared by:

Kelly Vader, Environmental Planner
B. M. ROSS AND ASSOCIATES LIMITED

KV:

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

Job No. 11240

MUNICIPALITY OF NORTH PERTH
DETAILED DESIGN AND CLASS EA FOR HWY. 23 & C.R. 86 UPGRADES AND CLASS EA FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST (COMMUNITY OF LISTOWEL)

Stakeholder Meeting Notes
June 3, 2013

Group:
Location: North Perth Municipal Office
Time Started: 3:30 p.m. **Time Ended:** 4:30 p.m.

In Attendance:
Kriss Snell (North Perth)
Jamie Morgan (North Perth)
Pat Berfelz (North Perth)

Ryan Riehl (BMROSS)
Kelly Vader (BMROSS)

Meeting Details:

Kriss Snell began the meeting by thanking the representatives for attending and then briefly discussed the purpose of the meeting; to review details to be presented at the June 4th Public Open House and to review in more detail the preliminary designs for the proposed intersection improvements. He then asked the representatives from BMROSS to begin the discussion.

Kelly Vader explained the Class EA process and what additional steps were needed to complete the EA for the proposed road extensions and intersection improvements. She explained that the Municipality was meeting with all of the property owners directly impacted by the proposed project to seek their input before presenting the information to the public. Copies of the information would be presented at the public open house. She then referred to the preliminary design for the proposed Mitchell Road extension showing the area in front of their property.

Ryan Riehl described the general design details shown on the drawing and explained that the two entrances had been lined up with the Johnston's entrances as well as a future extension of Elizabeth Street, should it ever be required at some point in the future.

asked what would happen to the land located east of the Mitchell Road extension, immediately north of the roundabout. Kriss indicated that the Municipality would be purchasing the lands from r construction of the road extension and roundabout and might be looking to sell the piece to the east, if it is not needed for the road construction.

asked about access to the residential lots fronting on Main Street in front of their property.

Kriss noted that although the main access to their property, which is located at the west end these lots, is proposed to be eliminated once the Mitchell Road extension is completed, they would still be able to access their properties fronting on Main Street.

asked about the design of the roundabout and what would be located in the centre. Kelly explained that typically the middle of the circle is elevated and planted with vegetation so that vehicles do not see headlights through this area and are prevented from accidentally driving through the middle.

Kriss discussed the proposed extension of Binning Street, which is currently located on lands owned by Ben Lea Holdings. He discussed the possibility of a land exchange and mentioned that the Municipality could include planning approvals associated with the development of properties located north and south of the proposed road extension as part of the deal.

Kriss suggested that the Municipality could provide additional details on the depth of the lots located on the north side of the proposed Binning Street extension and provide a few possible lot layout scenarios for the two parcels for them to consider.

Kriss asked if it would be alright to proceed with the legal survey of the proposed Binning Street extension so that they could move forward with finalizing the approvals. said they were fine with this.

mentioned that they have been unable to find a farmer willing to mow the area after it was ploughed for the archaeological assessment. Jamie said that he would arrange for someone to mow the area.

Kelly explained about timing for the project and that a Class EA process for the road extension would probably be concluded first and then the MTO Class EA would be finalized, which would include the roundabout. The Municipality needs to seek input from MTO before moving forward with finalizing the Class EA.

Kriss discussed the proposed timeline for construction of the new school and indicated that they would like to finalize the Binning extension as soon as possible in order to provide access to the school site for construction

Kelly said that she would forward a copy of the presentation material from the public meeting to and as soon as it was finalized.

The meeting concluded at 4:30 p.m.

Meeting Notes Prepared by:

Kelly Vader, Environmental Planner
B. M. ROSS AND ASSOCIATES LIMITED

KV:

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

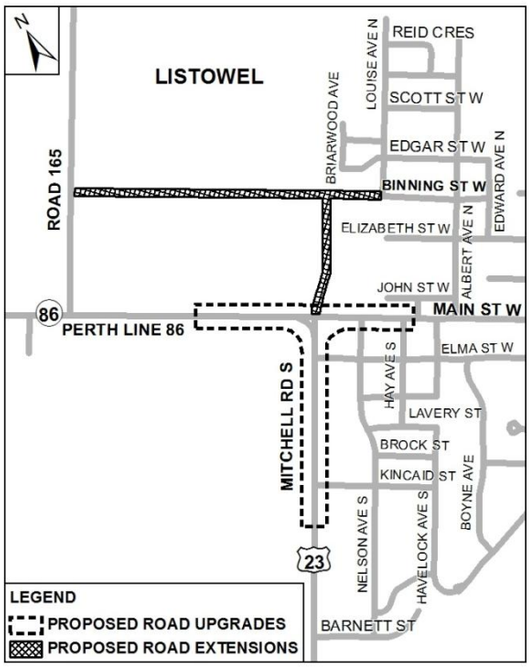
NOTICE OF PUBLIC INFORMATION CENTRE

THE PROJECT:

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Highway 23 (Mitchell Road S.) and Perth County Road 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. A preliminary preferred design plan has now been selected (refer to key plan) which identifies the planned upgrades as outlined below.

Primary Components:

- Construction of a roundabout at the intersection of Highway No. 23 and Perth Line 86 to address ongoing traffic issues associated with this intersection.
- Construction of turning lanes on Highway No. 23 adjacent to Kincaid Street to improve access to newly developed properties located at the westerly extent of Kincaid.
- Additional details regarding the extension of municipal sanitary sewers and watermains to the west limit of the project study area along Perth Line 86.
- Conceptual design of proposed stormwater drainage improvements within the project study area.
- Design details associated with the extension of Mitchell Road, north from the intersection of Hwy. # 23 and C.R. # 86, and the extension of Binning Street West to Road 165.



ENVIRONMENTAL ASSESSMENT PROCESS:

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA) process. The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project.

PUBLIC INFORMATION CENTRE:

A Public Information Centre (PIC) is planned to provide further information to the public on the results of study investigations and to receive input and feedback from interested persons:

Date:	**Tuesday June 4th, 2013**
Time:	**2:00 p.m. – 4:00 p.m. & 5:00 p.m. – 7:00 p.m.**
Location:	**North Perth Municipal Office, 330 Wallace Avenue North, Listowel**

Following the PIC, comments are invited for incorporation into the planning and design of this project, and will be received until July 5th, 2013. For further information on this project, or to review the Class EA process, please contact the project engineers: B.M. Ross and Associates, 62 North Street, Goderich, Ontario, N7A 2T4. Telephone (519) 524-2641. Fax (519) 524-4403. Attention: Kelly Vader, Environmental Planner (e-mail: kvader@bmross.net).

Kriss Snell, CAO
Municipality of North Perth

This Notice first issued May 22nd, 2013

MUNCIPALITY OF NORTH PERTH

DETAILED DESIGN & CLASS EA FOR HWY 23 AND COUNTY ROAD 86 IMPROVEMENTS AND CLASS EA FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

WELCOME

PUBLIC INFORMATION CENTRE

June 4th, 2013

engineering better communities

PUBLIC INFORMATION CENTRE

Welcome to the 2nd public information meeting being held in conjunction with the Class Environmental Assessment process for roadway improvements near the intersection of Hwy. 23 & C.R. 86.

The Municipality of North Perth initiated a study under the Ontario *Environmental Assessment Act* in March 2011 to examine the need for intersection improvements and proposed road extensions within the project study area.

The purpose of this meeting is to advise the public of the status of study investigations; present detailed design alternatives associated with the preliminary preferred servicing alternative; and to review other project elements for public feedback and input.

MEA CLASS EA PROCESS

PHASE 1

- IDENTIFY PROBLEM OR OPPORTUNITY
- BACKGROUND REVIEW

PHASE 2

- EVALUATE PROBLEMS AND IDENTIFY ALTERNATIVE SOLUTIONS
- IDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES
- CONSULT WITH THE PUBLIC AND REVIEW AGENCIES TO IDENTIFY ANY ISSUES OR CONCERNS WITH DEFINED PROBLEMS AND ALTERNATIVE SOLUTIONS
- EVALUATE ALTERNATIVE SOLUTIONS: IDENTIFY RECOMMENDED SOLUTIONS
- SELECT PREFERRED SOLUTION

PHASE 3

- IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
- IDENTIFY IMPACT OF ALTERNATIVE DESIGNS ON ENVIRONMENT, AND MITIGATING MEASURES
- CONSULT REVIEW AGENCIES/STAKEHOLDERS
- PREPARE ENVIRONMENTAL STUDY REPORT AND PUBLISH NOTICE OF COMPLETION

PRESENT

PHASES 4 & 5

- ADDRESS OUTSTANDING CONCERNS
- FINALIZE ESR AND PROCEED TO FINAL DESIGN

LISTOWEL • ELMA • WALLACE NORTH PERTH EST. 1998

BMROSS engineering better communities

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

SUMMARY OF CLASS EA PROCESS:

- PLANNING AND DESIGN PROCESS FOR MUNICIPAL WATER, WASTE WATER AND ROAD PROJECTS
- CONDUCTED TO EVALUATE THE POTENTIAL IMPACTS OF THE PROJECT ON THE NATURAL, CULTURAL, SOCIAL, ECONOMIC, AND BUILT ENVIRONMENTS

STUDY PHASES:

SCOPE OF THIS STUDY:

- CONSTRUCTION OF NEW ROADS OR OTHER LINEAR PAVED FACILITIES (> 2.4 M) CLASSIFIED AS A SCHEDULE 'C' ACTIVITY
  - SCHEDULE 'C' PROJECTS ARE APPROVED SUBJECT TO COMPLETION OF ALL FIVE PHASES OF CLASS EA PROCESS

- GENERAL STUDY COMPONENTS:
  - DEFINE PROBLEM / OPPORTUNITY
  - IDENTIFICATION OF ALTERNATIVE SOLUTIONS
  - CONSULTATION WITH THE PUBLIC / REVIEW AGENCIES
  - EVALUATION OF ALTERNATIVES / IMPACT MITIGATION
  - SELECTION OF A PREFERRED ALTERNATIVE
  - IDENTIFICATION OF ALTERNATIVE DESIGN CONCEPTS / IMPACT MITIGATION
  - DOCUMENTATION OF THE PROCESS
  - FINAL PUBLIC NOTIFICATION

INDIVIDUAL EA COMPONENTS

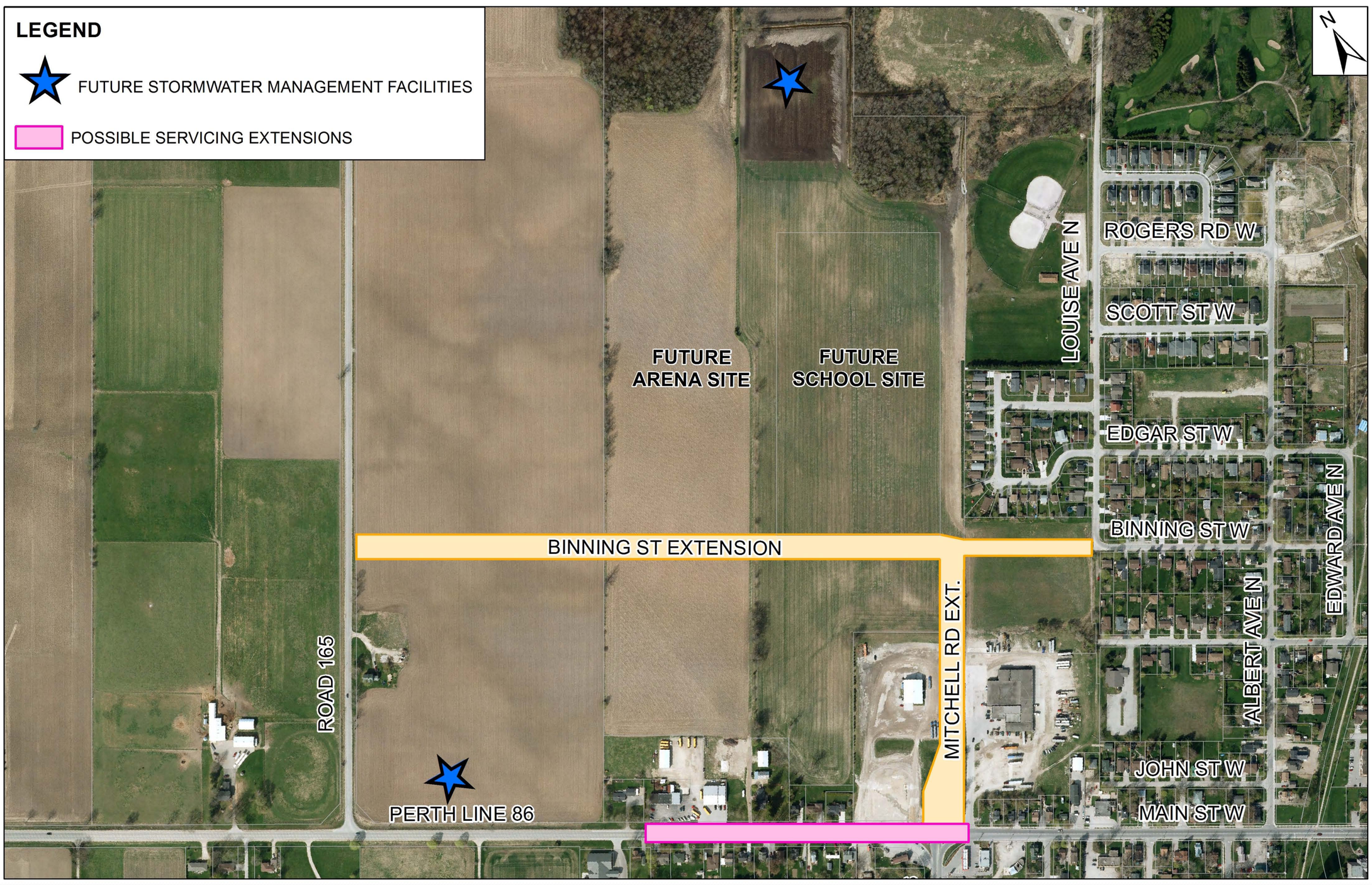
MEA CLASS EA

PROJECT COMPONENTS:

- PROPOSED ROAD EXTENSIONS
  - BINNING STREET WEST TO SIDEROAD 165
  - MITCHELL ROAD NORTH FROM HIGHWAY NO. 23 TO BINNING
- EXTENSION OF MUNICIPAL SEWAGE AND WATER WEST ON PERTH COUNTY ROAD 86 TO WEST LIMITS OF LISTOWEL
- IMPLEMENTATION OF STORMWATER MANAGEMENT IMPROVEMENTS WITHIN NORTHWEST DEVELOPMENT AREA

CLASS EA COMPLETION:

- PREPARATION OF ENVIRONMENTAL STUDY REPORT (ESR) AND PUBLICATION OF NOTICE OF STUDY COMPLETION
- THIRTY DAY MANDATORY PUBLIC REVIEW PERIOD WITH OPPORTUNITY FOR PART II ORDER REQUEST IF CONCERNS EXIST



INDIVIDUAL EA COMPONENTS

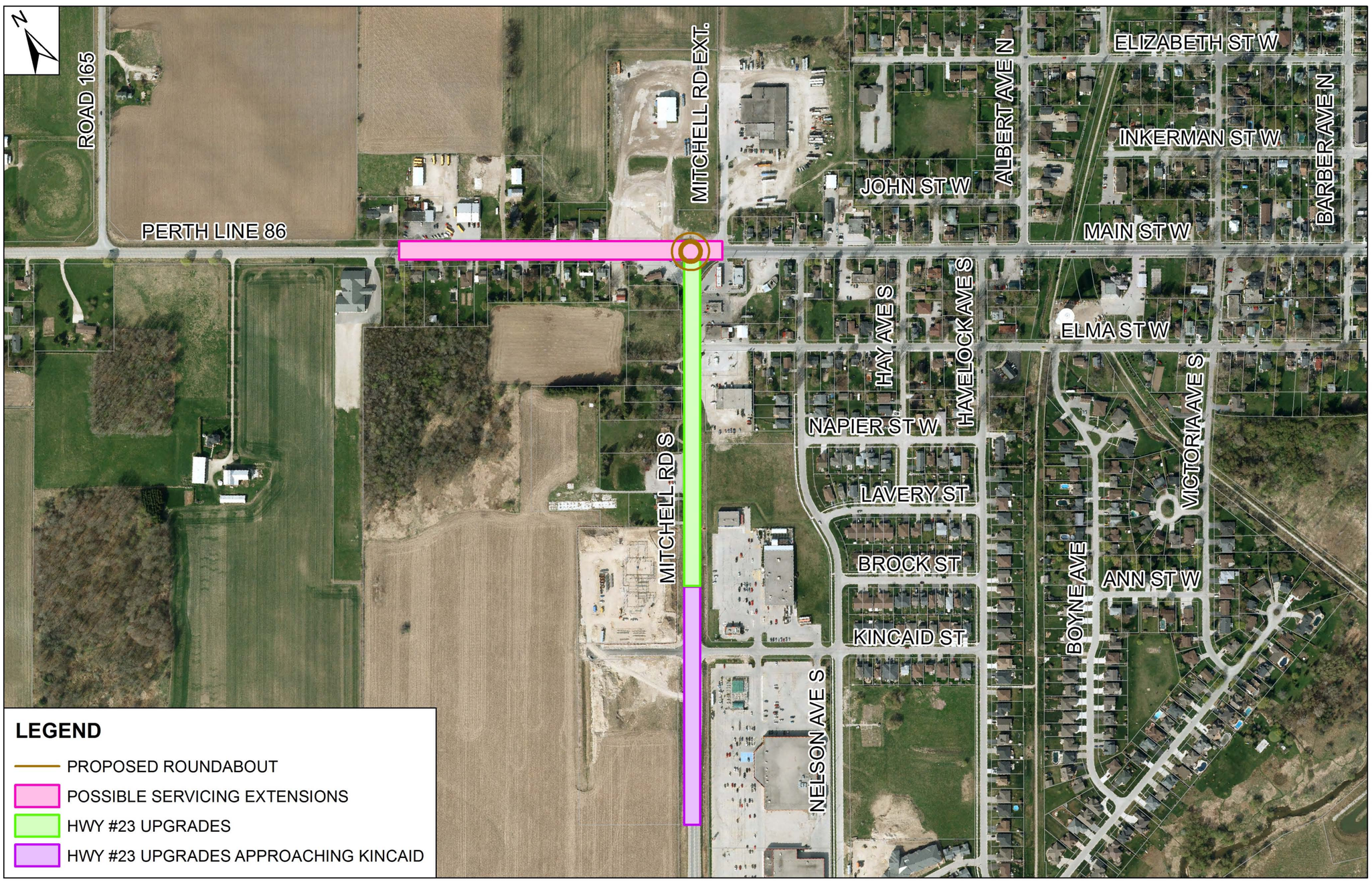
MTO CLASS EA

PROJECT COMPONENTS:

- INTERSECTION UPGRADES
  - ROUNDABOUT CONSTRUCTION
  - NEW ROAD ACCESS FOR MITCHELL ROAD NORTH EXTENSION
- CONSTRUCTION OF DEDICATED TURNING LANES ON HIGHWAY NO. 23 APPROACHING KINCAID STREET
- INSTALLATION OF SIDEWALKS AND OTHER STREETSCAPING IMPROVEMENTS ON HIGHWAY NO. 23

CLASS EA COMPLETION:

- PUBLICATION OF TRANSPORTATION ENVIRONMENTAL STUDY REPORT (TESR) AND PUBLICATION OF NOTICE STUDY COMPLETION
- THIRTY DAY MANDATORY PUBLIC REVIEW PERIOD WITH OPPORTUNITY FOR PART II ORDER REQUEST IF CONCERNS EXIST
- MTO APPROVAL



MTO CLASS EA FOR PROVINCIAL TRANSPORTATION FACILITIES

SUMMARY OF CLASS EA PROCESS:

- PLANNING AND DESIGN PROCESS FOR PROVINCIAL HIGHWAYS AND FREEWAYS, TRANSITWAYS AND FERRY BOATS
- GOAL IS TO PROVIDE A SAFE AND EFFECTIVE TRANSPORTATION SYSTEM WHILE AVOIDING OR MINIMIZING NEGATIVE ENVIRONMENTAL EFFECTS

STUDY STAGES:

- PLANNING
- PRELIMINARY DESIGN
- DETAIL DESIGN; AND
- CONSTRUCTION

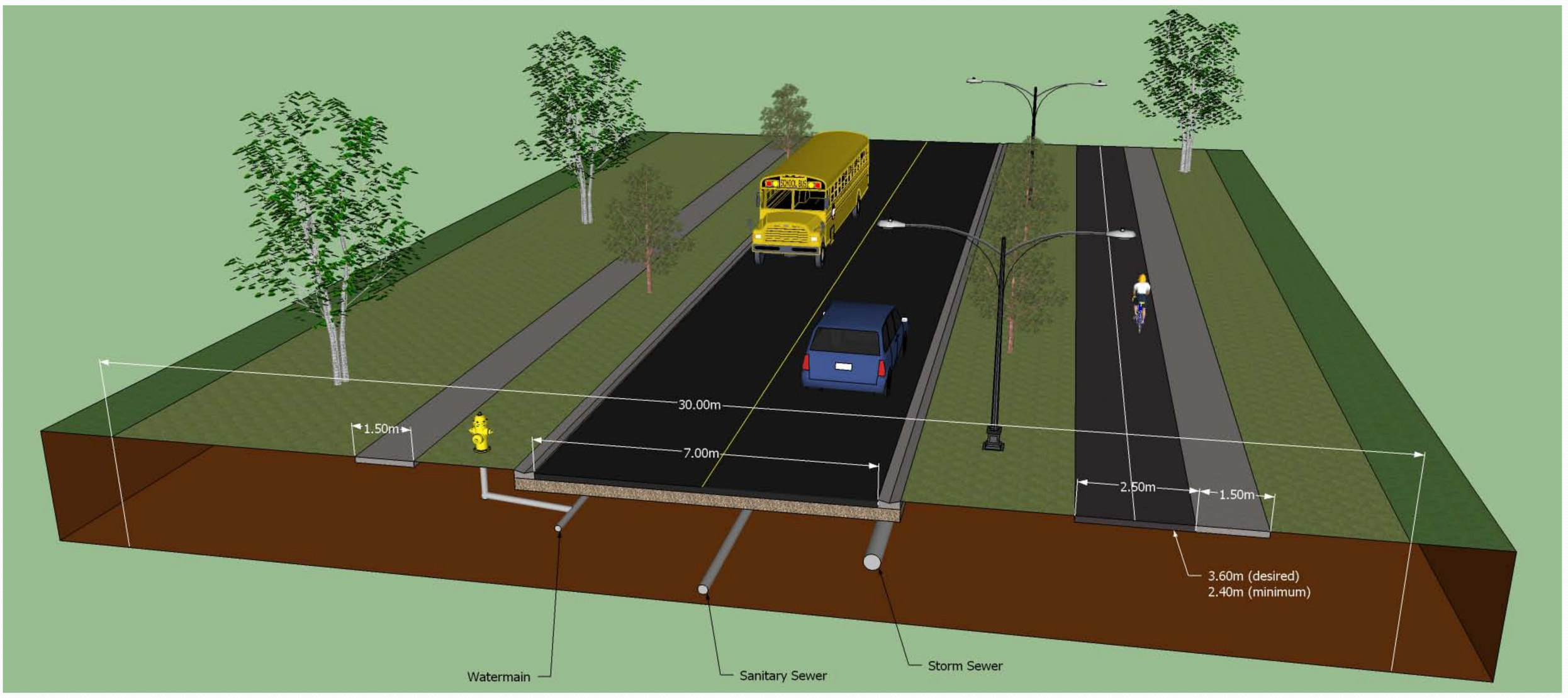
SCOPE OF THIS STUDY:

- HIGHWAY AND FREEWAY IMPROVEMENTS THAT PROVIDE A SIGNIFICANT MODIFICATION IN TRAFFIC ACCESS TO AND FROM EXISTING HIGHWAYS/ FREEWAYS, OR THAT INTRODUCE MUNICIPAL ROAD ACCESS TO LOCAL AREAS, SUCH AS:
  - MODIFICATION OF INTERCHANGES THAT INTRODUCE OR ELIMINATE MOVES TO OR FROM ANY DIRECTION;
  - OPENING OR CLOSING OF INTERSECTIONS WITH MUNICIPAL ROADS; INTRODUCING OR ELIMINATING MUNICIPAL ROAD ACCESS TO LOCAL AREAS.
- THIS TYPE OF ACTIVITY IS CLASSIFIED AS A GROUP ‘B’ ACTIVITY

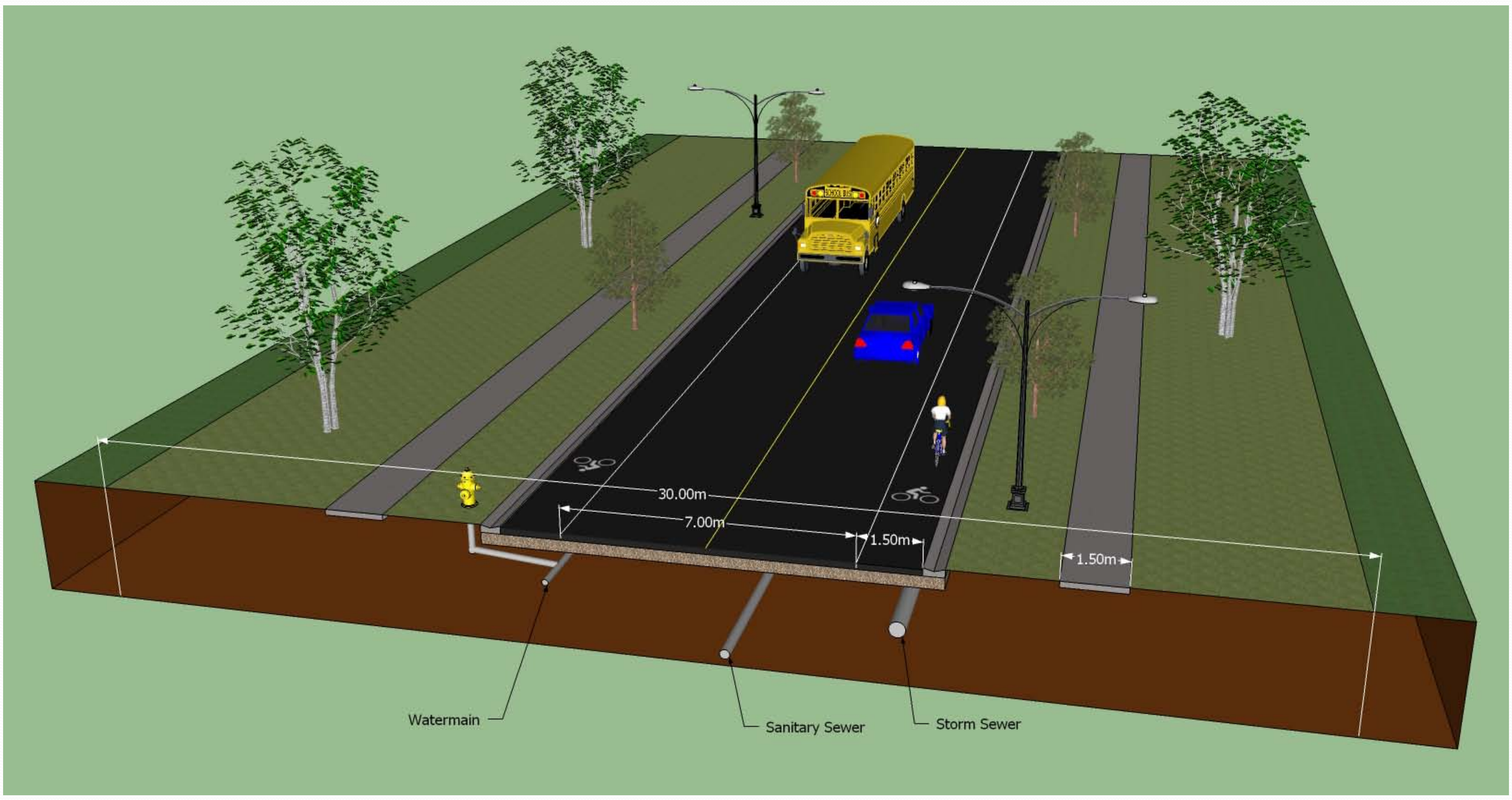
DESCRIPTION OF THE PROJECT

- CONSTRUCTION OF A ROUNDABOUT AT THE INTERSECTION OF HIGHWAY NO. 23 AND PERTH COUNTY ROAD 86
- INSTALLATION OF DEDICATED TURNING LANES ON HIGHWAY NO. 23 APPROACHING KINCAID STREET
- CONSTRUCTION OF A NEW MUNICIPAL ROAD ACCESS AT ROUNDABOUT WHICH WILL BE AN EXTENSION OF MITCHELL ROAD
- INSTALLATION OF SIDEWALKS AND OTHER STREETSCAPING IMPROVEMENTS ALONG HIGHWAY NO. 23 and County Road 86

BINNING STREET - CROSS-SECTIONS
DETAILED DESIGN OPTIONS



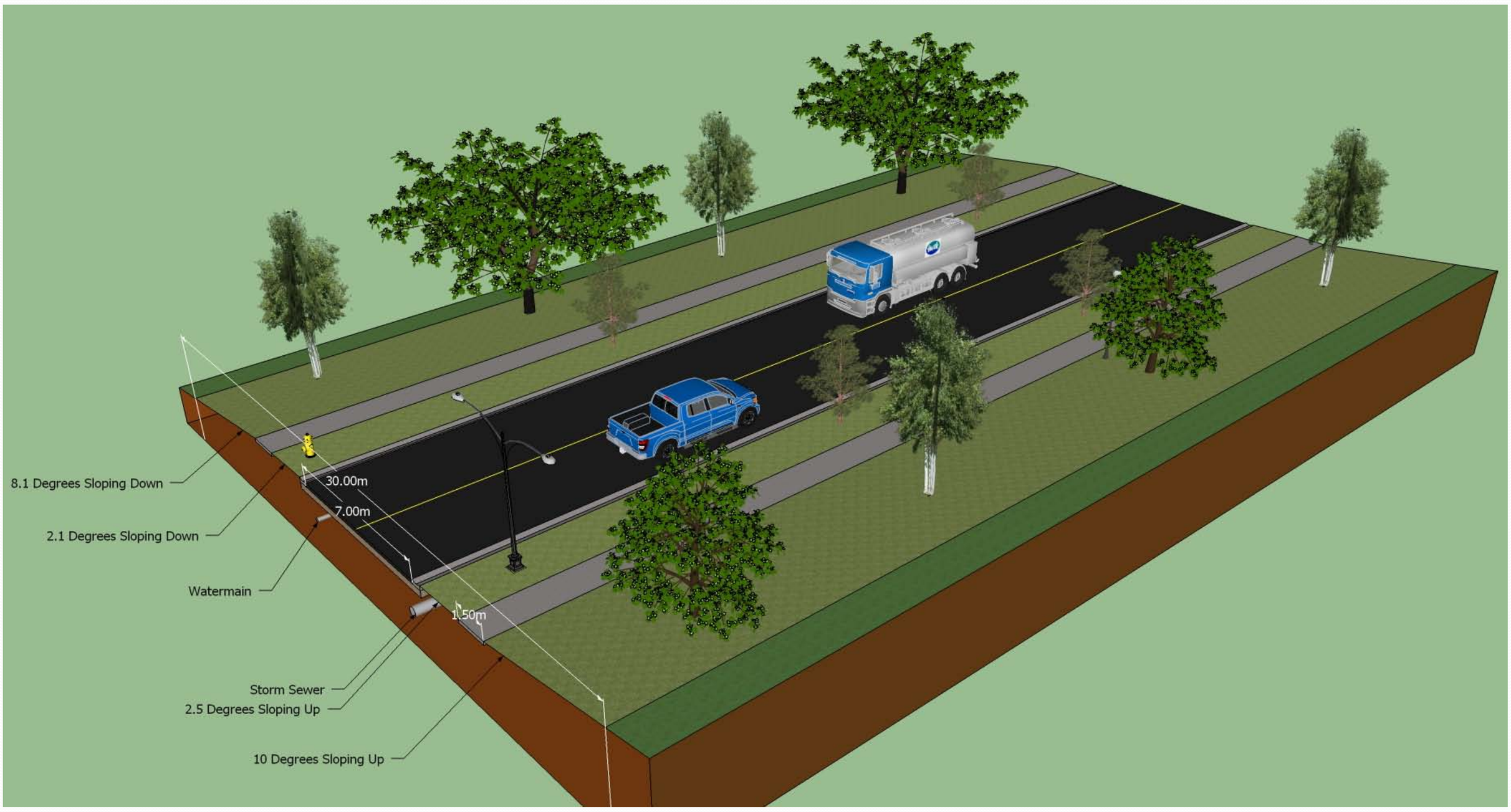
Preferred Design ▲



Alternative Design ▲

MITCHELL ROAD - CROSS-SECTIONS
DETAILED DESIGN OPTIONS

Preferred Design ▲



Alternative Design ▲

PROJECT TIMELINES

March 2012 – Project Initiation

November 2012 – Initial Public Meeting

Summer/Fall 2012 – On-site Investigations (Traffic study, Archaeological Assessment, Site Surveys, Preliminary Engineering)

Winter 2013 – Finalize Preliminary Design

Spring 2013 – 2nd Public Meeting

August 2013 – Finalize Class EA Processes

Fall 2013 – Construction of Binning Street Extension

2014 – Construction of Turning Lanes on Highway No. 23 approaching Kincaid Street

2015 – Construction of Roundabout, Mitchell Road Extension and Servicing Extensions

PUBLIC INPUT

- PUBLIC INPUT INTO THE PRELIMINARY PREFERRED DESIGN ALTERNATIVES IS BEING SOUGHT
- PLEASE TELL US WHAT CONCERNS YOU MAY HAVE WITH THE PROJECT AND WHAT YOU LIKE OR DON'T LIKE ABOUT THE PROPOSED ROUNDABOUT, ROAD EXTENSIONS OR OTHER PROPOSED IMPROVEMENTS
- COMMENT SHEETS ARE PROVIDED NEAR THE EXIT

NEXT STEPS

- INPUT RECEIVED FROM SECOND PUBLIC MEETING WILL BE REVIEWED IN ORDER TO FINALIZE THE SERVICING PLAN
- ADDITIONAL INPUT WILL BE SOUGHT FROM REVIEW AGENCIES AS WELL AS PROJECT STAKEHOLDERS
- THE MTO AND MEA CLASS EA PROCESSES WILL BE FINALIZED DURING THE SUMMER OF 2013 SO THAT CONSTRUCTION OF THE BINNING STREET EXTENSION CAN BEGIN IN ORDER TO PROVIDE ACCESS TO NEW SCHOOL SITE SCHEDULED FOR CONSTRUCTION IN NORTHWEST LISTOWEL
- A TRANSPORTATION ENVIRONMENTAL STUDY REPORT (TESR) AND ENVIRONMENTAL STUDY REPORT (ESR) WILL BE MADE AVAILABLE FOR PUBLIC REVIEW WHICH WILL DOCUMENT THE CLASS EA PROCESSES

PROJECT CONTACT INFORMATION

62 NORTH STREET
GODERICH, ON
N7A 2T4

KELLY VADER
ENVIRONMENTAL PLANNER
kvader@bmross.net
PHONE: 519-524-2641
TOLL FREE: 1-888-524-2641
FAX: 519-524-4403

330 Wallace Ave. N.,
Listowel, ON,
N4W 1L3

KRISS SNELL
CHIEF ADMINSTRATIVE OFFICER
ksnell@northperth.ca
TOLL FREE: 1-888-714-1993
PHONE: 519-291-2950
FAX: 519-291-5611

File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

_____

_____

_____

_____

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_____

_____

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_____

_____

_____

PLEASE HAND IN, MAIL, OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of North Perth will assist in decision making pertaining to the Environmental Assessment study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of North Perth will remain confidential unless prior consent is obtained.

File: 11240

MUNICIPALITY OF NORTH PERTH

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

We are pleased with the presentation of a roundabout as the best option. We have witnessed traffic flow out our front window for years and stop lights would be a bad decision esp. at peak times of the day - weekends in summer in particular.

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: ___

Address: ___

My concerns at this time is: where are the detours going to go. will Wallace South become a truck route ??

For sure, people from town going to Zehrs and CanTire will be using Elma West. This road is in terrible shape NOW and added town traffic will totally beat it to gravel.

Also any other detour use roads should be PRE fixed.

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____ Listowel

I'm very happy to see that you are going with a round-about. This will help this corner and traffic control greatly! Traffic Lights will just create a greater back-log of North-bound traffic than there is now.

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: St. N.

I would prefer lights. I am interested in sewers and water however I don't think this municipal government will spend money beyond highway #23. At present the street sweeper stops at the town limits! Elma Township still exists!

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N7A 2T4

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

would be interested in seeing water and sewers out west 86. with the option of choosing both or maybe one. ??

There is a lot of speeders come in to town and heading out. - don't seem to see the speed limit signs maybe they need to be ↓, therefore less potential for speeding ??

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

If you want Listowel & Territory to grow a single lane traffic circle is prohibitive & regressive to expansion Listowel is a designated truck route for all material going from Quebec & Ontario to U.S. Material made in Windsor or Sarnia going to Fort McMurray goes through Listowel.

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File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

Please Put Large. Visable Speed Limit signs and More Than Now

Sign For Truckers use of Jake Brake in Residential area

PLEASE HAND IN, MAIL, OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of North Perth will assist in decision making pertaining to the Environmental Assessment study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of North Perth will remain confidential unless prior consent is obtained.

File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

PLEASE CONSTRUCT THIS ROUND ABOUT SOONER RATHER THAN LATER.

MORE COULD BE USED AS TRAFFIC CALMING MEASURES RATHER THAN 4 WAY STOPS

PLEASE HAND IN, MAIL, OR FAX TO:

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PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: ____

Address: ____

- Oppose Roundabout - heavily

- believe traffic lights →

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N7A 2T4

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MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

I am not in favor of the roundabout I think we should duplicate the South side turn lanes and stop signs on just 4 way stop

PLEASE HAND IN, MAIL, OR FAX TO:

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Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
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File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

- Use intersection a few times a week.

- like single lane round about

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Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

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File: 11240

MUNICIPALITY OF NORTH PERTH

DETAILED DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNIE STREET WEST

PUBLIC INFORMATION CENTRE

June 4th, 2013

COMMENTS

Name: _____

Address: _____

1) I wish to be notified of any meetings & decisions made in regard to Elizabeth Street West. I understand there is future consideration of a sidewalk.

2) I personally vote for Stop lights at the intersection of 86 & 23. I personally will take all other back streets & sideroads to avoid driving through the roundabout. I feel other residents will also do this increasing problems on side streets

PLEASE HAND IN, MAIL, OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
Email: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of North Perth will assist in decision making pertaining to the Environmental Assessment study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of North Perth will remain confidential unless prior consent is obtained.

July 3, 2013 Fax: 519-291-2072 + Email: ksnell@northperth.ca

North Perth Municipal Office
330 Wallace Avenue North
Listowell, Ontario
N4W 1L3

Attention: Kriss Snell, CAO

Dear Mr. Snell,

Re: Proposed Project at Intersection of Highway No. 23 (Mitchell Road S.) and Perth Line 86 (Main Street), Town of Listowel

Our company
which we have developed, operate and manage a commercial /retail development and, as such, we have an interest in the above-captioned project.

It is our submission that the proposed construction of a roundabout at the intersection of Highway No. 23 and Perth line 86 to address ongoing traffic issues will have a material adverse effect on the existing and as yet undeveloped commercial/ retail businesses in the immediate vicinity and accordingly we strongly object to the proposed project.

The intersection should be served by the construction and installation of stop lights and related signalization. This would better preserve the viability of commercial /retail establishments in the immediate vicinity of the intersection that are and will continue to be very dependent on the flow of pedestrian and vehicular traffic. A roundabout encourages flow through as opposed to retail traffic and is better suited to a residential area.

While we appreciate the Municipality's concern to address ongoing traffic issues associated with the intersection, we urge the Municipality to reconsider and revise its plan to ensure that it will safeguard and enhance the economic stability of existing and future commercial/retail businesses in the immediate vicinity of the said intersection.

We look forward to receiving your feedback in connection with the foregoing at your earliest convenience.

Thank you,

July 10, 2013

BM ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Attention: Kelly Vader, Environmental Planner

Re: File 11240
Municipality of North Perth
Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road & Binning Street West

Kelly:

Further to our meeting on May 30th, 2013 and the subsequent Public Information Centre held on June 4th, 2013, we provide the following general comments with respect to the Detailed Design & Class EA for HWY 23 and County Road 86 Improvements and Class EA for the Extension of Mitchell Road & Binning Street West.

The corner of Highway 23 and Perth Line 86 has long been a busy intersection, and traffic issues continue to build as development in this area continues. The traffic control currently at this intersection – one stop sign – is inadequate.

We generally support the Council's preferred option to install a roundabout to improve traffic flow at this intersection, provided that our concerns about design details and access to our property are addressed in the final design.

1. The roundabout must be designed to accommodate the relatively high level of large truck traffic seen at this corner.
2. We request that the length of the curve of Mitchell road along the east side of our property be reviewed so that hopefully less property will be required and result in maximum flexibility of the remaining land.
3. We require confirmation that our west access driveway will be retained.
4. We are evaluating our preferred locations for driveway access to the Mitchell Road Extension with a view to optimize daily operations and truck flow within our yard.

By addressing these points, we will have a greater level of confidence that our operational needs will be met, while retaining flexibility for possible future development of the lower yard.

If a roundabout is not possible, we could accept a four way signalized intersection, provided it would be constructed at the same time as the extension of Mitchell Road.

We would have issues with a four way intersection with only stop signs for traffic control – even if just a temporary measure. We believe that simple stop signs would not serve the community well – or our business. If this were the case, we would need to re-evaluate our position on the Mitchell Road Extension.

Regarding the Mitchell Road extension, we support the Council's preferred design of 3 lanes, as a center turning lane could make it easier for heavy trucks and smaller vehicles to co-exist during peak traffic periods for the School and Rec Center.

We agree with the preferred design to include a bike path next to the Binning Street extension, and the strategy to hopefully divert bicycle traffic away from the Mitchell Road extension. Should it ever become necessary to address bicycle traffic on the Mitchell Road extension, a separate bike path would be preferred.

As noted, the above are general comments only. We await confirmation whether the MTO will endorse the roundabout option before providing more detailed comments about these and other concerns.

Yours truly,

MUNICIPALITY OF NORTH PERTH
(COMMUNITY OF LISTOWEL)

NOTICE OF COMPLETION FOR HIGHWAY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS

PROJECT OVERVIEW

The Municipality of North Perth has completed a Class Environmental Assessment of the Highway 23 corridor in southwest Listowel, including the intersection of Highway 23 and Perth Road 86. The Class EA was completed in accordance with the Class Environmental Assessment process for Provincial Transportation Facilities (MTO 2000). An MEA Class EA process was recently completed in the same general area for planned municipal road and servicing extensions, some of which will be completed in conjunction with the current planned works.

The study recommendations associated with the current project included road improvements to Highway 23 including the installation of sidewalks and improved entrances, construction of a roundabout at the intersection of Highway 23 and Perth Road 86, construction of stormwater drainage improvements within the project study area, and the extension of municipal water and sanitary servicing to properties within the study area.

PROCESS

A Transportation Environmental Study Report (TESR) has been completed for this project and will be available on **February 18, 2015,** for a 30-day public review period. The report summarizes the environmental assessment process for this project and is available for review at the following locations:

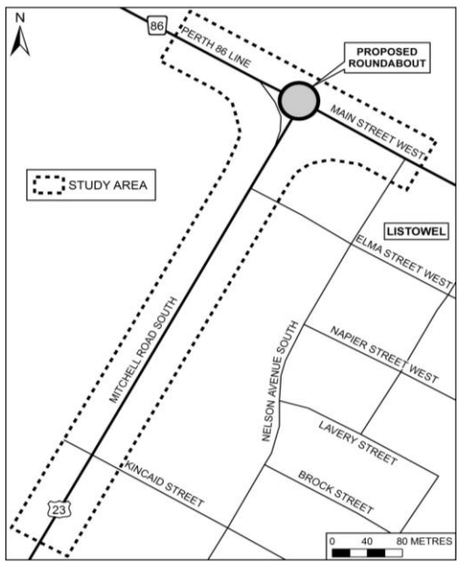
Municipality of North Perth
Municipal Office
330 Wallace Ave., N.
Listowel, ON N4W 1L3
www.northperth.ca

Listowel Public Library
260 Main Street West
Listowel, ON
N4W 1A3

Interested persons are encouraged to provide comments by **March 20, 2015**. If, after consulting with MTO, you still have unresolved concerns, you have the right to request the Minister of the Environment (Ferguson Block, 11th Floor, 77 Wellesley St. W. Toronto ON M7A 2T5) make a Part II Order for this project. A Part II Order may lead to preparation of an individual environmental assessment. For more information on the Part II Order request process, you are encouraged to contact the Ministry of the Environment.

The Minister of the Environment must receive your Part II Order request by **March 20, 2015**. A copy of the request should also be forwarded to the MTO and the consultant at the addresses below.

If there are no outstanding Part II Order requests after **March 20, 2015**, the project will be considered to have met the requirements of the Class environmental assessment.



COMMENTS

To obtain additional information or provide comments, please contact:

Darren Alexander, P. Eng.
Consultant Project Manager
B. M. Ross & Associates Ltd.
62 North Street, *Goderich, ON*
N7A 2T4
Phone: 1-519-524-2641
Toll-free: 1-888-524-2641
Fax: 1-519-524-4403
E-mail: dalexander@bmross.net

Kelly Vader,
Environmental Planner
B.M. Ross & Associates Ltd.
62 North Street, Goderich, ON
N7A 2T4
Phone: 1-519- 524-2641
Toll-free: 1-888-524-2641
Fax: 1-519-524-4403
E-mail: kvader@bmross.net

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will be part of the public record.

APPENDIX F

AGENCY CONSULTATION

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 11240

March 15, 2012

Christel Hollinger
Perth County Emergency Management Coordinator
1 Huron Street
Stratford, ON
N5A 5S4

RE: Detailed Design and Class EA for Highway 23 and Perth Line 86 Road Improvements and Class EA for the Extension of Mitchell Road and Binning Street West, Municipality of North Perth (Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Provincial Highway 23 (Mitchell Road South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection (see key plan). At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades.

- Perform traffic study to identify traffic signal warrants and turning lane requirements.
- Road improvements to Highway 23 and Perth Line 86 including road resurfacing, widening and construction of dedicated turning lanes.
- Extension of municipal sanitary sewers and watermains to project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Road, north from the intersection of Highway 23 and Perth Line 86.
- Extension of Binning Street West to Road 165 to service future development lands along the west boundary of Listowel.

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'B' activities under the Municipal Class Environmental Assessment (Class EA). The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project. This project has the potential to be "stepped down" to a Group 'C' project subject to screening for significant environmental issues. Following the PIC, the proponent will decide if it is appropriate for the project to be "stepped down". A notice will be issued providing a 30-day public review period in conjunction with a decision to "step down" the project.

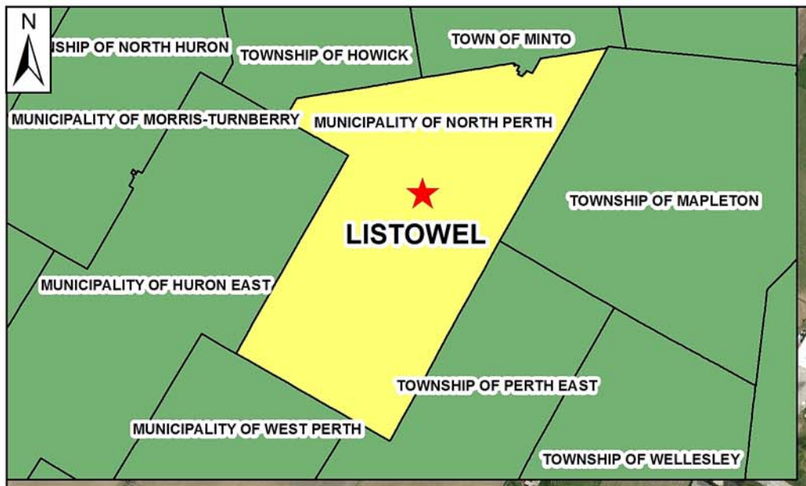
Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by April 17, 2012. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:hv
Encl.
c.c. Kriss Snell, Municipality of North Perth



ROAD 165

PERTH LINE 86

MITCHELL RD S

EDGAR ST W

ALBERT AVE

BINNING ST W

EDWARD AVE N

CAMPBELL ST W

ELIZABETH ST W

BARBER AVE N

JOHN ST W

BROCK ST

KINCAID ST

MCDONALD ST W

LEGEND

PROPOSED ROAD UPGRADES

PROPOSED ROAD EXTENSIONS

0 125 250 500 Metres

BMROSS engineering better communities

MUNICIPALITY OF NORTH PERTH

CLASS EA FOR PROPOSED ROAD EXTENSIONS AND UPGRADES (TOWN OF LISTOWEL)

GENERAL LOCATION PLAN

DATE	PROJECT No.
MAR. 15, 2012	11240
SCALE	FIGURE No.
1:6,000	1.0

MUNICIPALITY OF NORTH PERTH
CLASS EA FOR MITCHELL AVE EXTENSION
AGENCY CIRCULATION LIST

REVIEW AGENCY	INVOLVEMENT
Ministry of the Environment **- EA Co-ordinator**	**Mandatory Contact**
Ministry of Culture (Toronto)	**Potential Impact on Heritage Features**
Ministry of Natural Resources (Guelph)	**Potential Impact on Natural Features**
Ministry of Transportation **Att: Susan Wagter, London Office**	**General Information**
County of Perth **- Administration Department** **- Planning & Development Department** **- Public Works Department**	**General Information**
Maitland Valley Conservation Authority	**Potential Impact on Natural Features**
Municipality of North Perth	**Copy of Correspondence – Proponent**
North Perth Fire Service **620 Wallace Ave S., Listowel, ON N4W 1Y4**	**General Information**
OPP – Listowel Detachment **330 Wallace Ave N. Listowel, ON N4W 1L3**	**General Information**
Perth County Emergency Management **Coordinator, Att. Christel Hollinger** 1 Huron Street, Stratford, Ontario N5A 5S4	**General Information**
Avon Maitland District School Board **Janet Baird Jackson, Superintendent of Business** **62 Chalk Street, Seaforth, Ontario, N0K 1W0**	**General Information**
Huron – Perth Catholic District School Board **Mill Street, Dublin, Ontario, N0K 1E0**	**General Information**

Huron-Perth Catholic District School Board

Mail PO Box 70 Dublin ON N0K 1E0 *Website* www.huronperthcatholic.ca
Phone 519 345 2440 *Fax* 519 345 2449

March 27, 2012

B.M. Ross & Associates Limited
Engineers & Planners
Attn: Kelly Vader
62 North Street
Goderich ON N7A 2T4

Dear Ms. Vader,

RE: DETAILED DESIGN AND CLASS EA FOR HWY 23 & PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS EA FOR EXTENSION OF MITCHELL RD. AND BINNING ST. W., MUNICIPALITY. OF NORTH PERTH

In response to your correspondence of March 16, 2012, please be advised that we have no concerns in regards to the planned road improvements outlined.

Sincerely,

Anne Marie Nicholson
Manager of Assessment & Plant

/dd

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 11240

April 10, 2012

'First Nation Contact'

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Ave. and Binning Street West Municipality of North Perth (Town of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Ave., north from the intersection of Provincial Highway 23 (Mitchell Ave. South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection (see key plan). At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades as follows:

- Perform traffic study to identify traffic signal warrants and turning lane requirements.
- Road improvements to Highway 23 and Perth Line 86 including road resurfacing, widening and construction of dedicated turning lanes.
- Extension of municipal sanitary sewers and watermains to project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Ave., north from the intersection of Highway 23 and Perth Line 86.
- Extension of Binning Street West to Road 165 to service future development lands along the west boundary of Listowel.

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA). The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project. This project has the potential to be "stepped down" to a Group 'C' project subject to screening for significant environmental issues. Following the PIC, the proponent will decide if it is appropriate for the project to be "stepped down". A notice will be issued providing a 30-day public review period in conjunction with a decision to "step down" the project.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by May 17, 2012. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:hv
Encl.
c.c. Kriss Snell, Municipality of North Perth

Response Form

Project Name: _Class EA for Hwy. 23 and Perth Line 86 Improvements - Listowel_

Project Description: _Proposed extension of Mitchelle Ave. And Binning Street in west part of Listowel. Road improvements to Perth Line 86 and Hwy. 23 in vicinity of intersection_

Project Location: __Municipality of North Perth, Town of Listowel_

(Key Plan of Project Location attached)

Please Detach and Return in Envelope Provided

Name of Aboriginal Community: _____

Contact Information: _____

Please check appropriate box

☐ **Please send additional information on this project**

☐ **We have no concerns with this project and do not wish to be consulted further**

INITIAL CONSULTATION PHASE

AGENCY CIRCULATION LIST:
ABORIGINAL INTERESTS

Environmental Unit
Environment and Natural Resources
Lands and Trusts Services
Aboriginal Affairs and Northern Development Canada
25 St. Clair Avenue East, 8th Floor
Toronto, ON M4T 1M2

Mr. Don Boswell, Senior Claims Analyst
Specific Claims Branch
Ontario Research Team
Aboriginal Affairs and Northern Development Canada
10 Wellington Street, Room 1310
Gatineau QU K1A 0H4

Ms. Allison Berman, Program Officer
Consultation and Accommodation Unit
Aboriginal Affairs and Northern Development Canada
300 Sparks Street, Room 205
Ottawa ON K1A 04A

Pam Wheaton, Director
Aboriginal and Ministry Relationships Branch
Ministry of Aboriginal Affairs
160 Bloor St. East, 4th Floor
Toronto, Ontario
M7A 2E6

First Nation Consultation List

Chief Randall Kahgee
Chippewas of Saugeen First Nation
Hwy. 21, R.R. # 1, Southampton
ON N0H 2L0

Chief Scott Lee
Chippewas of Nawash Unceded First Nation
R.R. #5 Wiarton, ON N0H 2T0

Great Lakes Métis Council (formerly Grey-Owen Sound Métis Council)
Malcolm Dixon, President
380 9th Street East
Owen Sound, Ontario
N4K 1P1
PH: 519-370-0435
maldixon@hotmail.com

Saugeen Ojibway Nation (SON) – Chippewas of Saugeen & Chippewas of Nawash
Environment Office Coordinator: Jake Linklater tel 519.534.5507 fax 519.534.5525
email jakelinklater@saugeenojibwaynation.ca

Métis Nation of Ontario
500 Old St. Patrick Street, Unit D
Ottawa ON K1N 9G4

Historic Saugeen Métis
204 High Street, Box 1492
Southampton ON N0H 2L0

Ministry of Aboriginal Affairs

160 Bloor St. East, 9th Floor
Toronto, ON M7A 2E6
Tel: (416) 326-4740
Fax: (416) 325-1066
www.aboriginalaffairs.gov.on.ca

Ministère des Affaires Autochtones

160, rue Bloor Est, 9e étage
Toronto ON M7A 2E6
Tél. : (416) 326-4740
Téléc. : (416) 325-1066
www.aboriginalaffairs.gov.on.ca

Ontario

Reference: 203
06/05/12

Kelly Vader, RPP, MCIP
Environmental Planner
B.M. Ross and Associates Limited
Engineers and Planners
62 North Street, Goderich, ON, N7A 2T4

Re: Detailed Design and Class EA for HWY 23 and Perth Line 86 Road Improvements and Class EA for the Extension of Mitchell Ave. and Binning Street West Municipality of Perth (Town of Listowel)

Dear Ms. Vader:

Thank you for informing the Ministry of Aboriginal Affairs (MAA) of your project. Please note that MAA treats all letters, emails, general notices, etc. about a project as a request for information about which Aboriginal communities may have rights or interests in the project area.

As a member of the government review team, the Ministry of Aboriginal Affairs (MAA) identifies First Nation and Métis communities who may have the following interests in the area of your project:

- reserves;
- land claims or claims in litigation against Ontario;
- existing or asserted Aboriginal or treaty rights, such as harvesting rights; or
- an interest in your project's potential environmental impacts.

MAA is not the approval or regulatory authority for your project, and receives very limited information about projects in the early stages of their development. In circumstances where a Crown-approved project may negatively impact a claimed Aboriginal or treaty right, the Crown may have a duty to consult the Aboriginal community advancing the claim. The Crown often delegates procedural aspects of its duty to consult to proponents. Please note that the information in this letter should not be relied on as advice about whether the Crown owes a duty to consult in respect of your project, or what consultation may be appropriate. Should you have any questions about your consultation obligations, please contact the appropriate ministry.

You should be aware that many First Nations either have or assert rights to hunt and fish in their traditional territories. For First Nations, these territories typically include lands and waters outside of their reserves.

In some instances, project work may impact aboriginal archaeological resources. If any Aboriginal archaeological resources could be impacted by your project, you should contact your regulating or approving Ministry to inquire about whether any additional Aboriginal communities should be contacted. Aboriginal communities with an interest in archaeological resources may include communities who are not presently located in the vicinity of the proposed project.

With respect to your project, and based on the brief materials you have provided, we can advise that the project appears to be located in an area where First Nations may have existing or asserted rights or claims in Ontario's land claims process or litigation, that could be impacted by your project. Contact information is below:

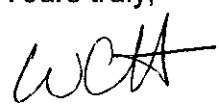
Six Nations of the Grand River Territory P.O. Box 5000 Ohsweken, Ontario N0A 1M0	Chief William K. Montour (519) 445-2201 (Fax) 445-4208 wkm@sixnations.ca arleenmaracle@sixnations.ca
Haudenosaunee Confederacy Chiefs Council 2634 6th Line Road RR 2 Ohsweken, ON N0A 1M0	Hohahes Leroy Hill Secretary to Haudenosaunee Confederacy Chiefs Council Cell 519 717 7326 jocko@sixnationsns.com

Through Aboriginal Affairs and Northern Development (AANDC), the Government of Canada sometimes receives claims that Ontario does not receive, or with which Ontario does not become involved. AANDC's Consultation and Accommodation Unit (CAU) established a "single window" to respond to requests for baseline information held by AANDC on established or potential Aboriginal Treaty and rights. To request information from the Ontario Subject Matter Expert send an email to: UCA-CAU@aadnc-aandc.gc.ca

Additional details about your project or changes to it that suggest impacts beyond what you have provided to date may necessitate further consideration of which Aboriginal communities may be affected by or interested in your undertaking. If you think that further consideration may be required, please bring your inquiry to whatever government body oversees the regulatory process for your project. MAA does not wish to be kept informed of the progress of the project; please be sure to remove MAA from the mailing list.

The information upon which the above comments are based is subject to change. First Nation or Métis communities can make claims at any time, and other developments can occur that could result in additional communities being affected by or interested in your undertaking.

Yours truly,



Wendy Cornet
Manager, Consultation Unit
Aboriginal Relations and Ministry Partnerships Division

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 11240

June 12, 2012

Chief William K. Montour
Six Nations of the Grand River Territory
P.O. Box 5000
Ohsweken, ON N0A 1M0

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Ave. and Binning Street West Municipality of North Perth (Town of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Ave., north from the intersection of Provincial Highway 23 (Mitchell Ave. South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection (see key plan). At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades as follows:

- Perform traffic study to identify traffic signal warrants and turning lane requirements.
- Road improvements to Highway 23 and Perth Line 86 including road resurfacing, widening and construction of dedicated turning lanes.
- Extension of municipal sanitary sewers and watermains to project study area.
- Construction of stormwater drainage improvements within the project study area.
- Extension of Mitchell Ave., north from the intersection of Highway 23 and Perth Line 86.
- Extension of Binning Street West to Road 165 to service future development lands along the west boundary of Listowel.

Municipal Class Environmental Assessment (MEA 2007)

The planning for this project is following the environmental screening process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA). The purpose of the Class EA screening process is to identify any potential environmental impacts associated with the proposed works and to plan for appropriate mitigation of any identified impacts. This process includes consultation with the public, stakeholders and government review agencies.

Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000)

The project will also be carried out in accordance with the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000), as a Group 'B' project. This project has the potential to be "stepped down" to a Group 'C' project subject to screening for significant environmental issues. Following the PIC, the proponent will decide if it is appropriate for the project to be "stepped down". A notice will be issued providing a 30-day public review period in conjunction with a decision to "step down" the project.

Your community has been identified as possibly having an interest in this project. For your convenience, a response form is enclosed along with a self-addressed stamped envelope. Please return by August 10, 2012. If you have any questions on this matter or require further information, please contact the undersigned at 519-524-2641 ext. 229 or by e-mail at kvader@bmross.net.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:hv
Encl.
c.c. Kriss Snell, Municipality of North Perth

INITIAL CONSULTATION PHASE

ABORIGINAL CIRCULATION LIST:

ADDITIONAL COMMUNITIES

Chief William K. Montour
Six Nations of the Grand River Territory
P.O. Box 5000
Ohsweken, Ontario
N0A 1M0

Hohahes Leroy Hill
Secretary to Haudenosaunee Confederacy
Haudenosaunee Confederacy
Chiefs Council
2634 6th Line Road
RR2 Ohsweken, Ontario
N0A 1M0

Kelly Vader

From: Kelly Vader [kvader@bmross.net]
Sent: November-01-12 11:00 AM
To: Allan Rothwell (arothwell@perthcounty.ca)
Subject: Listowel Road Extension EA Open House
Attachments: Public Meeting Notice.pdf

Hi Allan:

I just wanted to make sure that you knew about the public meeting coming up on November 15th for the road extension Environmental Assessment. I am working on the display boards for the meeting and wondered if you could advise if North Perth has adopted any streetscaping guidelines or policies associated with accessibility that we should be aware of.

In particular I am interested in the width and location of sidewalks proposed along the Mitchell Road and Binning Street extensions. As well as any improvements that should be incorporated along Main Street and Mitchell Road South.

Any input you could provide would be appreciated.

Kelly Vader, MCIP, RPP

B. M. Ross and Associates Limited
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www.bmross.net

File No. 11240

November 2, 2012

'Agency'

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road and Binning Street West Municipality of North Perth (Community of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Provincial Highway 23 (Mitchell Road South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades (see key plan).

The project is following the planning process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (MEA 2007) and Group 'B' projects under the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000). The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders and government review agencies.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. A Public Information Centre (PIC) has been planned to provide further information to the public and review agencies on the results of study investigations and to receive input and feedback from interested persons. The meeting is scheduled for **Thursday November 15, 2012 from 2-4 p.m. and from 5-7 p.m.** at the North Perth Municipal Office, 330 Wallace Avenue North, Listowel. If you are unable to attend the meeting and are interested in viewing the presentation material, a copy of the display information can be provided.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by December 21, 2012. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:hv
Encl.
c.c. Kriss Snell, Municipality of North Perth

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Consulting Engineers
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www.bmross.net

File No. 11240

November 2, 2012

Susan Wagter
Ministry of Transportation
659 Exeter Road
London, ON N6E 1L3

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road and Binning Street West Municipality of North Perth (Community of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Provincial Highway 23 (Mitchell Road South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades (see key plan).

The project is following the planning process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (MEA 2007) and Group 'B' projects under the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000). The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders and government review agencies.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. A Public Information Centre (PIC) has been planned to provide further information to the public and review agencies on the results of study investigations and to receive input and feedback from interested persons. The meeting is scheduled for **Thursday November 15, 2012 from 2-4 p.m. and from 5-7 p.m.** at the North Perth Municipal Office, 330 Wallace Avenue North, Listowel. If you are unable to attend the meeting and are interested in viewing the presentation material, a copy of the display information can be provided.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by December 21, 2012. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:hv
Encl.
c.c. Kriss Snell, Municipality of North Perth

Z:\11240-North_Perth-Mitchell_Ave_Extension\WP\Class EA\11240-12Nov02-MTO Let.doc

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www.bmross.net

File No. 11240

November 7, 2012

'First Nations'

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road and Binning Street West
Municipality of North Perth (Community of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Provincial Highway 23 (Mitchell Road South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. At this time, a preliminary design plan has been developed which identifies the works associated with the planned upgrades (see key plan).

The project is following the planning process set out for Schedule 'C' activities under the Municipal Class Environmental Assessment (MEA 2007) and Group 'B' projects under the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000). The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders and government review agencies.

Your community has been identified as possibly having an interest in the project and we are soliciting your input. A Public Information Centre (PIC) has been planned to provide further information to the public and review agencies on the results of study investigations and to receive input and feedback from interested persons. The meeting is scheduled for **Thursday November 15th from 2-4 p.m. and from 5-7 p.m.** at the North Perth Municipal Office, 330 Wallace Avenue North, Listowel. If you are unable to attend the meeting and are interested in viewing the presentation material, a copy of the display information can be provided.

Please forward your comments to our office by December 21, 2012. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:
Encl.

c.c. Kriss Snell, Municipality of North Perth

Ministry of Tourism, Culture and Sport

Culture Programs Unit
Programs and Services Branch
Culture Division
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
ArchaeologyReports@ontario.ca

Ministère du Tourisme, de la Culture et du Sport

Unité des programmes culturels
Direction des programmes et des services
Division de culture
401, rue Bay, bureau 1700
Toronto ON M7A 0A7
ArchaeologyReports@ontario.ca

November 13, 2012

Scott Martin
Golder Associates
110 Hanover Drive, Building A, Suite 203
St. Catharines, Ontario L2W 1A4

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled*, "Stage 1 and 2 Archaeological Assessment, Mitchell Road South Improvements and Binning Streets West Extension, Listowel Municipality of North Perth, Perth County, Ontario",* Dated *July 5, 2012,* Received by MTCS Toronto Office on *July 9, 2012*, MTCS Project Information Form Number *P218-224-2012*, MTCS RIMS Number *31RD009*

Dear Dr. Martin

The above-mentioned report, which has been submitted to this Ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18 has been entered into the Ontario Public Register of Archaeological Reports without technical review.*

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to ArchaeologyReports@Ontario.ca.

cc. *Kelly Vader, B.M. Ross and Associates Ltd.*

**** In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.***

Maitland Valley
Conservation Authority

Providing leadership to protect and enhance our water, forests and soils!

December 21, 2012

BM Ross and Associates Ltd,
62 North Street
Goderich, ON
N7A 2T4

Attention: **Kelly Vader, Environmental Planner**

RE: **Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class EA for the Extension of Mitchell Rd and Binning St W.**
Municipality of North Perth, Listowel

Dear Ms. / Mrs. Vader;

Please be advised that the Maitland Valley Conservation Authority (MVCA) has carried out a preliminary review of the proposed road works as noted above.

The proposed road improvements and extension are not located in any MVCA regulated areas. Additionally, the proposed works are not located within or adjacent (within 120 metres) to any significant natural heritage features.

None-the-less, we may wish to comment on future outlet drainage for the new road. Therefore, please submit SWM and Drainage details to the Authority once they have been drafted.

Thank you for the opportunity to comment at this time. Feel free to contact this office should you have any questions.

Regards,
Brandi Walter
Brandi Walter
Environmental Planner/Regulations Technician

MAITLAND VALLEY CONSERVATION AUTHORITY
1093 Marietta Street, Box 127, Wroxeter, ON N0G 2X0
519 335-3557 Fax: 519 335-3516 Email: maitland@mvca.on.ca

Ministry of Transportation

Engineering Office
Corridor Management Section
West Region

659 Exeter Road
London, Ontario N6E 1L3
Telephone: (519) 873-4598
Facsimile: (519) 873-4228

Ministère des Transports

Bureau du génie
Section de gestion des couloirs routiers
Région de l'Ouest

659, chemin Exeter
London (Ontario) N6E 1L3
Téléphone: (519) 873-4598
Télécopieur: (519) 873-4228

April 2, 2013

By email: dalexander@bmross.net

Darren L. Alexander, P. Eng.
B. M. Ross and Associates Limited
62 North Street
Goderich, ON
N7A 2T4

RE: Applicant: Municipality of North Perth
Submission No.: Draft Transportation Study Listowel
Municipality of North Perth, County of Perth – Highway 23

The Ministry of Transportation (MTO) has completed its review of the above noted Draft Transportation Study. The study has been considered and reviewed in accordance with the requirements of our highway access policies and criteria, and the permit requirements of the *Public Transportation and Highway Improvement Act* (PTHIA). The following outlines our comments, requirements and conditions.

1. We recommend a 1% growth rate for the purpose of this Transportation Study.

2. An analysis for each major phase of development and the 5, 10 year horizons beyond full build-out of the site are required as per MTO Guidelines for the Preparation of Traffic Impact Studies. (Attached)

3. The proposed commercial development at the southwest corner of Hwy 23 and Perth Road 86 shows trips assigned through the Elma Street intersection. The operational analysis in this study does not include Elma Street.

4. We request that the consultant provide a separate figure showing trip distribution for the proposed northwest development.

5. The report does not address the LT storage requirement for the intersection of Hwy 23 and Perth Rd. 86. These requirements should be calculated using the Geometric Design Standards for Ontario Highways (GDSOH) or Ontario Traffic Manual (OTM) Book 12 (March 2012 Edition) methodology.

6. The report recommends a separate right-turn lane for westbound traffic at Kincaid Street and Mitchell Road intersection. We do not allow multi-lane approach to stop control at an intersection.

…/2

7. We request that the consultant provide the electronic Synchro and Arcady files for our review.

Should you have any questions, please contact our office.

Chris Dixon
Corridor Management Planner
Corridor Management Section
MTO - West Region, London

c. Sylvie Lauzon, Corridor Management Officer – Ministry of Transportation

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www.bmross.net

File No. 11240

May 21, 2013

Susan Wagter
Ministry of Transportation
659 Exeter Road
London, ON N6E 1L3

RE: Detailed Design and Class Environmental Assessment for Highway 23 and Perth Line 86 Road Improvements and Class Environmental Assessment for the Extension of Mitchell Road and Binning Street West Municipality of North Perth (Community of Listowel)

The Municipality of North Perth is considering a project to extend Mitchell Road north from the intersection of Provincial Highway 23 (Mitchell Road South) and Perth Line 86 (Main Street) and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection. A preliminary preferred design plan has now been selected (refer to key plan) which identifies the planned upgrades as outlined below.

Primary Components:

- Construction of a roundabout at the intersection of Highway No. 23 and Perth Line 86 to address ongoing traffic issues associated with this intersection.
- Construction of turning lanes on Highway No. 23 adjacent to Kincaid Street to improve access to newly developed properties located at the westerly extent of Kincaid.
- Additional details regarding the extension of municipal sanitary sewers and watermains to the west limit of the project study area along Perth Line 86.
- Conceptual design of stormwater drainage improvements within the project study area.
- Design details associated with the extension of Mitchell Road, north from the intersection of Hwy. # 23 and C.R. # 86, and the extension of Binning Street West to Road 165.

The project is following the planning process set out for Schedule ‘C’ activities under the Municipal Class Environmental Assessment (MEA 2007) and Group ‘B’ projects under the Class Environmental Assessment for Provincial Transportation Facilities (MTO 2000). The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders and government review agencies.

A Public Information Centre (PIC) has been planned to provide further information to the public and review agencies on the results of study investigations and to receive input and feedback from interested persons. The meeting is scheduled for **Tuesday June 4th from 2-4 p.m. and from 5-7 p.m.** at the North Perth Municipal Office, 330 Wallace Avenue North, Listowel. If you are unable to attend the meeting and are interested in viewing the presentation material, a copy of the display information can be provided.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by July 26, 2013. If you have any questions or require further information, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Kelly Vader, RPP, MCIP
Environmental Planner

KV:es
Encl.

c.c. Kriss Snell, North Perth

Huron-Perth Catholic District School Board

Mail PO Box 70 Dublin ON N0K 1E0 *Website* www.huronperthcatholic.ca
Phone 519 345 2440 *Fax* 519 345 2449

June 12, 2013

One page.
FAXED June 12/13
519-524-4403

B.M. Ross & Associates Limited
Engineers & Planners
Attn: Kelly Vader
62 North Street
Goderich ON N7A 2T4

Dear Ms. Vader,

RE: DETAILED DESIGN & CLASS ENVIRONMENTAL ASSESSMENT FOR HWY 23 AND PERTH LINE 86 ROAD IMPROVEMENTS AND CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXTENSION OF MITCHELL ROAD & BINNING ST. W. MUNICIPALITY OF NORTH PERTH

In response to your correspondence of May 21, 2013, please be advised that we have no concerns in regards to the above-mentioned project.

Sincerely,

Anne Marie Nicholson
Manager of Assessment & Plant

/dd

Maitland Valley
Conservation Authority

Providing leadership to protect and enhance our water, forests and soils!

MEMORANDUM

TO: **Kelly Vader, RPP, MCIP, Environmental Planner, BMRoss**
CC: **Kriss Snell, Municipality of North Perth**
FROM: **Brandi Walter, Environmental Planner/Regulations Technician, MVCA**
DATE: **July 4, 2013**
SUBJECT: **Class Environmental Assessment for Highway 23 & Perth Line 86 Road Improvements & Class Environmental Assessment for the Extension of Mitchell Rd and Binning St. W.**
Municipality of North Perth, Listowel

It is the Maitland Valley Conservation Authority's (MVCA) understanding that the Municipality of North Perth is considering a project to extend Mitchell Rd. north from the intersection of Provincial Hwy 23 and Perth Line 86 and to undertake additional upgrades to adjacent roadways in the vicinity of the intersection.

Based on our review of MVCA's resource mapping and the Municipality of North Perth's Natural Environment Policies, MVCA has no concern for this project.

However, we recommend that during construction and until all exposed soils have been stabilized that sediment and erosion control measures be used and maintained to prevent sediment from moving off-site.

MAITLAND VALLEY CONSERVATION AUTHORITY
1093 Marietta Street, Box 127, Wroxeter, ON N0G 2X0
519 335-3557 Fax: 519 335-3516 Email: maitland@mvca.on.ca

Kelly Vader

From: Brandi Walter [bwalter@mvca.on.ca]
Sent: July-04-13 1:07 PM
To: 'Kelly Vader'
Cc: 'Steve Jackson'; 'Erin Gouthro'; "Allan Rothwell' (arothwell@perthcounty.ca)'
Subject: RE: Listowel Rd Improvements and Extension Class EA

Hi Kelly,

1) To be clear, the Class EA is for the road improvements only, correct? A Class EA is not required for the proposed developments.

2) Also, please advise as to location for the SWM outlet for the proposed ponds. If they will outlet to a watercourse directly and not the existing system, then MVCA must review and be satisfied with the plans as per MVCA's planning agreement with North Perth. If so, the outlet and grading adjacent to the watercourse for the north pond will require a MVCA permit. I appears that a portion of the SWM pond is located on an existing watercourse. Are you proposing to close in a portion of the watercourse? Please contact Erin Gouthro regarding watercourse alteration.

3) I assumed that the stormwater from the road improvements/extension are outletting to the existing SWM system. Please verify.

4) Please confirm that existing natural vegetation within the adjacent woodlands will not be disturbed as part of this development.

5) Have you considered incorporating a more naturalized/wetland stormwater treatment system for the north pond. Given it's location adjacent to the significant woodlands, there is an excellent opportunity to improve and expand on the natural features and local ecosystem. Considering the pond is located within the adjacent lands to the woodlands, I would expect and recommend that it be considered as a viable option. It would be great to think out of the box on this one and the site could be used as an outdoor education area for the local school.

Looking forward to your response.

Kind Regards,

Brandi Walter
Environmental Planner/ Regulations Technician
Maitland Valley Conservation Authority
519-335-3557 ext. 237 Fax519-335-3516
bwalter@mvca.on.ca

From: Kelly Vader [mailto:kvader@bmross.net]
Sent: Thursday, July 04, 2013 11:42 AM
To: 'Brandi Walter'
Cc: (egouthro@mvca.on.ca)
Subject: RE: Listowel Rd Improvements and Extension Class EA

Brandi:

Thank you for the comments related to the Class EA process. We have recently finalized a preliminary stormwater management plan for the lands affected by the above-noted Class EA process. The attached figure illustrates the location of two communal stormwater management facilities to be constructed i) north of the Binning Street extension, and ii) south of the Binning Street extension. Can you please advise whether these structures will require approval through your office?

The north pond will be constructed during the fall of 2013 to control storm water runoff associated with the proposed school site and future arena facility. The south pond will not be constructed for a number of years and would be designed to address stormwater flows associated with future residential development south of the Binning Street extension.

Thanks.

Kelly Vader, MCIP, RPP

B. M. Ross and Associates Limited
62 North Street
Goderich, ON N7A 2T4
Phone: (519) 524-2641, Ext. 229
Fax: (519) 524-4403
kvader@bmross.net
www.bmross.net

From: Brandi Walter [mailto:bwalter@mvca.on.ca]
Sent: July-04-13 11:33 AM
To: 'Kelly Vader'
Subject: Listowel Rd Improvements and Extension Class EA

Hi Kelly,

Please find attached, MVCA's comments for the Class EA for road improvements in Listowel.

Regards,

Brandi Walter

Environmental Planner/ Regulations Technician

Maitland Valley Conservation Authority

519-335-3557 ext. 237 Fax519-335-3516

bwalter@mvca.on.ca

Ministry of Tourism, Culture and Sport
Culture Services Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel. 416 212-4019
Fax: 416 314-7175

Ministère du Tourisme, de la Culture et du Sport
Unité des services culturels
Direction des programmes et des services
401, rue Bay, Bureau 1700
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Téléc. : 416 314-7175

Ontario

December 16, 2013 (EMAIL ONLY)

Kelly Vader, RPP, MCIP
BM Ross and Associates Ltd
62 North Street, Goderich
ON N7A 2T4

Project: **Detailed Design and Class EA for Highway 23 and Perth Line 86 Road Improvements and Extension of Mitchell Road and Binning Street West, Municipality of North Perth (Community of Listowel)**
MTCS File: **31EA015**

Dear Kelly Vader:

Thank you for circulating the Ministry of Tourism, Culture and Sport (MTCS) with the information regarding the Class EAs for Highway 23 and Perth Line 86 Road Improvements and Extension of Mitchell Road and Binning Street West.

The Ministry of Tourism, Culture and Sport has an interest in conserving, protecting and preserving Ontario's cultural heritage including:

- Archaeological resources;
- Built heritage resources; and
- Cultural heritage landscapes.

Under the EA process, a determination of the project's potential impact on these cultural heritage resources is required. Please advise MTCS whether archaeological and/or heritage impact assessments will be completed for your EA project, and forward them to MTCS and also, incorporate your determinations and/or reports in your Class EA documentation.

Archaeological Resources

As you are aware, screening your EA project with the MTCS's *Criteria for Evaluating Archaeological Potential* determines whether it may impact archaeological resources. Please find the screening criteria at: http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/GetFileAttach/021-0478E~2/$File/TXT_0478E.htm.

Information regarding archaeological sites may be obtained through contacting the following email address:*archaeologysites@ontario.ca*. If your EA project area exhibits archaeological potential, an archaeological assessment (AA) by an *OHA* licensed archaeologist is

recommended and the archaeological assessment report is required to be forwarded to MTCS for review.

Built Heritage and Cultural Heritage Landscapes

The MTCS *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* checklist attached determines whether your EA project may impact these cultural heritage resources: the clerk/s for the municipality/ies encompassing your EA project can provide information on property registered or designated under the *Ontario Heritage Act*.

If your EA project may impact known or potential cultural heritage resources, MTCS recommends that a Heritage Impact Assessment (HIA) be prepared by a qualified consultant. The MTCS *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send completed HIAs to MTCS and the local municipality for review, and make it available to local heritage organizations with an interest.

Environmental Assessment Reporting

HIA and AA reports and their recommendations are part of the EA project. The Environmental Study Report should document and summarize any determinations that no cultural heritage resources are impacted and no technical studies are warranted as part of the EA process, if none are warranted. MTCS is in no way liable if the information in the completed checklists is found to be inaccurate or incomplete.

Thank you again for the opportunity to provide input on the Class EAs for Highway 23 and Perth Line 86 Road Improvements and Extension of Mitchell Road and Binning Street West t. MTCS remains interested in remaining on the circulation list and continuing to be informed as the EA proceeds. Please contact me at MTCS if you have any questions or would like some clarification of these comments.

Sincerely,

Penny Young
Penny.Young@ontario.ca
Heritage Planner
Culture Services Unit
t. 416-212-4019

cc: Kriss Snell, Municipality of North Perth